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The Graduate School  
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**AN INVESTIGATION OF THE ADOPTION OF ENVIRONMENTAL CERTIFICATION  
IN TWO SEGMENTS OF THE NORTH AMERICAN WOOD PRODUCTS INDUSTRY**

A Dissertation in  
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by  
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## **ABSTRACT**

This dissertation contains research that examined the determinants of wood industry executives' decisions and intentions to adopt environmental certification. Specifically, the research investigated the influence of executives' characteristics, perceptions of environmental certification, and perceptions of hostility in the business environment on their decisions and intentions to adopt environmental certification. An upper echelons approach was used in this research to explore the strategic choice of adopting environmental certification.

Executives from member firms of two wood products industry trade associations were surveyed for this research: the Kitchen Cabinet Manufacturers Association (KCMA) and the Wood Component Manufacturers Association (WCMA). KCMA executives were surveyed for the purpose of exploring their decisions and intentions to adopt second-party environmental certification. WCMA executives were surveyed for the purpose of exploring their decisions and intentions to adopt third-party, chain-of-custody environmental certification. In addition to these executives, managers from KCMA member firms were surveyed to evaluate issues tied to the implementation of environmental certification within firms in the kitchen cabinet industry that had adopted certification.

Results from the research indicate that executives' functional orientations, perceptions of the benefits and challenges of certification, and perceptions of hostility in the business environment influence their decisions and intentions to adopt environmental certification. Implications are drawn about the meaning of these relationships as well as potential issues of the supply and demand of certified wood-based materials relative to the adoption of environmental

certification. Suggestions are given for future research relative to the adoption environmental certification and environmental initiatives in the wood products industry.

The following sentences provide an overview of the chapters of this dissertation. Chapter 1 provides an introduction and background of this research. A literature review of organizations and the natural environment, the nature of the decision to adopt environmental certification, the determinants of the decision to adopt environmental certification, and relevant wood industry characteristics is presented in chapter 2. Chapter 3 is a research article in which results from an examination of the implementation of second-party environmental certification within the kitchen cabinet industry are presented. Chapter 4 is a research article in which results from an investigation of kitchen cabinet industry executives' decisions to adopt second-party environmental certification are presented. Chapter 5 is a research article in which results from an examination of wood component industry executives' intentions to adopt third-party, chain-of-custody environmental certification are presented. An overview of conclusions from the entire dissertation and suggestions for future research are presented in chapter 6. Finally, the dissertation concludes with several appendices containing surveys used in the research and supplementary analyses of research data.

\*\*\* Note: Chapters 3, 4, and 5 were written as stand-alone articles prepared for submission to journals, and therefore contain redundancies with chapters 1 and 2.

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## **Research Objectives**

1. Use the upper echelons perspective of organizations to examine the decision to adopt, or not adopt, environmental certification among executives in two segments of the North American wood products industry.
2. Develop a measure of perceived benefits of environmental certification based on previously developed perceptual based measures of opportunities of environmental initiatives.
3. Empirically test the relationship between executives' perceptions of benefits of environmental certification and their decisions to adopt, or not adopt, environmental certification.
4. Empirically test the relationship between executives' perceptions of hostility in the business environment of the firm and their decisions to adopt, or not adopt, environmental certification.
5. Empirically test the relationships between executives' tolerance for ambiguity, openness to change, and functional orientation and their decisions to adopt, or not adopt, environmental certification.
6. Empirically test the relationships between executives' tolerance for ambiguity, openness to change, and functional orientation and their perceptions of benefits of environmental certification.
7. Empirically test the mediating effect of executive's perceptions of benefits of environmental certification on the relationships between managers' tolerance for ambiguity, openness to change, and functional orientation and their decisions to adopt, or not adopt, environmental certification.
8. Investigate supply and demand issues of environmentally certified materials, relative to the adoption of environmental certification, within the North American kitchen cabinet industry.

## CHAPTER 1: INTRODUCTION AND BACKGROUND

### Introduction

Executives of some firms choose to pursue environmental initiatives, while executives of other firms do not. Some researchers have suggested that executives who proactively pursue environmental initiatives see more opportunities, as opposed to threats, of environmental initiatives than executives who are more reactive in their pursuit of environmental initiatives (Sharma, 1997; Sharma and Nguan, 1999; Sharma et al., 1999). Researchers have also noted the importance of executives' attributes in influencing firm level actions toward the natural environment (Ashford, 1993; Deileman and de Hoo, 1993; Drumwright, 1994; Fineman and Clarke, 1996; Jennings and Zandbergen, 1995; Kemp, 1993; Marcus, 1995; Menon and Menon, 1997; Schmidheiny, 1992; Swanson, 1995; Wood, 1991). Another research approach suggests executives' perceptions of hostility versus munificence in the business environment of the firm influence the adoption of environmental initiatives (Arágon-Correa and Sharma, 2003).

This investigation examines factors that influence the decision to adopt environmental certification in the context of two segments of the North American wood products industry (i.e., the kitchen cabinet industry and the wood component industry). The primary goal of this research is to understand how executives' characteristics (i.e., tolerance for ambiguity, openness to change, and functional orientation), perceptions of environmental certification, and perceptions of the business environment influence their decision to adopt environmental certification. I argue that executives' perceptions of benefits of environmental certification and perceptions of hostility in the business environment influence their decision to adopt environmental certification. I also argue that executives' tolerance for ambiguity, openness to change, and functional orientation influence their decision to adopt environmental certification.

Finally, I argue that the relationship between these executive characteristics (i.e., tolerance for ambiguity, openness to change, and functional orientation) and executives' decisions to adopt environmental certification is mediated by managers' perceptions of the benefits of environmental certification. These arguments are drawn from past research which has established a theoretical and empirical foundation for the links between: (1) perceived opportunities and proactive environmental strategies (Sharma, 1997; Sharma and Nguan, 1999; Sharma et al., 1999), (2) an executive's perception of hostility in the business environment and their strategic decision effectiveness and firm entrepreneurial action (Elbana and Child, 2007; Covin, et al., 1999; Goll and Rasheed, 1997; Miller, 1983), and (3) executive characteristics and strategic orientation, choice, and action (Barker and Mueller, 2002; Chaganti and Sambharya, 1987; Strandholm et al., 2004; Thomas et al., 1991; Tyler and Steensma, 1998).

This investigation spans three research domains: management and organization science, business and the natural environment, and wood products business management. The field of wood products serves as the context of the investigation, while theoretical arguments are drawn from the research domains of management and organization science and business and the natural environment. Also, practical implications will be drawn regarding environmentally certified material usage in the North American wood products industry. A desired outcome of this research is to contribute to the management and organization, business and the natural environment, and wood products business management research domains by providing publishable works for journals in those fields.

### **Problem Statement**

Executives often see the opportunities of environmental initiatives differently. Even those executives who see a similar degree of opportunity differ in their decision to adopt

environmental initiatives. The upper echelons perspective of organizations asserts that executives' values and cognitive biases influence their perceptions and interpretations of issues and ultimately their strategic choices (Hambrick and Mason, 1984). These cognitive biases and values are influenced by executives' psychological and personality characteristics as well as their career experiences (Hambrick and Mason, 1984). Many researchers have used the upper echelons framework to explore the links between managers' characteristics and strategic orientation, issue interpretation, and strategic choice (for a review see Finkelstein et al., In press). In the context of organizations and their relationships with the natural environment, several researchers have noted the importance of executives' attributes in influencing actions oriented toward the natural environment (Ashford, 1993; Deileman and de Hoo, 1993; Drumwright, 1994; Fineman and Clarke, 1996; Jennings and Zandbergen, 1995; Kemp, 1993; Marcus, 1995; Menon and Menon, 1997; Schmidheiny, 1992; Swanson, 1995; Wood, 1991).

The labels which firms' decision-makers attach to strategic issues influence the meanings attached to those issues and subsequent strategic choices (Dutton and Jackson, 1987). Dutton and Jackson (1987) suggest that "opportunities" and "threats" are two salient categories in which organizational decision-makers consider strategic issues. Several authors have examined ways in which executives interpret issues in the business environment as either opportunities or threats (Andersson and Bateman, 2000; Dutton and Jackson, 1987; Jackson and Dutton, 1988; Sharma, 1997; Sharma and Nguan, 1999; Sharma et al., 1999; Thomas and McDaniel, 1990). This opportunity versus threat interpretation of issues in the natural environment has also been shown to be a relevant tool for explaining environmental responsiveness strategies of firms (Penner, 1994; Sharma, 1997; Sharma and Nguan, 1999; Sharma et al., 1999). Such research has only been suggestive as to how executives' perceptions of opportunities of environmental initiatives



relate to characteristics of executives. Research questions remain about how executives' perceptions of opportunities of environmental initiatives influence the links between executives' characteristics and their decisions to pursue environmental initiatives.

Of those executives who do perceive similar opportunities related to environmental initiatives, what influences their decision to adopt, or not adopt, environmental initiatives? In a theoretical assessment of the role of contingency factors in the relationship between organizational resources and capabilities and their influence on competitive advantage, Aragón-Correa and Sharma (2003) offer the following proposition: "Perceived munificence in the general business environment increases the likelihood that a firm will use its capabilities and resources to develop a proactive environmental strategy (p. 82)." The broader management and organization literature offers mixed perspectives of how executives' perceptions of hostility and munificence in the business environment might impact executives' decisions to adopt environmental initiatives (Elbanna and Child, 2007; Goll and Rasheed, 1997; Miller and Friesen, 1982, 1983). It remains inconclusive if and how executives' perceptions of hostility in the business environment will impact their decisions to adopt environmental initiatives.

### **Justification**

Empirical evidence has supported the business case for proactive corporate environmental practices by establishing a positive link between environmental performance and financial performance (Hart and Ahuja, 1996; Klassen and McLaughlin, 1996). Ultimately, companies pursue environmental initiatives for various reasons: to satisfy regulatory requirements, reduce costs, improve operational effectiveness, take advantage of market opportunities, improve relationships with key stakeholders, improve image or provide legitimacy, and to improve their overall competitiveness.

Many authors have emphasized the importance of the participation of executives in firms' successful environmental initiatives (Buzzelli, 1991; Lawrence and Morell, 1995; Masurel, 2007; Post and Altman, 1994; Winn, 1995). In a review of published theoretical models that describe the adaptation of organizations to issues in the natural environment, Post and Altman (1994) develop a three phase corporate greening model where executives are shown to be prominent in the successful execution of each phase of the model. Moreover, executives make decisions that directly impact the strategic orientation of the firm (Child, 1972). How executives interpret, and make sense of, their business environment influences organizational outcomes (Daft and Weick, 1984; Hambrick and Mason, 1984; Weick, 1979).

Due to their intimate relationship with the natural resource base and their continued scrutiny by the public, firms in the North American wood products industry provide a useful setting in which to explore the adoption of voluntary environmental initiatives. The competitive environment of firms in the secondary wood products industry, and firms that supply this industry, continues to intensify (Hoff et al., 1997). Firms must make strategic and tactical choices to rise up to the competitive demands of the now global marketplace (Hoff et al., 1997). The North American wood products industry has continued to experience increases in competition from producers in lower cost areas such as China and Southeast Asia. Wood products producers in these areas have lower labor costs (Buehlmann and Schuler, 2002; Hilsenrath and Wonacott, 2002; Schuler et al., 2001), and in some cases favorable trade balances (Hoff et al., 1997).

In the case of the U.S. wooden household furniture market, international producers have, in the last decade, forced approximately a 1/3 decline in U.S. producers' market share (Buehlmann and Schuler, 2002). According to Schuler et al. (2001), imported furniture now

constitutes over half of U.S. furniture sales. This pressure by global competitors has forced many U.S. manufacturing facilities to close their doors, placing a considerable burden on the rural economies where these facilities were located (Nwagbara et al., 2002).

Kitchen cabinet producers in North America are keenly aware of what has happened to U.S. wooden furniture manufacturers. This awareness has prompted cabinet manufacturers to make strategic and tactical changes within their firms, such as implementing lean principles in manufacturing and targeting niche markets. Recently, U.S. kitchen cabinet producers have been offered another option to help position their firms relative to their international competitors. The main trade association within the kitchen cabinet industry, the Kitchen Cabinet Manufacturers Association (KCMA), developed a voluntary environmental certification program in 2006. The adoption of environmental certification by North American kitchen cabinet producers could allow them to carve out a unique market niche by offering environmentally labeled products, which Asian producers might have trouble duplicating because of difficulties in acquiring similar certification. By adopting environmental certification and gaining a visible environmental seal or label on products, North American kitchen cabinet producers might be able move from defensive postures to more entrepreneurial actions.

Environmental certification, however, is new to the North American kitchen cabinet industry. There are questions why some firms would adopt such certification and others would not. I argue that the differences in executives' characteristics and perceptions play a role in differences between firms that adopt environmental certification and those that do not. Knowing more about the nature of executive characteristics and perceptions relative to environmental certification could help the wood products research community learn more about the adoption of environmental initiatives in wood products firms, as well as benefit the broader research domain

of business and the natural environment by providing knowledge about what factors contribute to perceptions surrounding environmental initiatives in organizations. Pragmatically, executives in the wood products industry could learn more about how they approach environmental initiatives, and trade associations might find reason to adjust their rationale behind their marketing of voluntary environmental initiatives.

This research aims to increase our understanding of why executives see the opportunities of voluntary environmental initiatives differently, and why executives who see a similar degree of opportunity differ in their decision to adopt environmental certification. Three key contributions are expected as a result of conducting this research: (1) a better understanding of how executives' characteristics and perceptions play a role in the decision to adopt environmental certification, (2) a more comprehensive examination of the upper echelons perspective in the context of business and the natural environment than has been done by researchers in that research domain, and (3) pragmatic results that provide executives with a new lens to view their pursuit of environmental initiatives, and trade associations with knowledge on how to adjust their marketing of environmental initiative programs.

### **Overview of Research**

This research investigates the adoption of environmental certification within the North American hardwood products industry. Specifically, two segments of the hardwood industry are examined: kitchen cabinets and wood components. These two industry segments are links in the hardwood products supply chain, with the wood component industry supplying the kitchen cabinet industry. By examining these two links in the supply chain, a fuller understanding of the impact of the adoption of environmental certification within the North American hardwood products industry can be gained.

Two types of environmental certification are examined in this research: second party and third-party, chain-of-custody. The second party certification examined is Environmental Stewardship Program (ESP) certification offered by the KCMA. This certification was examined relative to the kitchen cabinet industry segment. The third-party, chain-of-custody certification examined is that of the Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI), and Canadian Standards Association (CSA) certification schemes. This type of certification was examined relative to the wood component industry segment.

To investigate issues tied to the adoption of the two types of certification, three different sample groups were used. For the second party certification (i.e. ESP certification) that was examined, two sample groups were used: executives from the kitchen cabinet industry and managers in the kitchen cabinet industry who were responsible for implementing certification requirements within firms that had already adopted certification. For the third party, chain-of-custody certification (i.e. certification tied to the FSC, SFI, and CSA schemes), one sample group was used: executives from the wood component industry.

The two sample groups (i.e. executives and implementation managers) were used to examine second party certification for different reasons. The group of executives belonging to member firms of the KCMA was used for testing hypotheses tied to the theoretical perspectives described in Chapter 2 of this dissertation. The group of ESP certification implementation managers was used to assess the challenges of adopting second party certification (for those firms that had already adopted certification) and to gain understanding of potential supply and demand issues tied to environmentally certified wood-based materials. These two issues that are tied to the implementation managers are part of the agenda of this dissertation, although they are not tied to the theoretical arguments presented in Chapter 2 of this dissertation.

Relative to third party, chain-of-custody certification, only one sample group was used. The group of executives belonging to member firms of the WCMA was used for testing hypotheses tied to the theoretical perspectives described in Chapter 2 of this dissertation. Unlike the investigation of second party certification, there was no implementation manager sample group relative to the investigation of third party, chain-of-custody certification.

Particulars of the research methods used for each sample group can be found in the results chapters of this dissertation, Chapters 3, 4, and 5. Chapter 3 contains research tied to ESP certification implementation managers. Chapter 4 contains research tied to executives belonging to member firms of the KCMA. Chapter 5 contains research tied to executives belonging to member firms of the WCMA.

### **Research Questions**

The following research questions guided this investigation:

1. Does the proposed research model, based on the upper echelons and contingency perspectives of organizations, sufficiently explain the decision to adopt, or not adopt, environmental certification?
2. Do top managers' perceptions of benefits of environmental certification have a positive relationship with their decision to adopt environmental certification?
3. Do top managers' perceptions of challenges of environmental certification have a negative relationship with their decision to adopt environmental certification?
4. Do top managers' perceptions of hostility in the business environment of the firm have a negative or positive relationship with their decision to adopt environmental certification?

5. Does top managers' tolerance for ambiguity have a positive relationship with (a) top managers' decision to adopt environmental certification as well as (b) their perceptions of benefits of environmental certification?
6. Will top managers with throughput functional orientations be less likely to adopt environmental certification than top managers with output functional orientations?
7. Do top managers with throughput functional orientations perceive less benefits of environmental certification than top managers with output functional orientations?
8. Do top manager's perceptions of benefits of environmental certification mediate the relationship between top managers' characteristics and their decision to adopt environmental certification?
9. Is the construct of perceived benefits of environmental certification valid and reliable?
10. Relative to ESP certification, are there supply and demand issues with environmentally certified materials? If so, what is the nature of these issues?

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## CHAPTER 2: LITERATURE REVIEW

### Organizations and the Natural Environment

Throughout the 1990s and into the 2000s, firms have proactively integrated concerns about the natural environment into their business strategies (Buysse and Verbeke, 2003; Henriques and Sadosky, 1999; Sharma and Vredenburg, 1998). For example, giant retailers such as Walmart employ green marketing to persuade customers to shop at their stores (Post and Altman, 1994). Empirical evidence has supported the business case for proactive corporate environmental practices by establishing a positive link between environmental performance and financial performance (Hart and Ahuja, 1996; Klassen and McLaughlin, 1996). Ultimately, companies pursue green initiatives for various reasons such as: to satisfy regulatory requirements, reduce costs, improve operational effectiveness, to take advantage of market opportunities, to improve relationships with key stakeholders, improve image or provide legitimacy, and to improve their overall competitiveness. In addition to pursuing green initiatives for designated outcomes, firms can also unintentionally gain some of the outcomes just listed.

Post and Altman (1994) suggest that initially the broader business arena started to address environmental issues when they were confronted with environmental regulations. Many researchers have focused on the regulatory aspects of the adoption of environmental technologies (Ashford and Ayers, 1985; Jaffe and Palmer, 1997; Jaffe and Stavins, 1995; Sanchez and McKinley, 1998). The role of legislation in prompting corporate ecological response has been well documented (Lampe et al., 1991; Lawrence and Morell, 1995; Post and Altman, 1994; Vredenburg and Westley, 1993).

Firms also undertake environmental initiatives for cost reasons (Post and Altman, 1994). The cost savings associated with environmental initiatives can be seen through programs such as 3M's Pollution Prevention Pays (3P) and Dow's Waste Reduction Always Pays (WRAP), where, in the case of 3M, an estimated \$500 million was saved over 10 years (Hunt and Auster, 1990; Kleiner, 1991; Post and Altman, 1994; Smart, 1992). There is also evidence of firms adopting environmental initiatives partly to assist in improving their operational effectiveness (del Rio Gonzalez, 2005; Masurel, 2007). Several authors have suggested that organizational learning occurs as firms move forward with environmental initiatives (Bonifant et al., 1995; Hart 1995; Porter and van der Linde, 1995; Post and Altman, 1994). Porter and van der Linde (1995) posit that improved product quality can be achieved through efforts to improve a firm's environmental performance.

Significant new business opportunities arise by rethinking a firm's relationships with the natural environment (Cairncross, 1992). Offering environmentally minded products gives firms the opportunity to expand current markets and enter new markets (Coddington, 1993). In agreement with this view, Porter (1991) and Porter and van der Linde (1995) argue that when a firm makes environmental improvements in one market it might open up opportunities in other markets. This process would be similar to how a demanding domestic market can prepare a firm for competing in broader markets (Porter and van der Linde, 1995). Additionally, Cordano (1993) suggests that revenue can be improved through environmental marketing and outsourcing a firm's expertise in addressing environmental issues.

Focusing on relationships between the firm and influential entities, stakeholder theory offers another way to view outcomes associated with firms pursuing environmental initiatives. Many researchers have used stakeholder theory to examine the relationship of organizations and

the natural environment (Berry and Rondinelli, 1998; Bucholz, 1991; del Rio González, 2005; Hart, 1997; Henriques and Sadorsky, 1999; Lawrence and Morell, 1995; Milne and Patten, 2002; O'Donovan, 2002; Sharma and Vredenburg, 1998; Starik, 1995; Wilmhurst and Frost, 2000). Several of these investigations have focused on perceptions, and outcomes based on these perceptions, held by stakeholders about firms' environmental actions (Berry and Rondinelli, 1998; Lawrence and Morell, 1995; Sharma and Vredenburg, 1998; Starik, 1995). Bansal and Kistruck (2006) report that several researchers in the accounting and auditing domain have suggested firms that express commitment to the natural environment create positive impressions with stakeholders (Milne and Patten, 2002; O'Donovan, 2002; Wilmhurst and Frost, 2000). In their study of seven firms in the Canadian oil and gas industry, Sharma and Vredenburg (1998) found that a key competitive benefit conferred to environmentally proactive firms was improved relationships with stakeholders. This had a positive impact on the approval rate of firms' plans to modify operations (Sharma and Vredenburg, 1998).

Henriques and Sadorsky (1999) took a different approach when they examined the difference of the perception of stakeholder importance between environmentally committed firms and less environmentally committed firms. In general, they concluded that more environmentally proactive firms are more attentive to the importance of stakeholder groups than firms that are less environmentally proactive and environmentally reactive. Given the influence stakeholders can have on potential actions taken by firms, Hart (1997) suggests that a fully integrated environmental strategy should include how a company will interact with stakeholders.

Using a different approach from stakeholder theory, examining relationships with entities external to the firm, several researchers have explored the role of organizational image and reputation relative to firms' environmental initiatives (Bansal and Roth, 2000; del Rio González,

2005; Hart, 1995; Russo and Fouts, 1997; Shrivastava, 1995; Westly and Vredenburg, 1991).

Hart (1995) suggests that there is a large amount of unclaimed reputation space relative to corporate environmental performance. In an investigation of firms in the Spanish pulp and paper industry, del Rio González (2005) found that one of the main reason for firms to adopt clean environmental technologies was to improve corporate image.

Other researchers have emphasized the role of organizational legitimacy relative to environmental actions of firms (Bansal and Roth, 2000; Shrivastava, 1995; Westly and Vredenburg, 1991). In their model of corporate ecological responsiveness, Bansal and Roth (2000), identify organizational legitimacy as a key motive for pursuing environmental initiatives. This view is shared by Shrivastava (1995) and Westly and Vredenburg (1991) who conclude that by addressing environmental issues, firms may gain competitive advantage though social legitimacy.

Many of the above mentioned drivers, and outcomes, of organizational environmental actions are tied to the competitive positioning and competitive advantage of the firm. Porter and van der Linde (1995) stress that resistance to innovation, relative to environmental issues, leads to a loss of competitiveness in the ever increasing globalization of economies. Hart (1997) suggests that a manager's attention can be diverted by focusing on the 'greening' of the organization just as risk reduction, reengineering, and cost cutting, and can lose sight of the broader strategic importance, competitive positioning. For example, addressing environmental issues can offer early-mover advantages (Porter and van der Linde, 1995). The automotive industry is a case in point. While U.S. car makers were fighting environmental regulations, German and Japanese car makers captured earl-mover advantages by being proactive and addressing environmental problems (Porter and van der Linde, 1995).

Barney's (1991) resource-based view of the firm emphasizes the idea of sustained competitive advantage. Based on Barney's (1991) work, Hart (1995) lays out a framework for a natural-resource-based view of the firm. He argues that corporate environmental action is becoming an increasingly important competitive domain which may be best understood by employing a resource-based view of the firm. He emphasizes three natural-resource-based strategic capabilities: pollution prevention, product stewardship, and sustainable development. Pollution prevention focuses on minimizing emissions, effluents, and waste and is achieved through the use of continuous improvement (Hart, 1995). The main competitive advantage of pollution prevention is cost reduction. Product stewardship focuses on minimizing the life-cycle costs of products and is sought through stakeholder integration (Hart, 1995). Hart (1995) sees the main competitive advantage of product stewardship as preempting competitors. This preemption can occur through two means: (a) gaining preferred access to important, but limited resources, and (b) establishing rules, regulations, and standards fitted to a firm's unique capabilities (Hart, 1995). Finally, sustainable development focuses on minimizing the environmental burden of firm growth and development and is achieved through rethinking the broader pattern of industrial activity (Hart, 1995). Ultimately, Hart (1995) envisions the main competitive advantage of sustainable development as future competitive position.

Across the literature on organizations and the natural environment are examples of how firms can gain business advantages by pursuing environmental initiatives. There is also evidence of the shortcomings and uncertainty in pursuing green initiatives. Wally and Whitehead (1994) express caution in assuming "green is gold." Firms may not achieve the desired cost reductions and level of operating efficiency that they had hoped (Wally and Whitehead, 1994). Customers who expressed interest in green products may not pull through and buy green products.

Ultimately, firms face a considerable degree of uncertainty in the potential outcomes of environmental initiatives (del Rio González, 2005; Shrivastava, 1995; Wally and Whitehead, 1993). Top managers must take these uncertainties into account as they make decisions regarding the adoption of environmental initiatives.

### **The Nature of the Decision to Adopt Environmental Certification**

Schendel and Hofer (1979) discuss levels of strategy, where the levels of strategy can be considered in a hierarchical order from business unit strategy, to corporate strategy, to enterprise level strategy. The decision to adopt environmental certification is primarily at the level of business unit strategy as opposed to corporate strategy. In other words, the decision to adopt environmental certification addresses issues surrounding the question of how does a firm prosper in a given line of business, versus the question of what businesses should a firm be in. But at the same time, by addressing issues of organizational legitimacy, the decision to adopt environmental certification also includes elements of enterprise level strategy, which encompasses issues of legitimacy of the organization. Ultimately the outcomes tied to the decision to adopt environmental certification are associated with business unit strategy.

Relative to business unit strategy, Miles and Snow (1978) discuss the entrepreneurial, engineering, and administrative problems facing firms. The entrepreneurial problem leads the firm's decision-makers to address issues about which products, services, and markets they will target (Miles and Snow, 1978). These issues are oriented toward the external business environment of the firm. The engineering problem leads the firm's decision-makers to address issues about how to effectively and efficiently produce and deliver the targeted products and services. These issues are primarily oriented toward the internal processes of the firm. Finally, the administrative problem leads the firm's decision-makers to address issues about how to best



structure the organization to achieve the direction set forth by answering the entrepreneurial and engineering problems facing the firm (Miles and Snow, 1978). Issues surrounding the administrative problem are internal to the firm.

The potential opportunities tied to the decision to adopt environmental certification range from preparing for anticipated upcoming changes in regulatory requirements, reducing costs, improving operational effectiveness, taking advantage of market opportunities, improving relationships with key stakeholders, improving image or providing legitimacy, to improving overall competitiveness. Several of these potential opportunities (taking advantage of market opportunities, improving relationships with key stakeholders, improving image or providing legitimacy, and improving overall competitiveness) are associated with the entrepreneurial problems facing firms. Also, several of the potential opportunities (regulatory requirements, reducing costs, improving operational effectiveness, and improving overall competitiveness) are associated with the engineering problems facing firms. With all these potential opportunities, both the ones associated with the entrepreneurial problem as well as the engineering problem, there is uncertainty whether a firm will be able to achieve them. Also, all of these potential opportunities, whether associated with the entrepreneurial problem or the engineering problem, will also be tied, in part, to the administrative problem, because the administrative problem is assumed to be tied to both the entrepreneurial and engineering problems.

In the firms included in this project, accompanying the adoption of environmental certification is an environmental label or seal that is displayed on products which meet certification requirements. Although firms cannot accurately predict the purchasing behaviors of their customers relative to products which carry these environmental labels, there is a mechanism in which firms communicate their adoption of environmental certification with entities external

to the firm. So, the environmental seal gives firms a tool which allows them to address external, entrepreneurial problems. On the other hand, there is no clearly defined mechanism in which firms can achieve the potential opportunities associated with the engineering problem facing the firm. There is a societal momentum toward concern for environmental issues, and the display of an environmental label on certified products serves as a way in which firms can address this concern. It could be argued that the potential opportunities associated with the entrepreneurial problems versus engineering problems are a stronger impetus for firms to adopt environmental certification.

Another question that arises is: Is the decision to adopt environmental certification part of a broader predetermined organizational strategy to address the firm's relationship with the natural environment? Several authors have investigated strategies aimed at addressing the relationship of firms and the natural environment (Hart, 1995; Sharma and Vredenberg, 1998, Shrivastava, 1995a). But there is no evidence that would clearly suggest that the decision to adopt environmental certification is part of a predetermined strategy aimed at addressing issues associated with the natural environment. The decision to adopt environmental certification may, or may not, be part of an intended natural environment oriented strategy. It may be simply a strategic choice that when examined from a future standpoint may, or may not, appear to be part of a series of decisions which show a pattern of a natural environment oriented strategy. As Mintzberg (1978) asserts, strategy is a "pattern in a stream of decisions (p. 935)." In other words, strategies are not always intended or formulated. They can result from formation rather than the formulation (Mintzberg, 1978). Given this uncertainty, in this investigation, the decision to adopt environmental certification will be considered as a strategic choice made by the decision-maker, or decision-makers, of the firm.

## **The Influence of Top Managers on Strategic Choice**

The work of Cyert and March (1963) and their view of a dominant coalition, or a group of powerful individuals who make decisions which effect organizational actions and outcomes, has influenced organizational researchers who are interested in studying the role of top managers of organizations. Hambrick and Mason (1984), who expanded upon the work of Carnegie School theorists such as Cyert and March, provided researchers with an upper echelons perspective of the organization, where the organization is a reflection of its top managers. Important to the upper echelons perspective is the idea of strategic choice. The term strategic choice encompasses decision and indecision, and formal and informal choices, choices that address the entrepreneurial, engineering, and administrative problems facing organizations and are related to the organizational strategy (Child, 1972; Hambrick and Mason, 1984). Strategic choices do not include everyday, repetitious decisions that lend themselves to calculable solutions (Hambrick and Mason, 1984). Strategic choices are often surrounded with uncertainty as to how means and ends connect as well as what exactly the means and ends are (Hambrick and Mason, 1984).

According to Carnegie School theorists, the ability of managers to make complex decisions (strategic choices) on a techno-economic basis is limited by bounded rationality, multiple and conflicting goals, a wide range of options, and varying aspiration levels (Cyert and March, 1963; Hambrick and Mason, 1984; March and Simon, 1958). Top managers' cognitive biases, values, experience, and attributes influence the strategic choices they make (Hambrick and Mason, 1984). Employing the framework of Hambrick and Mason's (1984) upper echelons model, many researchers have shown that demographic characteristics of top managers (e.g. tenure, education, functional background), as well as psychological and personality

characteristics, influence their strategic choices and associated organizational outcomes (Finkelstein, et al., In press; Hambrick, 2007).

This current investigation explores the relationship between top managers' perceptions of benefits of environmental certification and their decisions to adopt environmental certification (see Figure 2.1). It will also examine the relationship between top managers' perceptions of hostility in the firm's business environment and the decision to adopt environmental certification. This investigation also explores the relationships between top managers' tolerance for ambiguity, openness to change, and functional orientation and (a) their decisions to adopt environmental certification and (b) their perceptions of benefits of environmental certification. Finally, this investigation examines the mediating effect of top managers' perceptions of benefits of environmental certification on the relationships between top managers' tolerance for ambiguity, openness to change, and functional orientation and their decisions to adopt environmental certification.

----- Insert Figure 2.1 here. -----

The next two sections of the literature review discuss the relationships shown in the following model (Figure 2.1). Please note that this model represents only part of the full research model. The full research model is presented later in the literature review. For an alternative graphical representation of the following model please refer to the Venn diagrams contained within the methods section.

### **Perceived Benefits of Environmental Certification**

Many authors have emphasized the importance of the participation of top managers in successful firm environmental initiatives (Buzzelli, 1991; Lawrence and Morell, 1995; Masurel, 2007; Post and Altman, 1994; Winn, 1995). Masurel (2007) asserts that the entrepreneurial

decisions of top managers serve as key motivators for firms to invest in voluntary environmental measures. In a review of models that describe the adaptation of organizations to issues in the natural environment, Post and Altman (1994) develop a three phase corporate greening model where top managers are prominent in the success of each phase of the model. Top managers make decisions that directly impact the strategic orientation of the firm (Child, 1972). How managers interpret, and make sense of, their business environment influences organizational outcomes (Daft and Weick, 1984; Hambrick and Mason, 1984; Weick, 1979).

The labels which firms' decision-makers attach to strategic issues influences the meanings attached to those issues and subsequent strategic choices (Dutton and Jackson, 1987). Dutton and Jackson (1987) suggest that "opportunities" and "threats" are two salient categories which organizational decision-makers consider strategic issues. Several authors have examined ways in which managers interpret issues in the business environment as either opportunities or threats (Andersson and Bateman, 2000; Dutton and Jackson, 1987; Jackson and Dutton, 1988; Sharma, 1997; Sharma and Nguan, 1999; Sharma et al., 1999; Thomas and McDaniel, 1990). This opportunity versus threat interpretation of issues in the natural environment has also been shown to be a relevant tool for explaining environmental responsiveness strategies of firms (Penner, 1994; Sharma, 1997; Sharma and Nguan, 1999; Sharma et al., 1999).

An issue framed as a threat represents a negative situation where loss is anticipated and one has limited control (Dutton and Jackson, 1987; Fredrickson, 1985). An issue framed as an opportunity represents "a positive situation in which gain is likely and over which one has a fair amount of control (Dutton and Jackson, 1987: p. 80)." Other researchers who have studied managerial decision-making also view opportunities as positive and oriented toward gains (Mintzberg et al., 1976; Nutt, 1984). Relevant to the controllability aspect of opportunity,

Anderson (1977) suggests that proactive, externally oriented responses are more common as a person gains confidence in his or her ability to control outcomes. The managerial interpretation of opportunities relative to the natural environment can be viewed as: (1) positive impacts on the organization's operations, (2) gains through competitive advantage, and (3) the ability of managerial action to address specific environmental issues confronting the organization (Dutton and Jackson, 1987; Sharma and Nguan, 1999).

In their study of seven firms in the Canadian oil and gas industry, Sharma and Vredenburg (1998) found that managers of environmentally proactive firms, firms that pursued more voluntary environmental initiatives, perceived competitive benefits associated with environmental responsiveness, conversely managers of environmentally reactive firms perceived environmental responsiveness as detracting from performance. Sharma and Nguan (1999) also found that firms' environmental strategies were influenced by how managers interpreted environmental issues as opportunities versus threats. Specifically, firms with more proactive, voluntary, environmental strategies had managers who saw environmental issues as opportunities as opposed to threats (Sharma, 1997; Sharma and Nguan, 1999; Sharma et al., 1999). Managerial perception of the opportunities, or benefits, of initiatives has also been shown to influence the greening of organizational culture (Harris and Crane, 2002) as well as the adoption of new technologies (Dvir et al., 1993). For voluntary environmental initiatives, the managerial perception of opportunities tied to those initiatives is an important determining factor in their adoption.

Not only are managerial perceptions of opportunities of environmental initiatives important, but so is seeing these opportunities in the framework of typical business decisions and gains. By framing environmental issues in ordinary business dress, or like any other business

issue, successful champions of environmental issues avoid adverse responses of other organizational members that can result from painting an issue as hot or laden with emotion (Andersson and Bateman, 2000: p. 565). Andersson and Bateman (2000), suggest that in addition to framing issues as opportunities, emphasis of the financial, strategic, or competitive benefits of the issue is also important. This is aligned with other research that suggests issues that garner support in business organizations are concrete, presented in a formal manner, and are in line with strategic aims of the organization (Ashford et al., 1991; Dutton and Ashford, 1993). Shelton and Shopley (1996) echo this by arguing that managers of environmental initiatives need to build better business cases to support their aims. Even Shrivastava (1995), with his utopian view of ecocentric management, acknowledges the need for corporations to realize economic returns in implementing green technologies and entering green markets. Given these arguments, top managers who perceive more benefits of environmental certification are more likely to pursue environmental certification than top managers who perceive less benefits of environmental certification.

Hypothesis 1 (H1): Top managers who perceive more benefits of environmental certification will be more likely to adopt environmental certification.

### **Perceived Hostility in the Business Environment**

As Duncan (1972) declares, organizations must adapt to their environment (business environment) if they are to remain viable. Managers' perceptions of the firm's business environment are important in how a firm interacts with its environment (Hambrick and Mason, 1984; Pfeffer and Salancik, 1978; Weick 1969). One of the key dimensions in which managers perceive the external business environment is the hostility versus munificence of the business environment (Dess and Beard, 1984).

Building on descriptions from Khandwalla (1977) and Miller and Friesen (1978), Miller and Friesen (1983) define hostility in the business environment as “the degree of threat to the firm posed by the multifacetedness, vigour and intensity of the competition and the downswings and upswings of the firm’s principle industry (p. 222).” Hostile business environments prompt firms to act, because decision-makers perceive a threat to organizational survival (Ashmos et al., 1997; Elbanna and Child, 2007). Similarly, hostile business environments are characterized by competitive intensity and pose threats to the viability of organizations (Covin et al., 1999; Miller, 1994; Zahra, 1993). Covin and Slevin (1989) describe hostile business environments as having intense competition and limited exploitable opportunities. Alternately, benign business environments are munificent and offer choice among investment and marketing opportunities (Covin and Slevin, 1989; Khandwalla, 1977; Miller and Friesen, 1983). Akin to hostility is munificence. Munificence refers to the ability of a business environment to support an organization’s sustained growth (Aldrich, 1979; Dess and Beard, 1984). Castrogiovanni (1991) considers hostility as one of several ways to label munificence, and hostility places emphasis on a firm’s relationship with its competition (Miller and Friesen, 1982). In stating conclusions and providing explanations of observed relationships, researchers readily mix the words hostility and munificence (Covin and Slevin, 1989; Goll and Rasheed, 1997; Elbanna and Child, 2007).

In their investigations of strategic decision processes and strategic decision effectiveness, Goll and Rasheed (1997) and Elbanna and Child (2007) conclude that munificence in the business environment plays a moderating role in the relationship between strategic decisions and organizational outcomes. Goll and Rasheed (1997) find the relationship between strategic decision processes and strategic decision effectiveness to be weaker in hostile business environments, where Elbanna and Child (2007) find it to be stronger in hostile business



environments. It should be noted that both Goll and Rasheed (1997) and Elbanna and Child (2007) measured munificence of the business environment, as opposed to hostility, and used an objective measure which assessed the growth rate in the value of shipments. The results of these studies make it unclear whether hostility in the business environment will have a negative or positive influence on the decision to adopt environmental certification.

Considering the aspects of environmental certification that address entrepreneurial problems facing firms, the work of Miller and Friesen (1982, 1983) offers similar mixed perspectives as the work of Goll and Rasheed (1997) and Elbanna and Child (2007). Miller and Friesen (1982) suggest that managers' perception of hostility in the business environment will lead to more innovation, primarily product and service innovation, in firms. But, in studies of Canadian firms and US versus Canadian firms, Miller and Friesen (1982, 1983) find mixed results for the relationship of perceived hostility in the business environment and firm innovation. It should be noted that Miller and Friesen (1982, 1983) used a subjective measure of hostility. Once again, it is unclear whether hostility in the business environment will have a negative or positive influence on the decision to adopt environmental certification.

In the context of organizations' relationships with the natural environment, Aragón-Correa and Sharma (2003) provide a theoretical assessment of the role of contingency factors in the relationship between organizational resources and capabilities and their influence on competitive advantage. They suggest that slack resources associated with munificent business environments will provide opportunities for organizations to generate proactive approaches to managing their relationships with the natural environment (Aragón-Correa and Sharma, 2003). Building on this idea, they offer the following proposition: "Perceived munificence in the general

business environment increases the likelihood that a firm will use its capabilities and resources to develop a proactive environmental strategy (p. 82).”

In an empirical investigation of the determinants of the adoption of environmentally friendly technologies in a portion of the US printing industry, Rothenberg and Zyglidopoulos (2007) did not find a significant relationship between munificence in the business environment and the adoption of environmentally friendly technologies. Like Goll and Rasheed (1997) and Elbanna and Child (2007), Rothenberg and Zyglidopoulos (2007) used an objective measure of munificence of the business environment. Aragón-Correa and Sharma (2003) emphasize managers’ perception of munificence. When examining individual tactical decisions and actions, Castrogiovanni (1991) suggests that either a subjective or objective measure of munificence can be used. Perhaps if Rothenberg and Zyglidopoulos (2007) had used a subjective, perceptual measure of environmental munificence they may have found different results. Building on the proposition of Aragón-Correa and Sharma (2003), top managers’ perception of the hostility in the business environment will impact their decision to adopt environmental certification. Specifically, as a top manager perceives more hostility in the business environment he or she will be less likely to decide to adopt environmental certification.

Hypothesis 2a (H2a): Top managers who perceive more hostility in the firm’s business environment will be less likely to adopt environmental certification.

Counter to this hypothesis, researchers have also shown a positive relationship between the perception of hostility in the business environment and the entrepreneurial actions of firms. Among small manufacturing firms, Khandwalla (1977) found that an entrepreneurial style is effective in hostile business environments. This finding was supported by Covin and Slevin (1989) in their investigation of small manufacturing firms. Miller (1983) found firm

entrepreneurial orientation to have a significant positive relationship with perceived hostility in the business environment. In a study of European firms in mature industries, Stopford and Baden-Fuller (1994) found that firms initiated entrepreneurial actions in response to increased hostility in the business environment. Covin et al. (1999) found a relationship between perceived hostility in the business environment and firms' expansion of market breadth. Miller (1987) found that a firm strategy of market differentiation was related to the degree of perceived hostility in the business environment. Once again considering the opportunities of environmental certification tied to entrepreneurial problems as well as the opportunities related to engineering problems that arise in pursuing solutions to the entrepreneurial problems, the following counter hypothesis to hypothesis 2b is offered.

Hypothesis 2b (H2b): Top managers who perceive more hostility in the firm's business environment will be more likely to adopt environmental certification.

The next section, and associated sub-sections, of the literature review discuss the relationships shown in the following model (Figure 2.2). Please note that this model represents only part of the full research model. The full research model is presented later in the literature review. For an alternative graphical representation of the following model please refer to the Venn diagrams contained within the methods section.

----- Insert Figure 2.2 here. -----

### **Managerial Influences of the Decision to Adopt Environmental Certification**

In the context of organizations and their relationships with the natural environment, several researchers have noted the importance of top managers' attributes in influencing actions oriented toward the natural environment (Ashford, 1993; Deileman and de Hoo, 1993; Drumwright, 1994; Fineman and Clarke, 1996; Jennings and Zandbergen, 1995; Kemp, 1993;

Marcus, 1995; Menon and Menon, 1997; Schmidheiny, 1992; Swanson, 1995; Wood, 1991). Drumwright (1994), in her assessment of firm purchasing practices, concludes that top manager's ideals and values directly effect the nature and degree of environmentally responsible purchasing behaviors. Several researchers have proposed that managers' attitudes significantly influence the adoption of pollution prevention oriented activities (Ashford, 1993; Deileman and de Hoo, 1993; Kemp, 1993; Marcus, 1995; Schmidheiny, 1992). Similarly, Jennings and Zandbergen (1995) note the influence of managerial interpretations of environmental issues on environmental strategies adopted by firms. Drawing from the literature on corporate social responsibility (CSR), which often contains an environmental element, researchers have emphasized the importance of managerial values and attitudes in successfully championing CSR activities (Drumwright, 1994; Fineman and Clarke, 1996; Menon and Menon, 1997; Swanson, 1995; Wood, 1991). The following sections discuss top managers' tolerance for ambiguity, openness to change, and functional orientation in relation to the decision to adopt environmental certification.

#### *Tolerance for Ambiguity*

Drawing from the work of decision theorists Luce and Raiffa (1957), Gupta and Govindarajan (1984) argue that managerial decision-making will involve some degree of both uncertainty and risk. This extends to firm-level decisions about environmental initiatives. Walley and Whitehead (1993) suggest that the lack of clarity surrounding outcomes, positive or negative, of environmental initiatives create uncertainty for organizational decision-makers. Shrivastava (1995) supports this view. He suggests that firms face uncertainty about the effectiveness and costs of technologies aimed at protecting or improving the natural environment. Specifically, uncertainty about the true costs of implementing initiatives, future

regulatory requirements, and market responses loom over firms pursuing environmental initiatives (del Rio González, 2005).

In their investigation of firms in the Canadian gas and oil industry, Sharma et al. (1999) found that managers of firms that had reactive, as opposed to proactive, environmental strategies perceived the relationship between firm actions and environmental impacts as being more uncertain and more uncontrollable. In contrast, managers of firms that had proactive environmental strategies focused on the possible gains that could be harnessed from environmentally oriented firm initiatives (Sharma et al., 1999). The perception of uncertainty is a factor in managers seeing opportunity in voluntary environmental initiatives.

Tolerance for ambiguity is related to a manager's perception of uncertainty. Tolerance for ambiguity is "the tendency to perceive ambiguous situations as desirable," and intolerance of ambiguity is "the tendency to perceive ambiguous situations as sources of threat" (Budner, 1962: p. 29). Viewing this construct in the context of managerial decision-making, Westerberg et al. (1997) define tolerance for ambiguity as the degree to which an individual has the ability to make decisions in environments filled with either uncertainty or risk, or both. Nutt (1993) found that executives who had a higher tolerance for ambiguity were more aggressive decision-makers than executives who had a lower tolerance for ambiguity. Kim et al. (1993), examining innovation in small firms in Korea, found that managers from innovative firms had a higher tolerance for ambiguity than managers from non-innovative firms.

In their well known investigation of managerial influence and its relationship to strategic business unit (SBU) strategies, Gupta and Govindarajan (1984) found higher levels of tolerance for ambiguity to be associated with managers of SBUs with build strategies than SBUs with harvest strategies, where build strategies focus on increasing market share and harvest strategies

focus on short term profit maximization. Their work offers insight into the relationship of a manager's tolerance for ambiguity and the identification and pursuit of opportunities in the external business environment of the firm. Wincent and Westerberg (2005) found tolerance for ambiguity of small to medium sized enterprise (SME) owners to have a positive relationship with networking behavior, and in turn to have an indirect effect on entrepreneurial behavior, suggesting that tolerance for ambiguity is associated with seeing and seizing new opportunities. Similarly, in an investigation of international new ventures, Acedo and Jones (2007) found tolerance for ambiguity to be negatively related to managers' perception of risk and negative outcomes associated with internationalization.

Top managers who have a higher tolerance for ambiguity should cope better with the uncertainty in outcomes surrounding environmental certification. Top managers with a higher tolerance for ambiguity should be more likely to pursue the adoption of environmental certification than top managers with a lower tolerance for ambiguity. They will likely see more benefits of environmental certification than top managers with a lower tolerance for ambiguity. This perception of benefits of environmental certification is likely to be a powerful influence on how a top manager's tolerance for ambiguity leads to his or her decision to adopt environmental certification.

Hypothesis 3a (H3a): Top managers who have a higher tolerance for ambiguity will be more likely to adopt environmental certification than top managers who have a lower tolerance for ambiguity.

Hypothesis 3b (H3b): Top managers who have a higher tolerance for ambiguity will perceive more benefits of environmental certification than top managers who have a lower tolerance for ambiguity.

Hypothesis 3c (H3c): The relationship between a top manager's tolerance for ambiguity and his or her decision to adopt environmental certification will be mediated by the top manager's perception of benefits of environmental certification.

## *Openness to Change*

Openness was initially identified by Adorno et al. (1950) as an individual trait that contributes to a 'flexible' personality as opposed to rigid, intolerant personality. Openness to change has been described as the opposite of dogmatism, or clinging to a cognitively closed set of beliefs (Rokeach, 1960). In Schwartz's (1994) typology of individual values, he classifies openness to change as a higher-order dimension that is polar to conservatism. Schwartz (1994) suggests that openness to change is the degree to which an individual is motivated to pursue innovative ways. Researchers have shown that individuals who are more open to change accept novelty and are willing to seek new information that may counter their previously held beliefs (Durant and Lambert, 1975; Feather, 1969; Hunt and Miller, 1968; Zagona and Kelly, 1966).

Dietz et al. (2002) suggest that openness to change is a determinant of an individual's tendency toward environmentalism. Researchers exploring ecocentric management have suggested that leaders who are more environmental will attribute more importance to openness to change than leaders who are less environmental (Flannary and May, 1994; Johnson, 1998; Shrivastava, 1994). Egri and Herman (2000) found that managers of non-profit environmental organizations placed more importance on openness to change values than managers in general across various organizational types.

Relative to CEOs and top managers, not specific to non-profit environmental organizations, Finkelstein and Hambrick (1996) discuss the concept of openness to change. They describe openness to change as having two components: cognitive and social/interpersonal (Finkelstein and Hambrick, 1996). The research on openness to change relevant to managers seems to focus on the cognitive aspect. From the work of Hambrick et al. (1993), it can be

concluded that some managers have a higher propensity for change while other managers favor the status quo.

Researchers have explored managers' and executives' openness to change across several contexts. In the context of employing information technology in managerial work groups, McCartt and Rohrbaugh (1995) found that managers who were more open to change perceived more benefits associated with decision conferences of work groups. Datta et al. (2003) examined the relationship of newly appointed CEOs' openness to change in relation to strategic persistence following a succession event. They found that in high discretion environments the negative relationship between newly appointed CEOs' openness to change to strategic persistence was significant (Datta et al., 2003). In their study of Jordanian and US bank managers, Moussetis et al. (2005) concluded that managers who were more open to change showed more strategic aggressiveness. Implicit in the work of Datta et al. (2003) and Moussetis et al. (2005) is that between the relationship of the dispositional attribute of openness to change and the actions of strategic persistence and strategic aggressiveness is an individual's perception or interpretation of the issues and events surrounding the situation. This perception and interpretation is at the core of the upper echelons perspective that links attributes of managers with their strategic choices (Hambrick and Mason, 1984).

In firms that have not adopted any form of environmental certification in the recent past, the decision to adopt environmental certification likely encompasses a new decision for strategic decision-makers. Top managers who are more open to change are more likely to pursue the adoption of environmental certification than top managers who are less open to change. They will likely see more benefits of environmental certification than top managers who are less open



to change. This perception of benefits is likely to be a powerful influence on how a top manager's openness to change leads to his or her decision to adopt environmental certification.

Hypothesis 4a (H4a): Top managers who are more open to change will be more likely to adopt environmental certification than top managers who are less open to change.

Hypothesis 4b (H4b): Top managers who are more open to change will perceive more benefits of environmental certification than top managers who are less open to change.

Hypothesis 4c (H4c): The relationship between a top manager's openness to change and his or her decision to adopt environmental certification will be mediated by the top manager's perception of benefits of environmental certification.

### *Functional Orientation*

Regardless if their job requirements are generalist in nature, top managers bring their past career experiences with them to their current role (Hambrick and Mason, 1984). Top managers have often been exposed to various functional perspectives, but usually top managers have spent a greater portion of their career in a primary functional area (Finkelstein et al., In press). As assessed by Hambrick and Mason (1984) as well as Finkelstein et al. (In press), Dearborn and Simon (1958), in one of the earliest empirical works on the influence of manager's functional background on managerial choice, suggest that when managers with different functional positions were presented with the same problem situation and were asked to provide an assessment from a perspective of the entire organization, managers defined the problem for the most part in terms of their own functional area.

Miles and Snow (1978) in their strategic typology describe managers as having either an output or a throughput function. Emphasizing growth and the search for new domains, output functions include marketing, sales, and product development (Hambrick and Mason, 1984; Miles and Snow, 1978). With an emphasis on improving internal organizational efficiency, throughput functions include production, process engineering, and accounting (Hambrick and Mason, 1984;

Miles and Snow, 1978). Having a different emphasis or focus, managers from these two functional domains will likely have different perspectives on the firm and its relationship with the business environment (Hambrick and Mason, 1984; Lawrence and Lorsch, 1967; Miles and Snow, 1978).

In an investigation of the Miles and Snow's (1978) strategic typology applied to tobacco companies, Chaganti and Sambharya (1987) found a higher proportion of executives with output orientations in Prospector firms, which emphasize entrepreneurial decisions as opposed to engineering and administrative decisions, than firms from other strategic types. Similarly, Thomas et al. (1991) in their examination of computer companies found that Prospector firms as compared to Defender firms, which place emphasis on engineering decisions that primarily concern the internal domain of the firm, had more CEOs from output functional backgrounds, where as Defenders has more CEOs from throughput functional backgrounds. Other researchers have also found similar relationships between executives' and top managers' functional backgrounds and their strategic focus or orientation (Barker and Mueller, 2002; Strandholm et al., 2004; Tyler and Steensma, 1998).

As previously discussed, benefits associated with environmental certification are likely to be influenced more by the entrepreneurial, more externally focused, problems facing the firm rather than the primarily internally focused, engineering problems facing the firm. The functional orientation of a top manager will influence his or her decision to adopt environmental certification. A top manager's functional orientation will determine the degree to which he or she identifies benefits of environmental certification. Specifically, top managers with throughput functional backgrounds, such as operations/production and process engineering, will perceive less benefits of environmental certification and be less likely to adopt environmental certification

than top managers with output functional backgrounds, such as sales and marketing. The perception of benefits of environmental certification is likely to be a powerful influence on how a top manager's functional orientation leads to a top manager's decision to adopt environmental certification.

Hypothesis 4 (H4): Top managers with throughput functional orientations will be less likely to adopt environmental certification than top managers with output functional orientations.

Hypothesis 5a (H5a): Top managers with throughput functional orientations will perceive less benefits of environmental certification than top managers with output functional orientations.

Hypothesis 6a (H6a): The relationship between a top manager's functional orientation and his or her decision to adopt environmental certification will be mediated by the top manager's perception of benefits of environmental certification.

Summarizing, this current investigation explores the relationship between top managers' perceptions of benefits of environmental certification and their decisions to adopt environmental certification. It will also examine the relationship between top managers' perceptions of hostility in the firm's business environment and the decision to adopt environmental certification. This investigation also explores the relationships between top managers' tolerance for ambiguity, openness to change, and functional orientation and (a) their decisions to adopt environmental certification and (b) their perceptions of benefits of environmental certification. Finally, this investigation examines the mediating effect of top managers' perceptions of benefits of environmental certification on the relationships between top managers' tolerance for ambiguity, openness to change, and functional orientation and their decisions to adopt environmental certification.

The preceding discussion provided the theoretical support for the following model (Figure 2.3). Please note that this is the proposed full research model. For an alternative

graphical representation of the full research model please refer to the Venn diagrams contained within the methods section.

----- Insert Figure 2.3 here. -----

The following five sections of the literature review describe the context in which the theoretical arguments discussed above are to be examined. First, the U.S. domestic wood kitchen cabinet industry is discussed. Then there are two brief sections about the Kitchen Cabinet Manufacturers Association (KCMA) and the Environmental Stewardship Program of the KCMA. Finally, the literature review ends with two sections about the Wood Component Manufacturers Association (WCMA) and third-party, chain-of-custody environmental certification.

### **The U.S. Domestic Wood Kitchen Cabinet Industry**

The U.S. wood kitchen cabinet industry (NAICS 337110; previously NAICS 243400), which includes the kitchen countertop manufacturing, is a significant contributor to the U.S. economy. In 2002 the industry was composed of over 9,450 companies that employed over 126,000 people and produced over \$14.1 billion in shipped finished goods (U.S. Department of Commerce, 2002). Partsch (2007) estimates that 86% of the industry's sales are related to cabinets. Also, the wood kitchen cabinet and countertop industry has over 5700 small-scale companies employing less than five employees (U.S. Department of Commerce, 2002). In contrast, the three largest producers accounted for approximately 59% of industry wide sales in 2006 (Partsch, 2007).

Of the various kitchen cabinet operations, the two extreme business types are assembly operations and integrated operations. Assembly operations purchase cabinet components, apply finish, and assemble the components into finished cabinets. Integrated operations convert raw

materials into component parts and then proceed with assembly operation steps of applying finish and assembling components into finished cabinets. A majority of kitchen cabinet firms are toward the assembly operation end of the spectrum, where they convert some raw materials but a majority of the components they use are purchased from suppliers.

Manufacturers are also differentiated by the products they offer, which are of three main types: stock cabinets, semi-custom cabinets, and custom cabinets. Stock cabinets are manufactured to pre-specified design standards that do not accommodate more discriminating customers who want unique products. The design of stock cabinets is heavily influenced by process capabilities as well as overall assumptions of customer likes and dislikes. The design of custom cabinets is largely determined by the desires of the customer. Rather than adhering to rigid pre-specified design standards, custom cabinets are made to meet desired aesthetics and functionality as specified by the customer. This flexibility in design and customer accommodation demands higher prices in the marketplace. Between these two extremes in product type and design are semi-custom cabinets. Semi-custom cabinets are manufactured in accordance with pre-specified design standards that have built in flexibility that allow customers to select product modifications within a predetermined range of modifications. This allows manufacturers to still benefit from some of the process efficiency of a stock cabinet operation, while offering some of the flexibility of a custom cabinet operation. As such, semi-custom cabinets typically demand higher prices than stock cabinets, but lower prices than custom cabinets.

Cabinet types loosely coincide with company size. To fully reap the benefits of process efficiencies associated with stock cabinets, larger companies produce a substantial volume of stock cabinets. The largest company in the cabinet industry, Masco Corporation, significantly

contributes to the total volume of stock cabinets produced annually (Partsch, 2003). On the other end of the spectrum, custom cabinets are manufactured primarily by small craftsman-type shops. With many semi-custom manufacturers describing their products as custom products, it is difficult to exactly pin down the relative size of semi-custom manufacturers. It is safe to say that semi-custom manufacturers on average will be larger companies than custom manufacturers.

As previously suggested, the U.S. kitchen cabinet industry is concentrated with the three largest producers in the industry, Masco Corporation, Masterbrand Cabinets, Inc., and American Woodmark Corporation, producing approximately 59% of domestic cabinets in 2006 (Partsch, 2007). Interestingly, these three firms are publicly owned while the large majority of the rest of the industry is privately owned. In 2006, the top ten companies, shown in Table 2.1, accounted for roughly 79% of the market (Partsch, 2007). During the 1990's, the kitchen cabinet industry saw considerable consolidation and growth among the top producers (Ohm, 2001; Sachdev, 2002). Companies with sales greater than \$25 million represented about 95% of all domestic cabinet sales in 2006 (Partsch, 2007). In 2006, stock cabinet sales accounted for approximately 49.0% of the total market, while semi-custom and custom cabinet sales accounted for approximately 32.5% and 18.5% of the total market, respectively (Partsch, 2007). When considering firms that have less than \$25 million in annual sales, custom cabinet sales account for roughly 65% of the market (Partsch, 2007).

----- Insert Table 2.1 here. -----

Prior to November 2006, the US domestic kitchen cabinet industry experienced 127 months of continuous growth (Anonymous, 2007d). As of June 2007, the kitchen cabinet industry has seen an overall decline in sales of 2.9% for 2007 (Anonymous, 2007d). Comparing cabinet sales from February 2007 to February 2006, stock cabinet sales declined 21.1%, semi-

custom cabinet sales declined 9.8%, and custom cabinet sales declined 8.7% (Anonymous, 2007d). The decline in cabinet sales, across the three main product categories, is tied to declines in new housing starts (Partsch, 2007). Being so heavily dependent on housing starts, stock cabinets saw a huge sales decline. Semi-custom and custom cabinets weathered the new housing storm a little better due to sales in the remodeling market. The industry anticipates that 2008 will bring cabinet sales back into the positive with a forecasted 3% annual increase in sales through 2010, reaching a total estimated \$16 billion in sales by the end of 2010 (Anonymous, 2007d).

Kitchen cabinets are sold through home centers, dealers, builders (Punches et al., 1995), distributors, and also directly to consumers (Partsch, 2007). Table 2.2 shows the distribution of industry total sales for 2006 across these categories. Company size seems to impact how cabinets are sold. For companies that had annual sales less than \$25 million in 2006, cabinets sales were distributed in the following manner: dealers (75%), straight to consumers and builders (each were roughly 7 to 8%), home centers (5%), and distributors (4%) (Partsch, 2007).

----- Insert Table 2.2 here. -----

Referring to 1997 data, kitchen cabinet firms used an estimated 1.2 billion board feet of combined hardwood lumber and hardwood component parts (Hansen and West, 1998). For 1999, (Olah et al., 2003) estimated the total consumption of hardwood lumber in the cabinet industry to be approximately 484 million board feet. Of the hardwood lumber purchased by cabinet manufacturers in 1999, 33% was FAS and Selects, 62% was No. 1 Common, 5% was No. 2 Common, and less than 1% was below No. 2 Common (Olah et al., 2003). In relation to component part usage, for 1999 Olah et al. (2003) estimated that 68.3 million cabinet doors, 26.3 million board feet of edge-glued panels and cut-to-size blanks, and 31.8 million board feet of other cabinet parts were used by the cabinet industry. The majority of these component parts

were hardwoods. Also for 1999, Olah et al. (2003) estimated the cabinet industry used approximately 24.7 million board feet of softwood lumber. In addition to hardwood and softwood lumber and components, the cabinet industry also uses hardwood and softwood plywood, particleboard, medium density fiberboard (MDF), hardboard, and veneer (Hansen and West, 1998). Of these panel materials, particleboard, at 1,044 million ft<sup>2</sup> used on ½ inch basis, was most commonly consumed, as estimated for 1999 (Olah et al., 2003).

In the stock cabinet arena, foreign competition is a key concern (Plantz, 2003). Across the industry, companies are being pushed for shorter lead times. During the 1990's, lead times across the industry were reduced from multiple weeks to in many cases within a week (Nicknish, 2000). Also, skilled labor is a concern for cabinet manufacturers, especially labor that can operate computer automated equipment and systems (KCMA, 2003; Ohm, 2001; Olah et al., 2003; Nicknish, 2000). In relation to raw materials, price increases and supply or availability is also a concern among cabinet manufacturers (Olah et al., 2003). Finally, air quality regulations are a concern among manufacturers, especially the larger ones (Olah et al., 2003).

The industry has recently been pressured by concerns of formaldehyde emissions from their finished products. The main force on this environmental and health front has been the California Air Resources Board, or CARB. CARB's aim is to reduce formaldehyde emission in internal environs within the state of California, specifically the proposed Airborne Toxic Control Measure (ATCM) impacts the wood composite panel industry which supplies the cabinet industry. CARB's proposed ATCM was established based on a review of parts per million (ppm) release of formaldehyde of wood composite panels produced globally, specifically in the U.S., Europe, and Japan. This regulation has two phases that are introduced at two different time



periods. Phase 1 was introduced in April of 2007, and Phase 2 will be introduced in January of 2009.

It is widely believed that Phase 2 of the proposed ATCM will become the de facto national standard for formaldehyde emissions from wood composite panels and products manufactured from the panels (G. Gramp, personal communications, 2007).

### **The Kitchen Cabinet Manufacturers Association**

The Kitchen Cabinet Manufacturers Association (KCMA) is the principle association in the U.S. for manufacturers of kitchen cabinets, vanities, decorative laminate products, as well as suppliers to the industry. The headquarters for KCMA is in Reston, VA. Originally, the KCMA was named the National Institute of Wood Kitchen Cabinets and was founded in 1955 during a time when the wood portion of the cabinet industry faced stiff competition from steel cabinet manufacturers. In 1961, the association's name was changed to the National Kitchen Cabinet Association in response to industry trends in using multiple material types in cabinets. To more clearly reflect the nature of members of the association, the association changed its name to the KCMA in the spring of 1990. In 1996, countertop and other decorative laminate fabricators joined the KCMA and formed the Decorative Laminate Council within the KCMA. In addition to the active membership status of cabinet producers and fabricators of decorative laminate products, suppliers to the industry can join the KCMA as associate members. Both active and associate members are represented on the board of directors for the KCMA. The combined membership of active and associate members is over 350 companies and business units.

### **Environmental Stewardship Program Certification**

During the 2006 International Woodworking Fair, held in Georgia from August 23<sup>rd</sup> through 26<sup>th</sup>, the KCMA announced its Environmental Stewardship Program or ESP. The ESP is

a certification program and was developed for kitchen cabinet manufacturers to “demonstrate their commitment to sound environmental management and sustainable practices (*KCMA-ESP pamphlet*).” This program is not limited to KCMA members. All manufacturers of pre-finished, factory-engineered cabinets may participate. The ESP does not require testing, but in order to verify compliance documentation and certain records are necessary. ESP certification is voluntary and is awarded on an annual basis. Either individual product lines or facilities can become ESP certified.

ESP certification contains five categories of sustainability: air quality, resource management relating to product (materials), resource management relating to processes, environmental stewardship, and community relations. Within each of these categories there are several criteria that manufacturers strive to meet. Not all the criteria of each category need to be met fully to be qualified for ESP certification.

Within the air quality category, there are four criteria. These criteria focus on formaldehyde emission, as specified by the Composite Panel Association (CPA), from particleboard, medium density fiberboard (MDF), and plywood as well as hazardous air pollutants (HAPS) from finishing materials used to finish products. The product resource management category also has four criteria. These criteria focus on the use of recycled/recovered fiber content, as specified by the CPA, in particleboard and MDF as well as the use of hardwood lumber and components certified by the following entities: the American Tree Farm System, the Canadian Standards Association, the Sustainable Forestry Initiative, the Forest Stewardship Council, the Pan European Forest Certification Council, the International Tropical Timber Organization, and ISO 1400 Environmental Management Series. The four criteria of the process resource management category focus on recycling programs, process

waste reduction and reporting, alternative energy generation, and a documented energy conservation program. The four criteria of the environmental stewardship category focus on a written environmental quality policy statement, an environmental management system, environmental practice and policy review with key vendors and contractors, and a documented program that promotes the use of renewable/recycled materials or products. Finally, the community relations category has two criteria which focus on involvement and leadership in service or charitable organizations and no major non-compliance citations from federal, state, or local environmental regulatory agencies in the previous 12 months.

ESP certification is based on a point system. There are a total possible 105 points that are distributed across the five target categories. Across the five target categories there are 18 different criteria that together make up the total possible 105 points, as shown in Table 2.3. Realizing that manufacturer's may have difficulty meeting all the criteria due to size, infrastructure, and location, KCMA requires that manufacturers earn a minimum of 80 points to qualify for ESP certification.

----- Insert Table 2.3 here. -----

Those manufacturers who earn the ESP certification are awarded an ESP seal to display on their products. This seal lets consumers, builders, architects, and others know a firm's commitment to sustainability. In addition to the use of the ESP seal, manufacturers also receive recognition on the KCMA website and technical advice and assistance from KCMA to help maintain compliance, or in the event of falling from compliance, assistance in returning to compliance.

Trade publications associated with the US domestic wood kitchen cabinet industry have emphasized the major benefit of the ESP to certified manufacturers is the use of the ESP seal or

label on their products (Anonymous 2006; Anonymous, 2007 a,b,c). It is this label that signifies a commitment to environmental issues to external groups. The ESP label offers manufacturers a way to differentiate their products from other manufacturers' products that have not been ESP certified. From this perspective, the ESP label and its associated requirements ultimately function as a source of product innovation for adopting firms. The ESP label offers product innovation in terms of a previously unavailable third party certified 'green' wood kitchen cabinet product. Because ESP is so new, many questions remain about its potential impacts on cabinet producers and the wood-based companies that supply them. KCMA leadership expects that approximately half of its members will join the program by late 2007.

### **The Wood Component Manufacturers Association**

Executives from member firms of the Wood Component Manufacturers Association (WCMA) were surveyed. The WCMA represents firms that manufacture dimension lumber and wood component products. These products are used in cabinetry, furniture, architectural millwork, flooring, staircases, building materials and a wide variety of decorative/specialty applications. Manufacturers belonging to the WCMA are located throughout the U.S. and Canada.

Of the 196 firms belonging to the WCMA, only 3 firms are publicly held. Many of the member firms of the WCMA are family-owned businesses with a handful of companies owned through employee stock ownership plans. Firms belonging to the WCMA average approximately \$4 million in annual sales and employ roughly 70 people on average (S. Lawser, personal communication, July, 2008). Since wood components are produced for wide variety of applications and sales are recorded based on end-product categories, accurate statistics from the Census Bureau are not available (S. Lawser, personal communication, July, 2008). Given this,

the following discussion on end use product categories is guided through communications with the executive director of the WCMA.

The building products industry is largest consumer of goods from WCMA member firms, consuming roughly 41% of the total annual sales volume of all WCMA member firms combined. Building products include interior trim, mouldings, millwork, staircases, flooring, windows and doors, and more. The second largest consumer of goods from WCMA member firms is the kitchen cabinet industry, consuming roughly 27% of the total annual sales volume of all WCMA member firms combined. Products sold to the kitchen cabinet industry include cabinet doors, drawer boxes, face frames, stile and rails, drawer fronts, and others. The third largest consumer of goods from WCMA member firms is the furniture industry, consuming approximately 22% of the total annual sales volume of all WCMA member firms combined. Wood components are used in dining room, kitchen, occasional, and upholstered furniture. Finally, the fourth largest consumer of goods from WCMA member firms is the highly fragmented decorative/specialty industry, consuming roughly 8% of the total sales volume of all WCMA member firms combined. Decorative/specialty products include picture frames, sporting goods, toys, games, musical instruments, gift items, and others.

### **Third-party, Chain-of-Custody Certification**

Where first-party certification is approved by the organization claiming certification, and second-party certification is approved by a group associated with the organization claiming certification, third-party certification requires evaluation of certification criteria by an entity that is independent from the organization claiming certification (Dovetail Partners, 2008). In the eyes of consumers, third-party certification is often viewed as being more legitimate in its agenda and efforts than first-party or second-party certification (Dovetail Partners, 2008).

Third-party certification relative to the forest products industry has basically two forms: forest certification and chain-of-custody certification.

Third-party forest certification promotes sustainable management of the forested land in which raw materials are drawn from for the forest products industry (SFI, 2008). Three third-party forest certification schemes that are in wide use in North America are the Sustainable Forestry Initiative (SFI), the Forest Stewardship Council (FSC), and the Canadian Standards Association (CSA). In addition to forest certification, SFI, FSC, and CSA offer third-party, chain-of-custody certification (CoC).

CoC tracks and records the possession and transfer of wood-based materials from the forest through the different stages of production to the end user (SFI, 2008). CoC is focused on the supply-chain that certified wood travels through until it reaches the end user (Miller, 2007). For wood component manufacturers who want to legitimately claim the use of wood materials from certified forests (i.e., certified under the SFI, FSC, or CSA certification schemes) in their products, CoC certification is a requirement. By qualifying for CoC certification, manufacturers can offer consumers, and other manufacturing partners, products that have a “green” label that communicates the CoC certification. Of the various product labeling under the three certification schemes mentioned, two label types are most relevant to wood component producers: a “pure” label and a “mixed,” or percentage based, label.

A pure label is for products that contain 100% certified wood, where as products carrying a mixed label contain a designated minimum portion of certified wood (FSC, 2008). For firms who sell, or are considering selling, both certified and non-certified products, both label types are subject to similar requirements. For firms who sell, or are considering selling, only certified products, then there are differences in the requirements of products carrying a pure label versus a

pure label. Assuming that most wood component firms will choose to offer both certified and non-certified products in their product portfolios, the following discussion will not distinguish between pure and mixed labels and assume the requirements of certification are similar among firms in the study.

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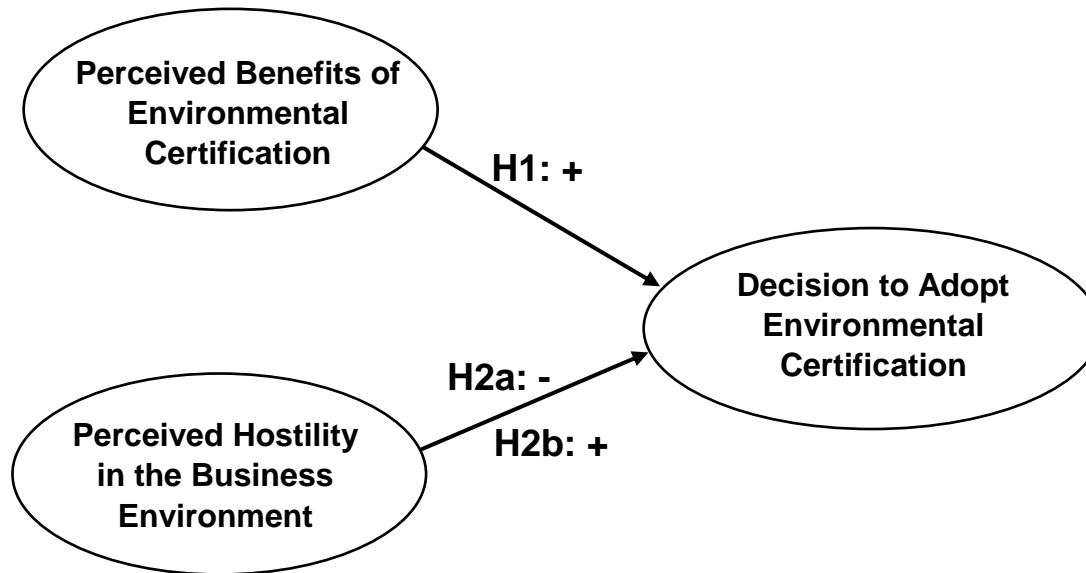
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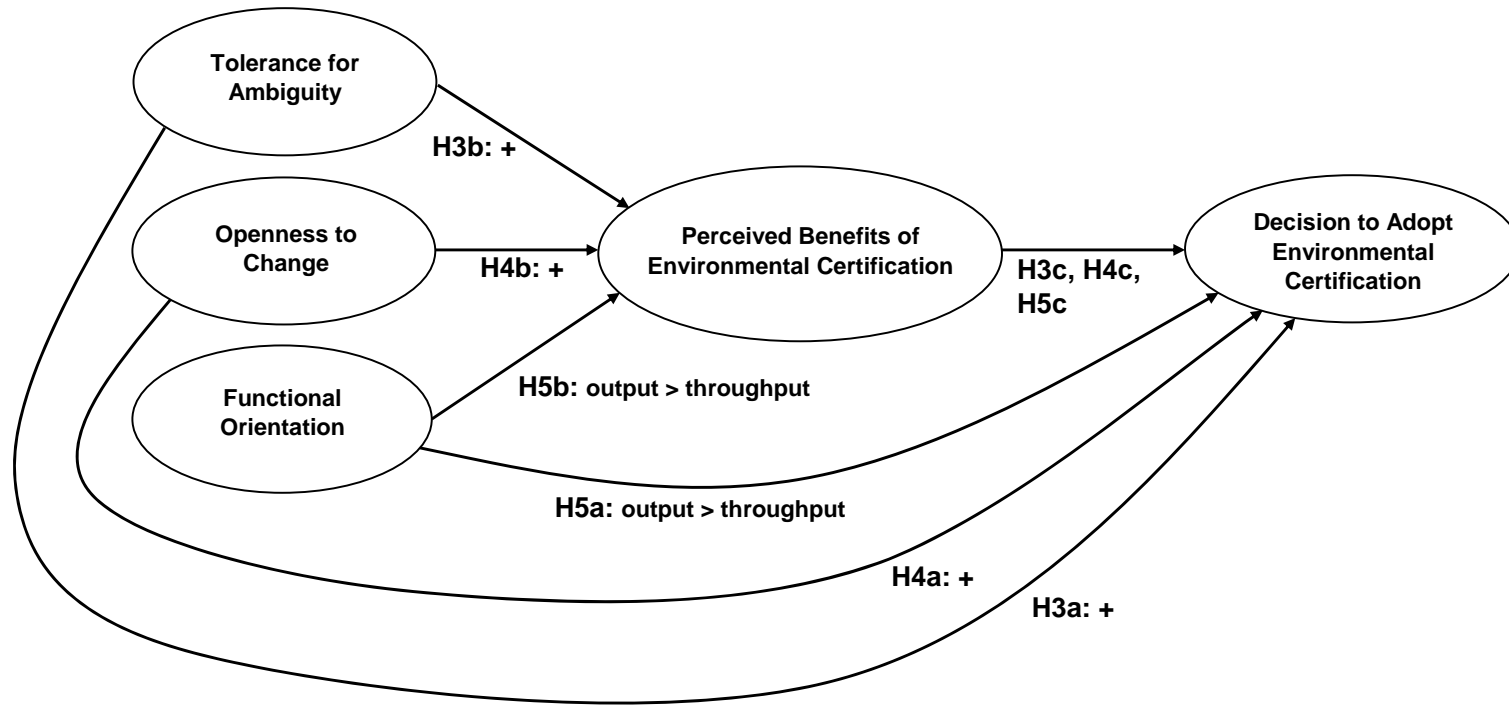
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*Figure 2.1.* Hypothesized influence of perceived benefits of environmental certification and perceived hostility in the business environment on the decision to adopt environmental certification



*Figure 2.2.* Hypothesized influence of managers' tolerance for ambiguity, openness to change, and functional orientation on the decision to adopt environmental certification mediated by perceived benefits of environmental certification

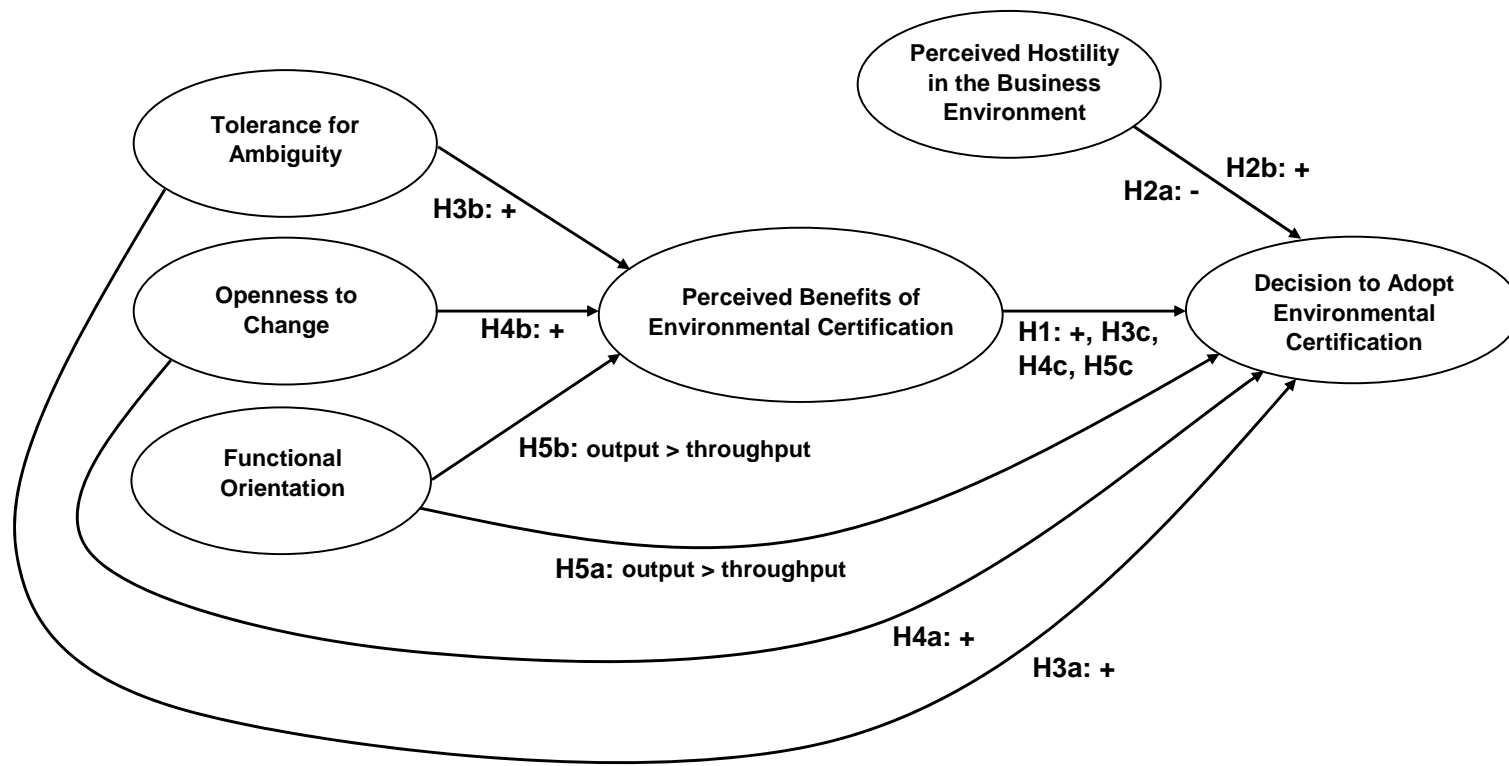


Figure 2.3. Proposed full research model

Table 2.1.  
*Top Ten U.S. Wood Kitchen Cabinet Manufacturers*

Rank	Company
1	Masco Corporation
2	Masterbrand Cabinet, Inc.
3	American Woodmark Corporation
4	Elkay Cabinet Group
5	Norcraft Companies L.L.C.
6	Republic National Cabinet Corporation
7	Cardell Cabinetry
8	Wood-Mode, Inc.
9	Bertch Cabinet Mfg., Inc.
10	LesCare Kitchens, Inc.

Source: Partsch (2003)

Table 2.2.  
*Percent of Kitchen Cabinet Industry Total Sales for 2006 by Sales Category*

<b>Sales category</b>	<b>Percent of industry total sales</b>
Dealers	44.0
Distributors	22.0
Home centers	16.6
Builders	15.3
Straight to consumers	2.1

Source: Partsch (2007)

Table 2.3.  
*Points of ESP Certification by Point Category*

<b>Point category</b>	<b>Points</b>
Air quality	30
Product resource management	30
Process resource management	20
Environmental stewardship	15
Community relations	10

**CHAPTER 3: ENVIRONMENTAL CERTIFICATION IN THE US KITCHEN CABINET  
INDUSTRY: DEMAND AND SUPPLY IMPLICATIONS FOR WOOD-BASED  
MATERIALS**

This is an article aimed at the *Forest Products Journal*. It discusses environmental certification schemes relative to green building, and supply and demand issues of environmentally certified materials relative to adoption of ESP certification in the kitchen cabinet industry.



## **Abstract**

The green building boom is having a multitude of effects on the wood products industry, and perhaps one of the greatest impacts is the proliferation of “green” certification systems. These systems range from certifying timber to semi-finished to finished goods to residential and commercial buildings. The rise in demand for green products, coupled with perceived inequities in certification schemes, has given rise to a variety of second party certification systems controlled by trade or other groups. This research investigated key aspects of a relatively new second-party environmental certification system propagated by the U.S. kitchen cabinet industry by surveying cabinet producers that have adopted this environmental certification system. Results suggest that process-based challenges, such as forming relationships with certified suppliers or training of employees, do not appear to be a significant obstacle in meeting certification requirements. However, supply and chain-of-custody issues remain a challenge as many respondents reported difficulties sourcing sufficient quantities of certified wood products. The authors conjecture that wide spread adoption of the cabinet industry’s environmental certification system could place a short-term strain on the availability of certified wood-based materials. In general, this research contributes to our understanding of the nature, inputs and outcomes of one example of second-party environmental certification within the wood products industry.

## Introduction

The market demand for green buildings is increasing (Anonymous, 2008e; Koltko, 2008; Sullivan, 2008), so much so that the trend has been referred to as the “green building movement” in the popular press (Iwata, 2008). Green building programs, such as the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED), the National Association of Home Builder’s National Green Building Standard and Green Globes are becoming more and more popular (Bowyer, 2007; Bowyer and Lindburg, 2008; Lockwood, 2008). The fact that green building is in vogue is further evidenced by the continuing growth in the various green building councils at both local and national levels (Cooper et al., 2008).

The expansion of the green building movement provides both opportunities and challenges for the wood products industry. Opportunities exist as new market space is created for manufacturers of environmentally friendly materials. A major challenge noted by experts is that some green building certification schemes such as LEED treat domestic, solid wood products unfairly with respect to their environmental performance or “sustainability” (Bowyer, 2007). For example, in a building in North America, bamboo shipped from across the globe earns points toward LEED certification whereas wood from local sources that is not certified by the designated certifying entity, but is still grown in a sustainable manner, does not earn points toward LEED certification (NAHB, 2007). Another bias of the LEED system is that it tends to favor wood products certified under the Forest Stewardship Council (FSC) (Bowyer, 2007).

Moreover, a working definition of “green” and/or “sustainable” is not altogether clear for many suppliers to popular green building programs (Schaefer-Munoz, 2007). With this lack of clarity, biases can creep into the requirements of green building programs and their attendant certification schemes.

The perceived shortcomings of some green building programs may have spurred industry trade associations to explore the creation of new certification programs. One example of such a program is the National Association of Home Builder's (NAHB) National Green Building Standard (NGBS). The NGBS recognizes all leading North American forest certification programs; however, wood remains the only structural material requiring third-party certification (Bowyer and Lindburg 2008 , NAHB, 2005). In May of 2008, the NGBS received accreditation through the American National Standards Institute (ANSI). ANSI approves only one certification scheme per product category. With ANSI approval, NGBS is likely to become the benchmark "green" standard for residential building (Anonymous, 2008c).

One prime example of a wood industry trade association taking a more active role with respect to environmental certification of manufactured wood products is the Kitchen Cabinet Manufacturers Association (KCMA). The KCMA launched its Environmental Stewardship Program (ESP) in 2006 not only to take advantage of increasing demand from consumers for "green" cabinets, but also to provide kitchen cabinet manufacturers with an option to pursue a second-party certification that could dovetail with the NAHB's National Green Building Standard. ESP certification also provides firms with a mechanism (i.e., a 'green' label) with which to differentiate their cabinets and enhance their image by communicating environmental responsibility to a consumer base concerned with issues such as formaldehyde release from products and the use of environmentally certified wood in products. Additionally, earlier adopters of ESP certification may be able to differentiate themselves from their competition through the presence of the ESP label on their products.

ESP certification is the only environmental product/process certification available to kitchen cabinet manufacturers that addresses hardwoods and composite materials

simultaneously. Certification is awarded to manufacturers based on a point system that requires manufacturers to address issues related to materials acquisition and use, air quality, manufacturing processes, environmental stewardship, and community relations (KCMA, 2008). A brief overview of the point categories and issues addressed within point categories is shown in Table 3.1. Both KCMA member firms and non-member firms are eligible to participate in ESP certification.

----- Insert Table 3.1 about here -----

The materials portion of ESP certification requires manufacturers to use environmentally certified wood-based materials in order to earn credit for materials. Table 3.2 shows the certification standards by material type as specified in the Environmental Stewardship Program. It should be noted that the ESP requirement for hardwood lumber casts a wide net over many certification schemes, not just the Forest Stewardship Council's program. The certification requirements of the Hardwood Plywood and Veneer Association (HPVA) are used for plywood, whereas the Composite Panel Association's (CPA) requirements are employed for particleboard and medium-density fiberboard (MDF) within the ESP program.

----- Insert Table 3.2 about here -----

Figure 3.1 illustrates the continuum of forest products certification from the resource base to buildings. This figure also shows where the KCMA ESP system fits into the broader picture of environmental certification in the wood products industry. At the resource level, timber and forests are certified by more than 50 first, second, and third-party entities operating throughout the world. The certification of wood products manufacturers is in the middle. This relatively complicated and potentially biased step faces challenges associated with chain-of-custody, process inputs and outputs and distribution effects. The number of

certifying entities addressing wood products conversion decreases dramatically, thus potentially magnifying their importance to our industry. At the end of the continuum are three key nationally recognized green building certification programs, with a variety of local certification programs (e.g., Austin, TX and Seattle, WA). An important aspect of ESP certification is that it enables manufacturers to dovetail ESP certified products with one of the key nationally recognized green building programs (e.g., the NAHB National Green Building Standard).

----- Insert Figure 3.1 about here -----

Widespread adoption of ESP, and others similar programs, would clearly have demand-side implications for certified wood-based materials. The U.S. kitchen cabinet industry is a large market and a significant consumer of hardwood lumber/components and non-structural panel products. In 2006 the total U.S. market for kitchen cabinets was estimated to be in the range of \$13.5-\$14.5 billion (Partsch, 2007). Olah et al. (2003) estimated that in 1999 the U.S. kitchen cabinet industry consumed approximately 484 MMBF of hardwood lumber, 1044 million ft<sup>2</sup> of ½ inch thick particleboard, 116 million ft<sup>2</sup> of ½ inch thick medium density fiberboard (MDF), and 279 million ft<sup>2</sup> of 3/8 inch thick hardwood plywood.

### **Research Objectives**

Since the inception of ESP certification, approximately half of the kitchen cabinet manufacturers that belong to the KCMA have adopted the certification<sup>1</sup>. The experiences of those firms that have adopted ESP certification could provide understanding of the potential changes in demand among kitchen cabinet manufacturers for certified wood-based materials. In addition, understanding can be gained about the challenges inherent in meeting the requirements

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<sup>1</sup> As of June, 2008

of ESP certification that may act as deterrents to pursuing ESP certification by those firms which have not yet done so.

This research, therefore, sought to describe ESP certification from the perspective of managers responsible for the implementation of ESP requirements at their firms. Specifically, this research describes: (1) managers' perceptions of the degree of difficulty that process-based challenges pose in meeting ESP certification requirements, (2) managers' perceptions of the degree of difficulty in acquiring certified wood-based materials in order for their firms to continue to meet the requirements of ESP certification, and (3) perceived differences in their current versus future use of various certified wood-based materials specified by ESP certification.

## **Research Methods**

### **Data collection**

The target population for this research was managers responsible for the implementation of ESP certification at early adopter firms. All of the firms included in the sample, except one, were members of the KCMA. Initially, an email letter was sent to participants with a message describing the research and containing a link to an on-line survey. After one week, a follow-up email was sent to potential participants who had not completed the on-line survey. A week later, a second, and final, follow-up email was sent to those who did not complete the on-line survey after the first follow-up email. The contents of each wave of emails contained a brief statement of endorsement of the research by the KCMA. All correspondence was from the researcher, not the KCMA.

## **Sample characteristics**

The KCMA provided a contact list of all 46 ESP firms and their implementation managers. Of those 46 managers, 33 completed the on-line survey, yielding a 68.8% (33/46) response rate. Of the 33 managers who completed the on-line survey, 13 of them were managers responsible for environmental certification requirements for multiple cabinet brands within their companies. At the time of the study, 87 of these brands were certified. In total, the 33 managers who completed the on-line survey were responsible for 72 cabinet brands, or 82.8%, of the 87 brands that were ESP certified.

Eight of the top 10 companies, by industry market share, in the U.S. kitchen cabinet industry were ESP certified at the time of the research. Managers of 6 of those 8 companies completed the on-line survey. We received surveys from all five of the top five producers, by market share, in the kitchen cabinet industry. Using annual sales figures, our sample is estimated to include approximately 61% (or approximately \$8.9 billion) of the total kitchen cabinet industry sales for 2007 of \$14.6 billion (Anonymous, 2008d).

A large majority (81.8%) of the participants were males. The organizational tenure of participants was basically evenly split, with 17 participants who had been with their firms for fewer than 10 years, and 16 participants who had been with their firms for 10 or more years. Non-response bias was assessed with *t*-tests that compared the mean responses of survey measures between those managers who responded to the initial email and those who responded after subsequent emails. All of the items that measured managers' perceptions of process-based challenges of ESP certification challenges of materials acquisition related to ESP certification, plus current and future usage of certified wood-based materials, were also used for *t*-tests for

non-response bias. At  $\alpha = .05$ , non-response bias was not significant with  $p$ -values ranging from .21 to .94.

## Measures

*Process-based challenges to ESP certification.* Participants were given a list of eight process-based issues related to implementing the requirements of ESP certification. This list was developed through conversations with managers from wood-products firms both within and outside of the kitchen cabinet industry who have been grappling with the decision to adopt either second-party or third-party certification, as well as with other industry experts. Managers were asked to rate the extent to which the respective challenges have been difficult to overcome in successfully implementing the requirements of ESP certification. Each of the items had a 5 point Likert type response format anchored by (1) not difficult, (2) moderately difficult, (3) difficult, (4) very difficult, and (5) extremely difficult.

*Materials acquisition challenges to ESP certification.* Managers were asked to rate the extent that acquiring a consistent supply of certified wood-based materials has been difficult to overcome in successfully implementing the requirements of ESP certification. The term “certified” was clearly defined for each material type. The certified wood-based materials considered were non-tropical hardwood lumber and hardwood components, plywood and plywood components, MDF and MDF components, and particleboard and particleboard components. Each of the items had a 5 point Likert type response format anchored by (1) not difficult, (2) moderately difficult, (3) difficult, (4) very difficult, and (5) extremely difficult.

*Percent of materials from certified sources.* Participants were asked to estimate what percentage of their facilities’ current (2008) material use was from certified sources. They were also asked to estimate what percentage of their facilities’ future (2013) material use they



anticipated will be from certified sources. The wood-based materials considered were non-tropical hardwood lumber, non-tropical hardwood components, non-tropical hardwood plywood, particleboard, and MDF. The term certified was clearly defined for each material type. Each of the items had 6 response categories anchored by (1) 1 to 20%, (2) 21 to 40%, (3) 41 to 60%, (4) 61 to 80%, (5) 81 to 100%, and (6) not applicable.

*Manager and firm characteristics.* Managers were asked to identify their companies, current job or position titles, functional areas they most identified with, organizational tenure, and cabinet-industry tenure. The brands managed by participants were determined via the contact list originally supplied by the KCMA. The 2007 annual sales of firms were obtained through publicly accessible on-line sources, and were used as a proxy for firm size. In the following analyses, the designation ‘smaller firms’ refers to firms with 2007 annual sales of less than \$30 million, and the designation ‘larger firms’ refers to firms with 2007 annual sales equal to or greater than \$30 million.

## **Results**

Figure 3.2 shows managers’ mean responses, by firm size, rating the extent that process-based challenges have been difficult to overcome in successfully implementing the requirements of ESP certification. The challenge that had the highest mean response from managers from smaller firms was having adequate cash flow to support any necessary changes as a result of certification requirements ( $\mu = 2.30$ ). For managers from larger firms, the challenge that had the highest mean response was establishing new relationships with new suppliers to obtain certified materials ( $\mu = 2.47$ ). Managers from larger firms perceived more difficulty in integrating certification requirements with existing company processes and practices versus their counterparts in smaller firms ( $t = 2.39, p = .02$ ). All other comparisons of the responses to

process-based challenges of managers from smaller versus larger firms were not significant ( $\alpha = .05$ ).

----- Insert Figure 3.2 about here -----

### **Materials acquisition challenges to ESP certification.**

Figure 3.3 shows managers' mean responses, by firm size, rating the extent to which acquiring a consistent supply of certified wood-based materials has been difficult to overcome in successfully implementing the requirements of ESP certification. For smaller firms, managers' mean responses to the difficulties of acquiring a consistent supply of certified wood-based materials ranged from 1.36 to 2.31. The mean responses of managers from larger firms were also low and ranged from 1.32 to 3.63.

----- Insert Figure 3.3 about here -----

The certified wood-based material category with the highest mean response for both firm size categories was non-tropical hardwood lumber and hardwood components. Managers of larger firms perceived more difficulty in acquiring a consistent supply of certified hardwood lumber and/or hardwood components versus small firm managers ( $t = 3.14, p < .01$ ). All other comparisons of the responses to materials acquisition challenges of managers from smaller versus larger firms were not significant ( $\alpha = .05$ ).

### **Percent of materials from certified sources**

Table 3.3 shows managers' responses, as a percentage of firms in the sample, to questions which asked them to estimate the percentage of their facility's (or facilities') current (2008) and future (2013) material use from certified sources. In general, an upward shift in the estimated use of certified hardwood lumber, hardwood components, and hardwood plywood can

be seen in Table 3. A flat trend for the estimated use of certified particleboard and certified MDF, from 2008 to 2013, can be seen in Table 3.3.

----- Insert Table 3.3 near here -----

Comparing 2008 to 2013 for the estimated use of certified hardwood lumber, managers' responses shifted from the lowest response category (1% to 20%) to higher response categories. For estimated certified hardwood lumber use in 2008, 48% of managers' responses are associated with the lowest response category (1% to 20%) and 23% are associated with the highest response category (81% to 100%). For estimated certified hardwood lumber use in 2013, 13% of managers' responses are associated with the lowest response category (1% to 20%) and 45% are associated with the highest response category (81% to 100%). A separate analysis of our sample's 10 largest firms, by sales, showed a similar upward trend for the anticipated change in the estimated use of certified hardwood lumber from 2008 to 2013.

In terms of the estimated use of certified hardwood components for 2008 versus 2013, managers' responses again shifted from the lower response categories to higher response categories. For estimated certified hardwood component use in 2008, 39% of managers' responses are associated with the lowest response category (1% to 20%). By 2013 it appears that many of these companies will shift to a much higher use of certified components. A separate analysis of our sample's 10 largest firms, by sales, showed a similar upward trend for the anticipated change in the estimated use of certified hardwood components for 2008 and 2013.

Similar patterns were seen when examining certified hardwood plywood usage. However, when comparing 2008 to 2013 for the estimated use of certified particleboard (PB) and certified MDF, there was no noticeable shift in managers' responses between time periods. This does not mean that certified PB and MDF would not see significant demand since results suggest

that this portion of the cabinet industry is already purchasing most of its PB and MDF from certified sources. A separate analysis of our sample's 10 largest firms, by sales, showed a similar flat trend for the anticipated change in the estimated use of certified particleboard and certified MDF from 2008 to 2013.

### **Manager characteristics**

Pearson product moment correlations were used to assess the relationships of manager characteristics with all the individual items that measured managers' perceptions of (1) process-based challenges of ESP certification, (2) challenges of materials acquisition related to ESP certification, or (3) current and future usage of certified wood-based materials. The correlations between the managers' organizational tenures and managers' perceptions of process-based challenges, materials acquisition challenges, and material usage were not significant ( $\alpha = .05$ ). Managers with longer cabinet industry tenures perceived more difficulty in having sufficient shop floor labor to meet the requirements of certification versus managers with shorter cabinet industry tenures ( $r = .43, p = .01$ ). Also, managers with longer cabinet industry tenures perceived more difficulty in having sufficient administrative staff to meet the requirements of certification versus managers with shorter cabinet industry tenures ( $r = .36, p = .04$ ). All other correlations between managers' cabinet industry tenures and managers' perceptions of process-based challenges, materials acquisition challenges, and material usage were not significant ( $\alpha = .05$ ).

### **Discussion**

This study focused only on managers from cabinet producers that had already adopted ESP certification. It is likely that managers from firms that have not adopted ESP will see the degree of difficulty or challenges in meeting requirements of ESP certification quite differently

than those surveyed in this study. Likewise, firms that have not adopted ESP certification may not anticipate the same trends in certified material use as the firms sampled for this study.

When considering the results of this study at the industry level, we note that our sample is estimated to include approximately 61% of the total sales of the U.S. cabinet industry.

Conclusions drawn about material use trends and their ramifications are, in part, based on the market share representation of the sample. Because of competitive pressures from rivals that have adopted ESP certification, some firms that have not yet adopted ESP may find it necessary to adopt certification regardless of their perceptions of difficulty in overcoming challenges related to it.

In general, managers perceived challenges not related to material acquisition to be relatively easy to overcome in order to meet the requirements of ESP certification. However, differences did exist among managers' perceptions of the difficulty in having sufficient shop floor labor and administrative staff to meet the requirements of certification and the difficulty in integrating certification requirements with existing company processes and practices. Even though these differences were present, managers' mean responses to these process-based challenges indicate a low degree of difficulty in overcoming them.

Generally, managers perceived difficulty in acquiring a consistent supply of certified (non-tropical) hardwood lumber and hardwood components. Additionally, managers from the larger firms (\$30+ million sales) that consume a greater volume of hardwoods perceived more difficulty in acquiring a consistent supply of certified hardwood lumber and components than managers from smaller firms. Moreover, results suggest significant increases in usage of certified hardwood lumber and components by 2013. The combined effects of these two findings point toward a considerable strain on the supply of hardwood products certified through

the American Tree Farm System, FSC, SFI, and CSA. We forecast similar demand increases for certified hardwood plywood.

### **Implications**

If there is a downside to wide spread adoption of ESP certification, it might be increased strain on the demand-supply relationship for certified wood-based products. With an increase in the adoption of the Environmental Stewardship Program, demand-side issues for certified wood-based materials are likely to arise. As previously noted, the kitchen cabinet industry is a large-scale user of hardwoods and non-structural wood-based panel products (Olah et al. 2003). This heavy use of wood-based materials and an anticipated rise in the demand for certified wood-based materials by firms that adopt ESP certification are at odds with one another.

These demand-side issues are likely to have their greatest impact on wood component manufacturers who supply kitchen cabinet manufacturers. If kitchen cabinet manufacturers depend on the wood component sector for certified components to satisfy ESP certification requirements, this could result in component manufacturers needing to pursue chain-of-custody certification. This would certainly be the case if a kitchen cabinet manufacturer needed to maintain a supply of FSC certified component parts, because FSC certification requires component parts manufacturers to be chain-of-custody certified if they sell products with an FSC label (Guillery et al., 2004). In turn, we can also foresee additional challenges for the upstream segments of the forest products industry that will be called on to supply increasing quantities of certified wood materials.

### **Limitations**

There are two main limitations to this research: anticipated changes in firms' manufacturing volumes were not accounted for, and only firms that have adopted ESP

certification were in the sample. By not estimating and accounting for anticipated changes in manufacturing volume, all statements and assertions concerning anticipated changes in certified wood-based materials usage need to be assessed with caution. Further, we only received survey feedback from one person at each company, and other key decision-makers could have different opinions with respect to the issues we posed.

## **Conclusions**

Overall, ESP certification appears to be an example of a well-targeted second-party certification scheme that is well suited to the challenges and needs of member firms. Our research did not investigate consumer response to ESP, but interviews with industry executives indicate that the program is having a positive impact on sales to homeowners. Given its myriad of benefits for firms in the kitchen cabinet industry, and with increasing consumer demand for green building and green building products, the adoption of ESP certification is likely to become more wide spread. Our results suggest that as more cabinet producers adopt ESP there may arise more demand-supply issues for certified hardwood lumber, components and certified hardwood plywood. Even though it is already becoming difficult to find adequate supplies of certified hardwood lumber, components, and plywood, it appears that without increases in availability there could be even greater shortages over the next five years. This suggests that parties throughout the hardwood supply chain should prepare for increased demand for certified materials.

It is important to note that all of the key green building programs are evolving and much work will be necessary to better discriminate between real and perceived environmental performance. In general, however, consumers continue to demand environmentally friendly wood products (Anonymous, 2008b), and this trend can be seen in the growth of green building

programs (Anonymous, 2008a; Cooper et al., 2008; Koltko, 2008). The National Association of Home Builder's (NAHB) National Green Building Standard (NGBS) is one of the most significant green building programs in North America (Bowyer, 2007). Recently, the NAHB's NGBS was submitted to the American National Standards Institute (ANSI) for approval (Anonymous, 2008c). With the NGBS having gained ANSI approval in May 2008, it is likely to become the premier green building standard for residential housing. With residential sales representing approximately 81% of the demand for kitchen cabinets in 2007 (Anonymous, 2008d), if the NGBS was to gain ANSI approval it will have a considerable impact on green product options for kitchen cabinet manufacturers. KCMA's ESP certification dovetails with the requirements of the NGBS, thus giving kitchen cabinet manufacturers that adopt ESP certification potential access to a new green market space. Not only would this help homebuilders and consumers desiring green cabinet products, but it would also help to improve the net impact the kitchen cabinet industry has on the environment.

Second-party certification systems such as KMCA's ESP are likely to become more prevalent in the wood products industries in order to satisfy consumer demand and provide a viable option for industry participants. It is therefore important to understand the challenges of second-party certification schemes and their implications for wood materials demand. Future research should investigate how consumers of wood products view second party certification versus independent third party systems. This stream of research should assist industry leaders to better understand the issues that will surround similar certification schemes as they arise throughout the wood products and allied industries. While this research was conducted to better understand the challenges and material demand issues of KCMA's ESP certification system, the results have broad implications for other segments of the industry. As similar second-party



certification schemes come into existence throughout the wood products and closely related industries, the knowledge gained by research endeavors such as this can assist in the evaluations of the issues that will surround future certification schemes.

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Table 3.1.

*Point Categories, and Issues Addressed within Point Categories, of the of the Environmental Stewardship Program (ESP)*

<b>Point category</b>	<b>Issues addressed within point categories</b>
Air quality	<ul style="list-style-type: none"> <li>• Formaldehyde emissions from panel products</li> <li>• Hazardous air pollutants (HAPS) from finishing operations</li> </ul>
Resource management – product	<ul style="list-style-type: none"> <li>• Recycled/recovered content of fiber and particle panel products</li> <li>• Plan to educate suppliers about preference for certified hardwood lumber</li> <li>• Use of certified hardwood lumber</li> </ul>
Resource management – process	<ul style="list-style-type: none"> <li>• Active recycling program</li> <li>• Use of program to track and reduce process wastes</li> <li>• Use of process residue to energy production (internal or external to the firm)</li> <li>• Documented energy conservation program</li> </ul>
Environmental stewardship	<ul style="list-style-type: none"> <li>• Written policy about relation to the natural environment</li> <li>• Use of an Environmental Management System (EMS)</li> <li>• Review of environmental practices of key vendors and contractors</li> <li>• Documented program promoting the use of renewable/recycled materials or products</li> </ul>
Community relations	<ul style="list-style-type: none"> <li>• Demonstrated community involvement and leadership</li> <li>• No major non-compliance citations from regulatory agencies in the previous 12 months</li> </ul>

Table 3.2.  
*Certification Schemes Included in the Environmental Stewardship Program (ESP) by Wood Material Type*

<b>Material type</b>	<b>Certification schemes</b>
Hardwood lumber and components	Forest Stewardship Council (FSC) Sustainable Forestry Initiative (SFI) American Tree Farm System Canadian Standards Association (CSA) Pan European Forest Certification Council (PEFC) International Tropical Timber Organization (ITTO) ISO 14000 Environmental Management Series
Plywood	PS-1 ANSI/HPVA HP-1
Particleboard	CPA EPPS CPA 2-06
Medium-density fiberboard	CPA EPPS CPA 2-06

Table 3.3.  
*Estimates<sup>1,2</sup> of the Percent of Materials Used From Certified<sup>3</sup> Sources in 2008 and 2013 by Material Type*

<b>Response category</b>	<b>Hardwood lumber</b>		<b>Hardwood components</b>		<b>Plywood (hardwood)</b>		<b>Particleboard</b>		<b>Medium-density fiberboard</b>	
	<b>2008</b>	<b>2013</b>	<b>2008</b>	<b>2013</b>	<b>2008</b>	<b>2013</b>	<b>2008</b>	<b>2013</b>	<b>2008</b>	<b>2013</b>
1% to 20%	48%	13%	39%	10%	9%	0%	6%	0%	6%	0%
21% to 40%	3%	19%	6%	17%	3%	3%	0%	3%	0%	3%
41% to 60%	3%	10%	0%	10%	3%	3%	0%	0%	0%	0%
61% to 80%	16%	3%	13%	3%	16%	6%	0%	0%	3%	0%
81% to 100%	23%	45%	23%	40%	66%	81%	85%	87%	82%	87%

<sup>1</sup> The survey question for current material use read: “For each of the following material types, what percentage of your facility’s (or facilities’) usage of the material do you estimate to be from certified sources currently (2008)?”

<sup>2</sup> Responses shown as a percent of the firms in the sample; Responses of “not applicable” and non-responses are not shown, so the sum of the responses in individual columns do not equal 100%

<sup>3</sup> Certified was defined for participants per material type according to ESP certification requirements

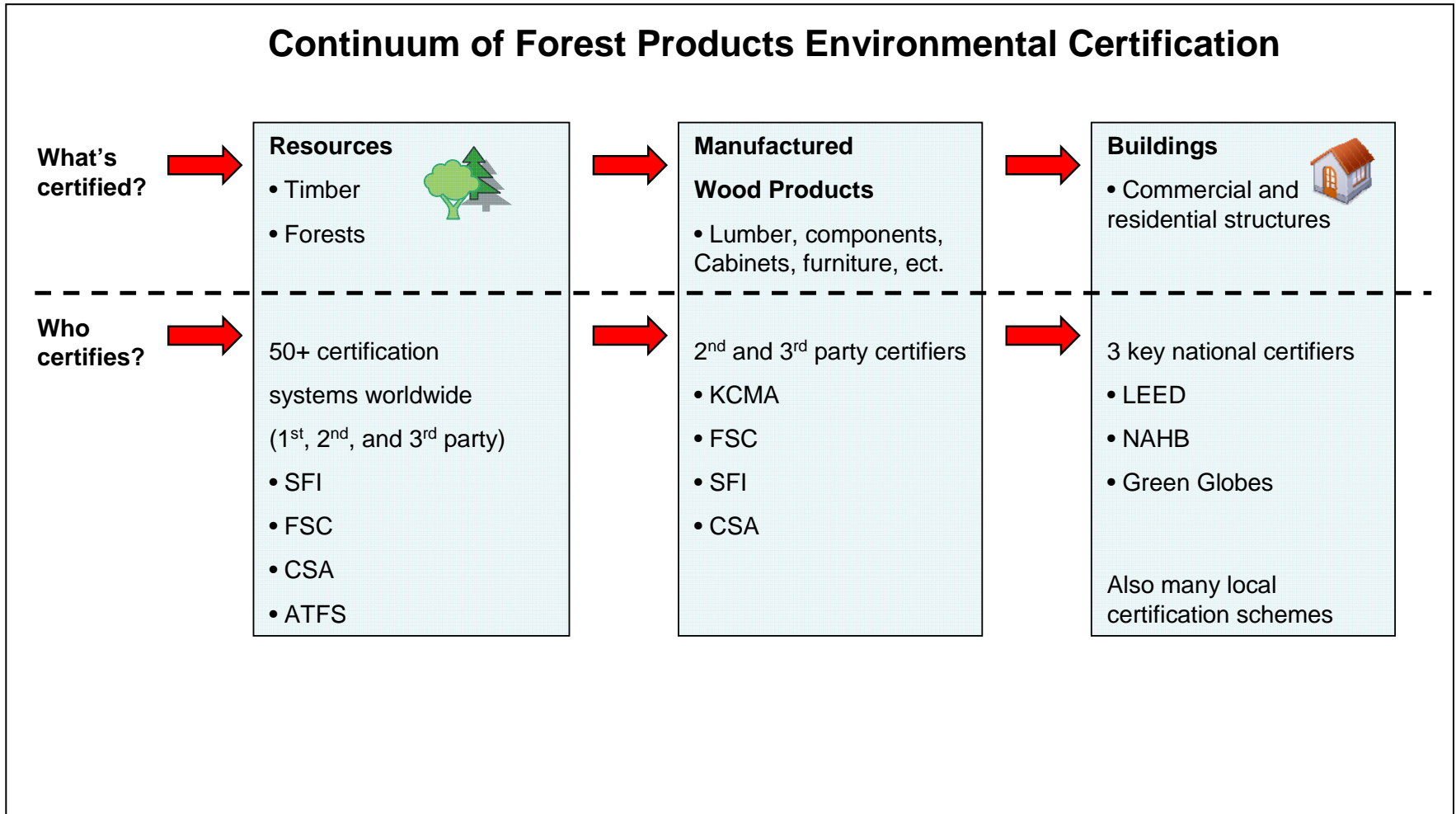


Figure 3.1. Continuum of forest products environmental certification

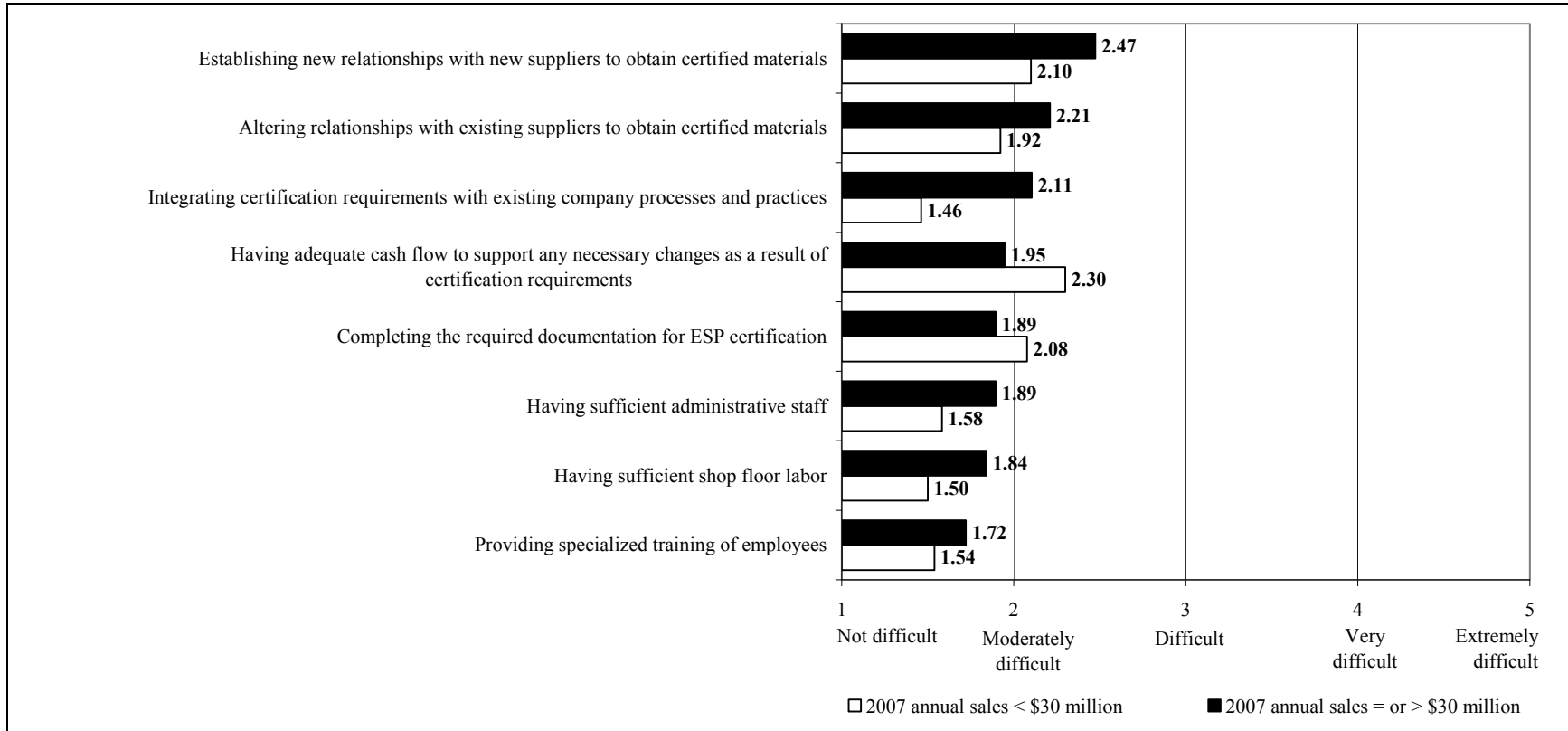


Figure 3.2. Mean responses to process-based challenges related to ESP certification by firm size



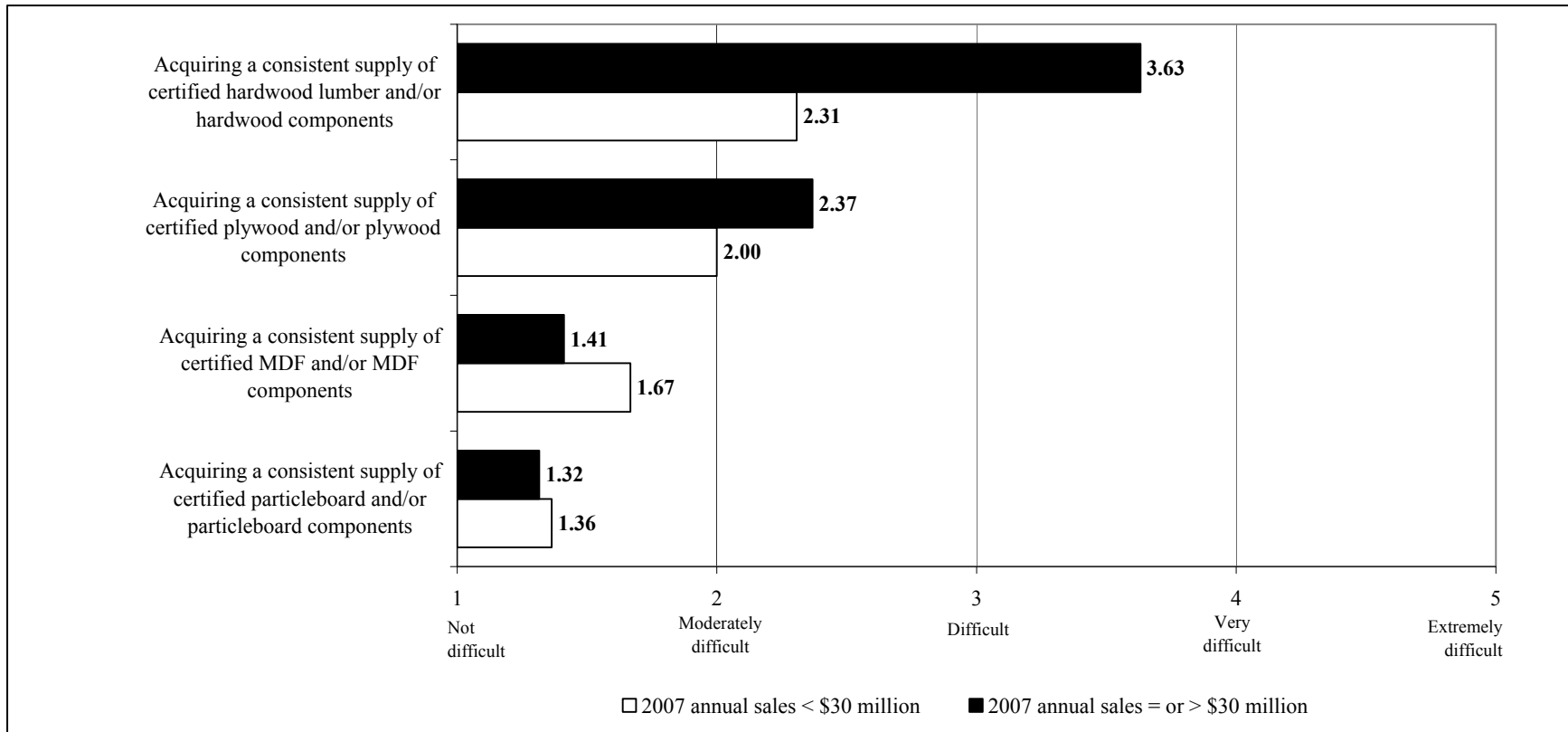


Figure 3.3. Mean responses to materials acquisition challenges related to ESP certification by firm size

## **CHAPTER 4: EXAMINING DETERMINANTS OF THE DECISION TO ADOPT ENVIRONMENTAL CERTIFICATION**

This is an article may be submitted to the journal *Business Strategy and the Environment*. It discusses the influence of executives' (1) functional orientation, (2) perceptions of hostility in the business environment, and (3) perceptions of benefits and challenges of environmental certification on their decisions to adopt, or not adopt, environmental certification.

## **Abstract**

A number of management researchers have argued that executives play a critical role in firms' pursuit of environmental initiatives. Several researchers have shown how executives' perceptions of environmental initiatives influence their adoption of such initiatives. This research builds on past research by examining the influence of executives' perceptions of environmental certification, perceptions of hostility in the business environment, and their functional orientations on their decisions to adopt environmental certification. The mediating effect of executives' perceptions of environmental initiatives on the relationship between executives' functional orientations and their decisions to adopt certification is examined. Results from logistic regression analyses indicate that executives' perceptions of certification, perceptions of hostility in the business environment, and their functional orientations all influence their decisions to adopt environmental certification. A mediating effects of executives' perceptions of certification were not found. This research contributes to the understanding of executive-based determinants of executives' decisions to adopt environmental certification.

## INTRODUCTION

Consumers are continuing to demand green products (Rokka and Uusitalo, 2008). This demand is affecting many markets, ranging from everyday items such as dishwashing detergent to products with longer life-cycles, such as vehicles, homes and other buildings (*citation needed*). Accompanying this demand is also a desire to have reassurance that products are adhering to environmental standards (Guillery et al., 2004).

As a means to address the issue of environmental standards, environmental certification schemes have been created (Guillery et al., 2004). Beyond offering a mechanism by which to compare products, environmental certification also often provides manufacturers with a means, a “green label,” with which to communicate environmentally friendly characteristics of their products or the processes employed to create the products. In other words, environmental certification (EC) offers both a way to compare and differentiate products based on ties to the natural environment, and a means by which firms can communicate their environmental initiatives to a consumer base which desires green products.

The adoption of EC has become more prevalent as evidenced in fields such as green building (Cooper et al., 2008). As EC becomes more widely adopted it also serves another purpose, improving the net environmental impact of participating firms. Of course this is contingent on the certification having an emphasis on the legitimate aims of improving the environmental impact which firms have on the natural environment.

Even though there has been an overall increase in the creation and adoption of EC, firms within a given industry differ in their decision to adopt EC. This suggests that the strategic decision-makers (i.e. top executives) of firms differ in how they perceive and ultimately act relative to EC. Why do some executives decide to adopt environmental certification, where as

others do not? What aspects of environmental certification are most influential in driving executives' decisions to adopt, or not adopt?

The research presented herein addresses these questions by examining executives' decisions to adopt environmental certification within a specified industry. It identifies dimensions of executives' perceptions of the benefits and challenges of EC, examines the influence of these perceptions, as well as the influence of executives' functional orientation or career path and their perception of hostility in the business environment on the decision to adopt certification. Finally, conclusions are drawn about the implications of these relationships.

## **THEORY DEVELOPMENT AND HYPOTHESES**

### **The Nature of the Decision to Adopt Environmental Certification**

Schendel and Hofer (1979) discuss levels of strategy, where the levels of strategy can be considered in a hierarchical order from business unit strategy, to corporate strategy, to enterprise level strategy. The decision to adopt EC is primarily at the level of business unit strategy rather than corporate strategy. In other words, the decision to adopt EC addresses issues surrounding the question of how does a firm prosper in a given line of business, versus the question of what businesses should a firm be in.

Relative to business unit strategy, Miles and Snow (1978) discuss three types of problems firms face: entrepreneurial, engineering, and administrative. The entrepreneurial problem leads the firm's decision-makers to address issues about which products, services, and markets they will target (Miles and Snow, 1978). These issues are oriented toward the external business environment of the firm. The engineering problem leads the firm's decision-makers to address issues about how to effectively and efficiently produce and deliver the targeted products and services. These issues are primarily oriented toward the internal processes of the firm. Finally,

the administrative problem leads the firm's decision-makers to address issues about how to best structure the organization to achieve the direction set forth by answering the entrepreneurial and engineering problems facing the firm (Miles and Snow, 1978). Issues surrounding the administrative problem are internal to the firm.

The potential benefits of adopting EC have a broad scope and include satisfying existing customer demand for green products, gaining new customers, improving a firm's competitive posture relative to its direct competitors as well as foreign competition, improving the image of firm in the eyes of environmental groups, being prepared for future regulatory changes, and improving upon the firm's previous actions toward the natural environment. These benefits are directly tied to entrepreneurial problems facing firms and only indirectly tied to the engineering or administrative problems facing firms. They involve domain selection and adjustment, activities directed toward external entities of the firm; not about effective and efficient production.

Potential challenges associated with the decision to adopt EC include several financial considerations, including the initial cost of becoming certified, the cost of staff hours dedicated to the documentation requirements, and costs associated with changing a company's internal practices and processes. Other challenges include altering relationships with suppliers to obtain certified raw materials, and the availability of certified raw materials. These challenges are not directly tied to the entrepreneurial problems facing firms; they are internally oriented and are associated with engineering and administrative problems. The challenges are not about product domain selection and adjustment, but are about how does a firm effectively and efficiently produce certified products and how does a firm structure itself to do so.

There is another question that arises relative to the decision to adopt EC: Is the decision to adopt part of a broader, predetermined organizational strategy to address the firm's relationship with the natural environment? Researchers have looked into strategies aimed at addressing the relationship of firms and the natural environment (Hart, 1995; Sharma and Vredenberg, 1998, Shrivastava, 1995a). There is no evidence that clearly suggests that the decision to adopt EC is necessarily part of such a predetermined strategy. The decision to adopt EC may simply be a strategic choice (Child, 1972) that when examined from a future standpoint may, or may not, appear to be part of a series of decisions which show a pattern of a natural environment oriented strategy. As Mintzberg (1978) asserts, strategy is a "pattern in a stream of decisions (p. 935)." Strategies are not always intended or formulated, but may be realized as a series of strategic choices that form a pattern (Mintzberg, 1978). In this investigation, the decision to adopt environmental certification will be considered as a strategic choice (Child, 1972) made by the decision-maker, or decision-makers, of the firm.

### **The Influence of Executives on Strategic Choice**

The work of Cyert and March (1963) and their view of a dominant coalition, or a group of powerful individuals who make decisions which effect organizational actions and outcomes, has influenced organizational researchers who are interested in studying the role of top managers of organizations. Hambrick and Mason (1984), who expanded upon the work of Carnegie School theorists such as Cyert and March, provided researchers with an "upper echelons" perspective of the organization, where the organization as a whole is a reflection of its top managers. Important to the upper echelons perspective is the idea of strategic choice. The concept of strategic choice encompasses formal and informal choices, indecision and decision, as well as those choices that address the entrepreneurial, engineering, and administrative problems

facing organizations (Child, 1972; Hambrick and Mason, 1984). Strategic choices do not include everyday, repetitious decisions that lend themselves to calculable solutions (Hambrick and Mason, 1984). They are often surrounded with uncertainty as to how means and ends connect as well as what exactly the means and ends are (Hambrick and Mason, 1984).

The ability of managers to make complex decisions, or strategic choices, on a techno-economic basis is limited by bounded rationality, multiple and conflicting goals, a wide range of options, and varying aspiration levels (Cyert and March, 1963; Hambrick and Mason, 1984; March and Simon, 1958). Top managers' cognitive biases, values, experience, and attributes influence the strategic choices they make (Hambrick and Mason, 1984). Employing the framework of Hambrick and Mason's (1984) upper echelons model, many researchers have shown that demographic characteristics of top managers (e.g. tenure, education, functional background), as well as psychological and personality characteristics, influence their strategic choices and associated organizational outcomes (Finkelstein, et al., In press; Hambrick, 2007). The strategic choice of deciding whether or not to adopt environmental certification is also subject to characteristics and perceptions of executives.

### **Perceived Benefits and Challenges of Environmental Certification**

Many authors have emphasized the importance of the participation of top managers in successful firm environmental initiatives (Buzzelli, 1991; Lawrence and Morell, 1995; Masurel, 2007; Post and Altman, 1994; Winn, 1995). Masurel (2007) asserts that the entrepreneurial decisions of top managers serve as key motivators for firms to invest in voluntary environmental measures. In a review of models that describe the adaptation of organizations to issues in the natural environment, Post and Altman (1994) developed a three phase corporate greening model where top managers are prominent in the success of each phase of the model. Top managers



make decisions that directly impact the strategic orientation of the firm (Child, 1972). How they interpret, and make sense of, their business environment influences organizational outcomes (Daft and Weick, 1984; Hambrick and Mason, 1984; Weick, 1979).

The labels which firms' decision-makers attach to strategic issues influences the meanings attached to those issues and subsequent strategic choices (Dutton and Jackson, 1987). Dutton and Jackson (1987) suggest that "opportunities" and "threats" are two salient categories which organizational decision-makers consider strategic issues. There has been considerable research into the ways managers interpret issues in the business environment as either opportunities or threats (Andersson and Bateman, 2000; Dutton and Jackson, 1987; Jackson and Dutton, 1988; Sharma, 1997; Sharma and Nguan, 1999; Sharma et al., 1999; Thomas and McDaniel, 1990). Such an approach to issues involving the natural environment has also been shown to be a relevant tool for helping to explain firms' responsiveness to environmental issues (Penner, 1994; Sharma, 1997; Sharma and Nguan, 1999; Sharma et al., 1999).

In their study of seven firms in the Canadian oil and gas industry, Sharma and Vredenburg (1998) found that managers of environmentally proactive firms, firms that pursued more voluntary environmental initiatives, perceived competitive benefits associated with environmental responsiveness. Conversely managers of environmentally reactive firms perceived environmental responsiveness as detracting from performance. Sharma and Nguan (1999) also found that firms' environmental strategies were influenced by how managers interpreted environmental issues as opportunities rather than threats. Specifically, firms with more proactive, voluntary environmental strategies had managers who saw environmental issues as opportunities rather than threats (Sharma, 1997; Sharma and Nguan, 1999; Sharma et al., 1999). For voluntary environmental initiatives, the managers' perceptions of benefits tied to

those initiatives is an important determining factor in their adoption, where as the perception of threats diminishes the likelihood of adopting voluntary environmental initiatives.

At the core of the conceptualization of opportunities and threats is the notion of benefits and challenges facing firms. The labeling of benefits and challenges helps to bring aspects of the decision to adopt EC closer to daily, routine activities of the firm rather than the more abstract framing of the labels of opportunities and threats. Using the labels of benefits and challenges, but building ideas and relationships in previous research on opportunities and threats, top managers who perceive more benefits of EC are more likely to pursue EC than top managers who perceive fewer benefits. Conversely, top managers who perceive more challenges of EC are less likely to pursue EC than top managers who perceive fewer challenges.

Hypothesis 1 (H1): Top managers who perceive more benefits of environmental certification will be more likely to adopt environmental certification.

Hypothesis 2 (H2): Top managers who perceive more challenges of environmental certification will be less likely to adopt environmental certification.

### **Functional Orientation**

Regardless if their job requirements are generalist in nature, top managers bring their past career experiences with them to their current role (Hambrick and Mason, 1984). Top managers have often been exposed to various functional perspectives, but usually top managers have spent a greater portion of their career in a primary functional area (Finkelstein et al., In press). As assessed by Hambrick and Mason (1984) as well as Finkelstein et al. (In press), Dearborn and Simon (1958), in one of the earliest empirical works on the influence of manager's functional background on managerial choice, suggest that when managers with different functional positions were presented with the same problem situation and were asked to provide an

assessment from a perspective of the entire organization, managers defined the problem for the most part in terms of their own functional area.

Miles and Snow (1978) in their strategic typology describe managers as having either an output or a throughput function. Emphasizing growth and the search for new domains, output functions include marketing, sales, and product development (Hambrick and Mason, 1984; Miles and Snow, 1978). With an emphasis on improving internal organizational efficiency, throughput functions include production, process engineering, and accounting (Hambrick and Mason, 1984; Miles and Snow, 1978). Having a different emphasis or focus, managers from these two functional domains will likely have different perspectives about the firm and its relationship with the business environment (Hambrick and Mason, 1984; Lawrence and Lorsch, 1967; Miles and Snow, 1978).

In an investigation of the Miles and Snow's (1978) strategic typology applied to tobacco companies, Chaganti and Sambharya (1987) found a higher proportion of executives with output orientations in Prospector firms, which emphasize entrepreneurial decisions as opposed to engineering and administrative decisions, than firms from other strategic types. Similarly, Thomas et al. (1991) in their examination of computer companies found that Prospector firms as compared to Defender firms, which place emphasis on engineering decisions that primarily concern the internal domain of the firm, had more CEOs from output functional backgrounds, where as Defenders had more CEOs from throughput functional backgrounds. Other researchers have also found similar relationships between executives' and top managers' functional backgrounds and their strategic focus or orientation (Barker and Mueller, 2002; Strandholm et al., 2004; Tyler and Steensma, 1998).

As previously discussed, the benefits of adopting EC are tied to entrepreneurial, more externally focused, problems facing the firm rather than those that are primarily internally focused, engineering problems. On the other hand, the challenges of adopting EC are primarily tied to engineering, as well as administrative, problems facing the firm. These connections to the entrepreneurial and engineering problems of the firms are likely to be related to how executives from different functional orientations differ on their perceptions of the benefits and challenges of certification.

The functional orientation of a top manager will influence his or her decision to adopt EC. A top manager's functional orientation will determine the degree to which he or she identifies benefits and challenges of EC. Specifically, top managers with throughput functional backgrounds, such as operations/production and process engineering, will perceive fewer benefits and more challenges and be less likely to adopt EC than top managers with output functional backgrounds, such as sales and marketing. The perceptions of benefits and challenges of EC are likely to be powerful influences on how a top manager's functional orientation leads to a top manager's decision to adopt EC.

Hypothesis 3 (H3): Top managers with throughput functional orientations will be less likely to adopt environmental certification than top managers with output functional orientations.

Hypothesis 4 (H4): Top managers with throughput functional orientations will perceive less benefits of environmental certification than top managers with output functional orientations.

Hypothesis 5 (H5): Top managers with throughput functional orientations will perceive more challenges of environmental certification than top managers with output functional orientations.

Hypothesis 6 (H6): The relationship between a top manager's functional orientation and his or her decision to adopt environmental certification will be mediated by the top manager's perception of benefits and challenges of environmental certification.

### **Perceived Hostility in the Business Environment**

As Duncan (1972) declares, organizations must adapt to their business environment if they are to remain viable. Managers' perceptions of the firm's business environment are important in how a firm interacts with its environment (Hambrick and Mason, 1984; Pfeffer and Salancik, 1978; Weick 1969). One of the key dimensions in which managers perceive the external business environment is hostility versus munificence (Dess and Beard, 1984).

Building on descriptions from Khandwalla (1977) and Miller and Friesen (1978), Miller and Friesen (1983) define hostility in the business environment as "the degree of threat to the firm posed by the multifacetedness, vigour and intensity of the competition and the downswings and upswings of the firm's principle industry (p. 222)." Hostile business environments prompt firms to act, because decision-makers perceive a threat to organizational survival (Ashmos et al., 1997; Elbanna and Child, 2007). Similarly, hostile business environments are characterized by competitive intensity and pose threats to the viability of organizations (Covin et al., 1999; Miller, 1994; Zahra, 1993). Covin and Slevin (1989) describe hostile business environments as having intense competition and limited exploitable opportunities. Alternately, benign business environments are munificent and offer choice among investment and marketing opportunities (Covin and Slevin, 1989; Khandwalla, 1977; Miller and Friesen, 1983). Akin to hostility is

munificence. Munificence refers to the ability of a business environment to support an organization's sustained growth (Aldrich, 1979; Dess and Beard, 1984). Castrogiovanni (1991) considers hostility as one of several ways to label munificence, and hostility places emphasis on a firm's relationship with its competition (Miller and Friesen, 1982). In stating conclusions and providing explanations of observed relationships, researchers readily interchange the words hostility and munificence (Covin and Slevin, 1989; Goll and Rasheed, 1997; Elbanna and Child, 2007).

In the context of organizations' relationships with the natural environment, Aragón-Correa and Sharma (2003) provide a theoretical assessment of the role of contingency factors in the relationship between organizational resources and capabilities and their influence on competitive advantage. They suggest that slack resources associated with munificent business environments will provide opportunities for organizations to generate proactive approaches to managing their relationships with the natural environment (Aragón-Correa and Sharma, 2003). They offer the following proposition: "Perceived munificence in the general business environment increases the likelihood that a firm will use its capabilities and resources to develop a proactive environmental strategy (p. 82)."

In an empirical investigation of the determinants of the adoption of environmentally friendly technologies in a portion of the US printing industry, Rothenberg and Zyglidopoulos (2007) did not find a significant relationship between munificence in the business environment and the adoption of environmentally friendly technologies. Rothenberg and Zyglidopoulos (2007) used an objective measure of munificence of the business environment. Aragón-Correa and Sharma (2003) emphasize managers' perception of munificence. When examining individual tactical decisions and actions, Castrogiovanni (1991) suggests that either a subjective

or objective measure of munificence can be used. Perhaps if Rothenberg and Zyglidopoulos (2007) had used a subjective, perceptual measure of environmental munificence they may have found different results. Building on the proposition of Aragón-Correa and Sharma (2003), top managers' perception of the hostility in the business environment will impact their decision to adopt environmental certification. Specifically, as a top manager perceives more hostility in the business environment he or she will be less likely to decide to adopt environmental certification.

Hypothesis 7 (H7): Top managers who perceive more hostility in the firm's business environment will be less likely to adopt environmental certification.

By using an approach emphasizing strategic choice and the role of executives in strategic choice, this research examines determinants to the decision to adopt EC within a given industry. Specifically, it investigates the influence of executives' functional orientations, perception of hostility in the business environment, and perceptions of the benefits and challenges of certification on the decision to adopt environmental certification. All the hypothesized relationships are shown in Figure 4.1. With understanding of these relationships, researchers can start to disentangle why some firms adopt EC while others in the same industry do not.

----- Insert Figure 4.1 here -----

## **METHOD**

### **Sample and Data Collection**

The target population of this research was executives representing 225 kitchen cabinet manufacturing firms that were members of the Kitchen Cabinet Manufacturers Association (KCMA). The KCMA is the major trade association in the U.S. for manufacturers of kitchen cabinets. Collectively, KCMA member firms represent a large portion of the total market for kitchen cabinets in the U.S.

Mail questionnaires<sup>2</sup> were sent to executives who were deemed, by the KCMA, to be influential in making strategy level decisions within their firms. Accompanying the questionnaires was a letter, written and signed by the executive director of the KCMA, encouraging participation in the research endeavor. The letter, questionnaire, and a business mail reply envelope were mailed to each executive. Only one mailing was conducted. In addition to the mailing, the executive director of the KCMA sent an email to participants, encouraging their participation, approximately a week and a half after the initial mailing. Information about non-respondents was not available, therefore tests for non-response bias were not conducted.

Of the 225 executives who were mailed questionnaires, 81 executives responded, for a response rate of 36%. This response rate appears to be within the typical range for eliciting responses from executives via surveys (Cycyota and Harrison, 2002). On average, executives in this sample had been working in the kitchen cabinet industry for 20.5 years, and in industry in general for 31.4 years. The median number of employees in the firms in the sample was 187. The estimated median annual sales for 2007 of the firms in the sample was approximately \$25 million. On average, firms in the sample had been in operation for 35 years.

## **Measures**

*Decision to Adopt Environmental Certification.* The EC scheme investigated in this research is the Environmental Stewardship Program (ESP) certification offered through the Kitchen Cabinet Manufacturers Association. ESP certification is awarded to manufacturers based on a point scheme that requires them to address issues related to materials acquisition and use, air quality, manufacturing processes, environmental stewardship, and community relations. Firms could attain certification for their brands, facilities, or both. Based on conversations with

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<sup>2</sup> The survey sent to KCMA executives is included in Appendix B of the dissertation.



trade association representatives and industry managers, smaller firms were generally more likely to pursue certification for entire facilities, where as larger firms were generally more inclined to pursue certification for individual brands rather than whole facilities. In either case, the requirements of the certification were the same.

Executives were asked about the status of their firm's decision to adopt certification. If an executive indicated that any of his or her firm's brands or facilities had adopted certification or were currently in the process of adopting certification, their firm was determined to have made a decision to adopt certification. If an executive indicated that all of his or her firm's brands or facilities had not adopted certification and were not in the process of adopting certification, their firm was determined to have made a decision not to adopt certification. So, the decision to adopt certification is treated as binary in the analyses.

*Perceived Benefits of Environmental Certification.* Executives' perceptions of benefits of EC were measured by a newly developed measure based on reported benefits of environmental initiatives by industry firms, research on opportunities of environmental initiatives (Henriques and Sadorsky, 1999; Sharma and Vredenburg, 1998), and Porter's (1980) views of the structure of the business environment. The development of this measure was heavily influenced by the work of Henriques and Sadorsky (1999) and Sharma and Vredenburg (1998), but is different enough from their measures to be considered more than a moderate modification. This new measure consisted of items that gauge a manager's evaluation of issues of product-market opportunities, competitive posture, company image and reputation, and fulfillment of anticipated regulatory changes. Items in this measure had a 5 point Likert type response format anchored by (1) provides no value, (2) somewhat valuable, (3) valuable, (4) very valuable, and (5) extremely valuable. As described in the results section below, factor analysis was used to identify the latent

dimensions of perceived benefits of certification.

*Perceived Challenges of Environmental Certification.* Executives' perceptions of challenges of EC were also measured by a novel measure based on reported challenges of environmental certification by industry executives obtained via phone and face-to-face interviews. As in the case of perceived benefits, the perceived challenges measure was influenced by the work of Henriques and Sadorsky (1999) and Sharma and Vredenburg (1998). The items in this measure were verified for validity by trade associations within the wood products industry. Items in this measure had a 5 point Likert type response format anchored by (1) provides no value, (2) somewhat valuable, (3) valuable, (4) very valuable, and (5) extremely valuable. As described in the results section below, factor analysis was used to identify the latent dimensions of perceived challenges of certification.

*Perceived Hostility in the Business Environment.* Executives' perceptions of hostility in the business environment were measured using the instrument developed by Covin et al. (1999). The measure contained 6 items with a 7 point Likert type response format anchored by (1) strongly disagree, (2) disagree, (3) slightly disagree, (4) neutral, (5) slightly agree, (6) agree, and (7) strongly agree. All the items were positively worded. A typical item is: "Competitive intensity is high in my industry." The estimated reliability of this instrument was  $\alpha = 0.74$ .

*Functional Orientation.* An executive's functional orientation was determined based on the categorization of output versus throughput as described by Hambrick and Mason (1984) and Miles and Snow (1978). Output functions include marketing, sales, and product development, where as throughput functions include production, process engineering, and accounting (Hambrick and Mason, 1984; Miles and Snow, 1978). Executives were asked: "To what degree (on a scale from 1 to 10) do you feel each of the following functional areas have influenced your

career path?” Respondents were then asked to circle one number for each of the following functional areas: (1) marketing, (2) sales, (3) product development, (4) operations/production, (5) process engineering, and (6) accounting.

Due to the very low magnitude of response values, and non-responses, to the functional areas of “product development” and “accounting”, these two functional areas were not considered when determining an executive’s functional orientation. The following equation<sup>3</sup> was used to determine if an executive was more output oriented than throughput oriented or vice versa.

Function orientation = (average of an executive’s responses for sales and marketing) – (average of an executive’s responses for operations/production and process engineering)

If the result of the above equation was greater than one, then the executive was determined to be more output oriented than throughput oriented. If the result of the of the above equation was less than negative one, then the executive was determined to be more throughput oriented than output oriented. If the result of the above equation was from negative one to positive one, then the executive was determined have a neutral functional orientation.

*Control Variables.* The following control variables were used: an executive’s industry tenure, an executive’s belief in the ability to charge a premium for environmentally certified products, a firm’s previous use of environmentally certified materials, firm age, the previous year’s annual sales of firms as a proxy for firm size, and the primary product category of the firm. The industry tenure of an executive was determined by the response to the following question: “How many years have you worked in the kitchen cabinet industry?” This variable

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<sup>3</sup> In the literature on functional orientation, or functional background, measures of functional orientation are most often based on archival data and employ a selection, or distinction, criterion akin to the equation used here. The functional orientation measure provided here is based on self-reported data and uses a variation of the selection criteria used by researchers using archival data.

was used to control for any potential for executives who had a longer industry tenure to have commitment to the status quo of norms embodied within industry activities, dialogue, or assumptions. Research by (Hambrick, et al., 1993) has shown that with an increase in tenure executives become more committed to the norms, or status quo, of their respective industry.

An executive's belief in the ability to charge a premium for environmentally certified products was measured with a single item that gauged the difficulty in "being able to charge a premium for environmentally certified products above the price for non-certified products." This item had a 5 point Likert type response format anchored by (1) not difficult, (2) moderately difficult, (3) difficult, (4) very difficult, and (5) extremely difficult.

A firm's previous use of environmentally certified materials was gauged via the question: "Prior to July 2006, was your company (or business unit) purchasing environmentally certified materials?" July 2006 was the inception date of the environmental certification examined in this research. The term "certified" was defined, relative to the requirements of the environmental certification, for participants. This question had a binary outcome of yes or no.

To account for institutional effects (DiMaggio and Powell, 1983; Hannan and Freeman, 1977) of firms, both firm age and firm size were controlled for. The square root transformation of firm age was used to better approximate a normal distribution of the variable. The previous year's annual sales of firms was used as a proxy for firm size. The log transformation of sales was used to better approximate a normal distribution of the variable.

There are three main product categories within the industry studied: stock, custom, and semi-custom cabinets (Partch, 2007). Executives were asked which category (stock, semi-custom, and custom) best describe their company's products. Since the line between semi-custom and custom is blurry, product category was coded to yield two categories, stock or not

stock.

## RESULTS

Table 4.1 contains the means, standard deviations, and correlations of the measures of an executive's perception of hostility in the business environment, functional orientation, perceptions of benefits and challenges of EC, the decision to adopt certification, and all control variables. None of the correlations were exceedingly high (e.g.  $> .7$ ), which suggests the measures of the constructs are separable from one another. Next, an overview of the analyses is given.

----- Insert Table 4.1 here -----

The logit models in Table 4.2 test the direct effects of the independent variables on the decision to adopt EC. Model 1 accounts for control variables only. In addition to the control variables, Model 2 includes the perceived benefits and challenges of EC. Model 3 includes the control variables, an executive's functional orientation, and perceived hostility in the business environment. Finally, Model 4 includes the control variables and all other variables that were significant in Models 2 and 3.

----- Insert Table 4.2 here -----

Table 4.3 contains the results of two separate OLS regressions using the perceived benefits and challenges that were found to be significant in logistic regressions as dependent variables. With the perceived competitive posture benefits as the dependent variable, Model 1 includes the control variables and an executive's functional orientation. Model 2 includes the control variables and an executive's functional orientation to predict the perception of cost challenges of EC.

----- Insert Table 4.3 here -----

## **Factor Analyses of Perceived Benefits and Challenges of Environmental Certification**

Factor analyses<sup>4</sup> were conducted to distinguish between and within the dimensions of perceptions of benefits and challenges of EC. Prior to confirmatory factor analysis, an exploratory factor analysis of the perceived benefits and challenges of EC was conducted using a sample of 84 executives from another portion of the wood industry. The exploratory factor analysis was done for questionnaire items measuring the perception of benefits and challenges of EC. The exploratory factor analyses yielded a six-factor target model, three factors for perceived benefits and three factors for perceived challenges. The three factors for perceived benefits of EC were: product-market benefits, environmental preparedness benefits, and competitive posture benefits. The three factors for perceived challenges of EC were: cost challenges, process adaptation challenges, and materials supply challenges.

A confirmatory factor analysis of the perceived benefits and challenges of EC was conducted using the current sample of 81 kitchen cabinet executives. The target model for the confirmatory factor analysis was the six-factor model identified through exploratory factor analysis. Confirmatory factor analyses were conducted to test the fit of the targeted six-factor model, compared to a one-factor model, a two-factor model, a seven-factor model, and all possible five-factor models. The factor loadings and communality estimates of the confirmatory factor analyses are shown in Table 4.4. Communality estimates represent the proportion of variance in a variable that can be predicted from the underlying factor it is part of (Tabachnick and Fidell, 1996). The fit statistics of the confirmatory factor analyses are shown in Table 4.5.

----- Insert Tables 4.4 and 4.5 here -----

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<sup>4</sup> The discussion of exploratory and confirmatory factor analyses is more in depth than is typically found in targeted journals. This section was purposefully written in a more detailed manner for this dissertation to demonstrate the process of developing the measures of “perceived benefits of environmental certification” and “perceived challenges of environmental certification,” which is the focus of research objective #2 of the dissertation. The discussion of factor analysis will be shortened prior to submitting this manuscript to a selected journal.

The one-factor model was tested to show that the dimensions of perceived benefits and challenges of EC are distinct from one another and not parts of one single dimension of perceptions of EC. The two-factor model was tested to show that the identified dimensions of perceived benefits and challenges of EC are distinct from two separate, aggregate benefits and challenges dimensions of perceptions of EC. All other models were tested to validate the six-factor target model.

The fit indices show that the one-factor and two-factor models do not fit the data well. Looking at all the models tested, the change in chi-square, compared to the target model, is lowest ( $\Delta \chi^2(6) = 5$ ) between the target model and the over factored seven-factor model. Along with the change in chi-square, the other “badness” of fit statistics, the standardized root mean square residual (SRMR) and the root mean square error of approximation (RMSEA), are lower for the target model (SRMR < .08; RMSEA = .06) versus all possible five-factor models. The difference in the values of SRMR and RMSEA for the target model versus the over factored model is small, favoring the target model. The “goodness” of fit statistics, the non-normed fit index (NNFI) and the comparative fit index (CFI), also show support for the target model (NNFI > .94; CFI > .95). The NNFI of the target model is higher than all the five-factor models and the over factored model. The CFI of the target model is higher than all the five-factor models and the over factored model. The “goodness” and “badness” of fit statistics for the target model suggest the proposed covariance structure adequately fits the covariance structure of the target model (Hu and Bentler, 1999).

The factor loadings from the confirmatory factor analyses for the perceived product-market benefits of EC ranged from 0.72 to 0.91. The communality estimates ranged from 0.52 to 0.83. The three items that compose this factor are: (1) gaining new customers in new markets,

(2) gaining new customers in existing markets, and (3) satisfying existing customer demand for environmentally certified products. The estimated reliability of these items was  $\alpha = 0.87$ .

Perceived environmental preparedness benefits of EC had factor loadings from the confirmatory factor analyses ranging from 0.66 to 0.97. The communality estimates ranged from 0.44 to 0.94. The three items that compose this factor are: (1) improving environmental groups' perception of the company, (2) being prepared for future environmental regulations, and (3) improving the company's existing environmental strategy. The estimated reliability of these items was  $\alpha = 0.82$ .

The factor loadings from the confirmatory factor analyses for the perceived competitive posture benefits of EC ranged from 0.42 to 0.92. The communality estimates ranged from 0.18 to 0.85. The three items that compose this factor are: (1) maintaining a competitive position versus competitors who have adopted EC, (2) improving competitive position versus competitors who have not adopted EC, and (3) improving competitive position with foreign (non U.S. and Canadian) competitors. The estimated reliability of these items was  $\alpha = 0.69$ .

Turning to the challenges of EC, the perceived cost challenges of EC had factor loadings from the confirmatory factor analyses of 0.79 and 0.95. The communality estimates were 0.62 to 0.91. The two items that compose this factor are: (1) justifying the initial costs of becoming certified, and (2) justifying the cost of additional staff hours needed for the documentation requirements of certification. The correlation between these two items was  $r = 0.75$ .

Perceived process adaptation challenges of EC had factor loadings from the confirmatory factor analyses of 0.54 and 0.87. The communality estimates were 0.29 to 0.75. The two items that compose this factor are: (1) changing existing company processes and practices to accommodate certification requirements, and (2) providing employees with specialized training



that helps them understand the requirements of certification. The correlation between these two items was  $r = 0.50$ .

The factor loadings from the confirmatory factor analyses for the perceived materials supply challenges of EC ranged from 0.77 to 0.87. The communality estimates ranged from 0.60 to 0.75. The three items that compose this factor are: (1) establishing relationships with new suppliers to obtain certified materials, (2) acquiring a consistent supply of certified materials, and (3) altering relationships with existing suppliers to obtain certified materials. The estimated reliability of these items was  $\alpha = 0.87$ .

### **Regression Analyses to Test Direct Effects on the Decision to Adopt Environmental Certification**

Model 2 of Table 4.2 displays the influence of all the factors of perceived benefits and challenges of EC simultaneously. Considering the results of Model 2, hypotheses 1 and 2 are both partially supported. In relation to hypothesis 1, the perception of competitive posture benefits of EC has a significant positive effect ( $mle = .81, p < .05$ ) on the decision to adopt EC. Perceptions of product-market benefits and firm environmental stance benefits had positive, but non-significant, effects on the decision to adopt EC. In relation to hypothesis 2, the perception of cost challenges of EC has a significant negative effect ( $mle = -1.38, p < .01$ ) on the decision to adopt EC. Perceptions of process adaptation challenges and materials supply challenges had negative, but non-significant, effects on the decision to adopt EC.

The influence of both an executive's functional orientation and his or her perception of hostility in the business environment are shown in Model 3 of Table 4.2. Perception of hostility in the business environment had a significant negative effect ( $mle = -.50, p < .05$ ) on the decision to adopt EC, supporting hypothesis 7. In support of hypothesis 3, executives with a throughput

orientation were less likely to decide to adopt EC than executives with an output orientation ( $t = -2.69, p < .01$ ). An executive's functional orientation, as measured for regression purposes by whether an executive was determined to be throughput oriented, had a significant negative effect ( $mle = -.71, p < .01$ ) on the decision to adopt EC, offering further support of hypothesis 3.

Model 4 of Table 4.2 shows the combined influence of an executive's functional orientation, his or her perceptions of competitive posture benefits and cost challenges of EC, and his or her perceptions of hostility in the business environment on the decision to adopt EC (pseudo  $R^2 = .68; \chi^2 = 59.83, p < .001$ ). In this full model, an executive's functional orientation had a significant negative effect ( $mle = -.95, p < .05$ ) on the decision to adopt EC, once again providing support of hypothesis 3. Again for the full model, both the perceptions of competitive posture benefits and cost challenges of EC had, respectively, a significant positive effect and a significant negative effect ( $mle = .63, p < .05; mle = -.99, p < .05$ ), on the decision to adopt EC.

To assist in further explaining the influence of perceptions of competitive posture benefits, cost challenges, and hostility in the business environment, Figure 4.2 plots the influence of each of these variables on the probability of adopting EC. The influence of functional orientation is not plotted in Figure 4.2. The equation used for the probability plots is:

$$P = e^{bx} / (1 + e^{bx})$$

where  $bx = 1.27 + (0.03*\text{executive's tenure}) + (0.01*\text{executive's perception of the ability to charge a premium for environmentally friendly products}) + (0.18*(\sqrt{\text{firm age}})) + (1.03*(\log(\text{sales}))) + (-2.06*\text{product category}) + (-0.56*\text{previous use of certified materials}) + (-3.43*\text{executive's functional background}) + (-0.44*\text{executive's perception of hostility in the business environment}) + (1.21*\text{executive's perception of competitive posture benefits}) + (-1.87*\text{executive's perception of cost challenges})$

Lines were plotted for each response level of the identified variables. For each plotted line, with the exception of the variable in which a line was plotted for, observed values per respondent were used for all other variables.

----- Insert Figure 4.2 here -----

For the perception of competitive posture benefits, a shift in response level from 1 (“provides no value”) to 5 (“extremely valuable”) yields a 46% increase in the probability of adopting EC. Examining the perception of cost challenges, a shift in response level from 1 (“not difficult”) to 5 (“extremely difficult”) yields a 70% decrease in the probability of adopting EC. For the perception of hostility in the business environment, a shift in response level from 1 (“strongly disagree”) to 7 (“strongly agree”) yields a 23% decrease in the probability in adopting EC. Although not depicted by a plot, when an executive is throughput oriented the probability of adopting EC is 0.40, and when an executive is not throughput oriented the probability of adopting EC is 0.75. Stated differently, there is a 35% decrease in the probability of adopting EC when an executive is throughput oriented versus not being throughput oriented.

#### **Regression Analyses to Test Direct Effects on the Perceived Competitive Posture Benefits and Cost Challenges of Environmental Certification**

Focusing only on the perceived benefits and challenges that had significant influence in the above logistic regressions, Table 4.3 shows the results of separate regression analyses with the perceived competitive posture benefits and the perceived cost challenges of EC as dependent variables. In reference to hypothesis 4, the null hypothesis cannot be rejected, there is no significant difference between executives with throughput orientations versus executives with output orientations in regard to their perceptions of competitive posture benefits of EC ( $t = -1.45$ ,  $p = .15$ ). Model 1 of Table 4.3 further explores hypothesis 4, an executive’s functional orientation, as measured by whether or not he or she was throughput oriented, had a negative but non-significant effect ( $b = -.07$ ,  $p = .56$ ) on the perception of competitive posture benefits of EC. Again, the null hypothesis associated with hypothesis 4 cannot be rejected.

In reference to hypothesis 5, the null hypothesis cannot be rejected, there is no significant

difference between executives with throughput orientations versus executives with output orientations in regard to their perceptions of the cost challenges of EC ( $t = .93, p = .86$ ). Model 2 of Table 4.3 further explores hypothesis 5, an executive's functional orientation, as measured by whether or not he or she was throughput oriented, had a positive non-significant effect ( $b = .02, p = .86$ ) on the perception of cost challenges of EC. Again, the null hypothesis associated with hypothesis 5 cannot be rejected.

The failure to reject the null hypotheses for hypotheses 4 and 5 negate the need to test hypothesis 6, which would test the mediation of the relationship between an executive's functional orientation and his or her decision to adopt EC by his or her perception of the benefits and challenges of EC. If the path from X (functional orientation)  $\rightarrow$  M (perceived benefits and challenges) is not significant, then mediation cannot be present (Mathieu and Taylor, 2006). So, in this sample, an executive's perceptions of benefits and challenges of EC do not mediate the relationship between his or her functional orientation and his or her decision to adopt EC.

## **DISCUSSION**

This research identified multiple dimensions of executives' perceptions of benefits and challenges of EC and then examined their influence on the decision to adopt EC. Also examined, was the influence of executives' functional orientations on their perceptions of the benefits and challenges of EC as well as their decisions to adopt EC. Finally, the influence of executives' perceptions of hostility in the business environment on their decision to adopt EC was examined.

Three factors of perceived benefits of EC were identified: product-market benefits, environmental preparedness benefits, and competitive posture benefits. Likewise, three factors of perceived challenges of EC were identified: cost challenges, process adaptation challenges,

and materials supply challenges. These six factors, three benefit factors and three challenge factors, provide a framework in which to assess executives' perceptions of EC. This framework moves beyond the framing of EC in terms of opportunities and threats and provides more pragmatic perspective rooted in the everyday business issues of the decision at hand, whether or not to adopt certification. In doing so, the framework examines EC in the same terms (i.e., everyday business terms) which are often needed to sell environmental initiatives among firm employees (Andersson and Bateman, 2000).

Only one benefit factor, competitive posture benefits, and only one challenge factor, cost challenges, significantly influenced the decision to adopt EC. Competitive posture benefits encompassed firm positioning relative to competitors who had not adopted certification, who had adopted certification, and foreign competitors who may or may not have the opportunity to pursue such certification. Cost challenges included costs associated with initially becoming certified as well as staffing costs required to maintain the required documentation for certification. This suggests that, in this sample, firms may have seen the decision to adopt EC as a tactical competitive move with this move's biggest hurdle having to do with costs.

Executives with throughput orientations were less likely to adopt EC than executives with output orientations, but the perceptions of EC of executives with throughput orientations did not significantly differ from those with output orientations. This suggests that functional orientation influences action (i.e., decision) relative to EC, but not necessarily perception. This difference in decisions by executives with different functional orientations is supported by research from the field of strategic management which has also shown differences in the strategic decisions made by executives with different functional orientations (Baker and Mueller, 2002; Chaganti and Sambharya, 1987; Strandholm, et al., 2004; Thomas, et al., 1991; Tyler and Steesma, 1998).

Perceived hostility is one way in which an executive views the context (i.e. the business environment) in which a firm is situated in. Perceptions about the business environment are relevant in the strategic decision-making of executives (Dess and Beard, 1984). In this sample, there is partial support for the influence of an executive's perception of hostility on their decision to adopt EC. However, when simultaneously considering perceptions of benefits and challenges of certification, perceptions of hostility in the business environment were found not to have a significant influence on executives' decisions to adopt EC.

Perceptions of hostility in the business environment encompass competitive intensity, customer loyalty, and ultimately firm survival (Covin et al., 1999). The perceived benefits and challenges of EC found to be influential in an executive's decision to adopt EC (i.e., competitive posture benefits and cost challenges) embody issues of competition and the use of limited firm resources. Perhaps perceptions of perceived hostility in the business environment is informing perceptions of benefits and challenges of certification, and in doing so the direct effect of perceived hostility on the decision to adopt certification is being masked, or partially mediated. A *post hoc* analysis provides some evidence that the relationship between perceptions of hostility and decisions to adopt EC may be partially mediated by perceptions of challenges of EC but not perceptions of benefits of EC. However, due to a limited sample size and its subsequent influence on the statistical power associated with significance testing of mediation (Hoyle and Kenny, 1999), no conclusive evidence of partial mediation was found.

### **Implications**

This research sought to move away from the framework of opportunities and threats to describe EC to a more targeted framework of specific perceived benefits and challenges of EC. By better understanding some of the finer nuances to the perception of EC, those organizations

that develop certification schemes can better tailor their communications of certification to address these specific perceptions, while still achieving the broader aims of certification. With a better suited or tailored communications effort around certification, the adoption of certification may increase leading to an improvement of an industry's net impact on the natural environment (providing the aims of the environmental certification scheme are legitimate).

The functional orientation of executives was influential in their actions (decisions) relative to EC, but not their perceptions of EC. This finding may be important to executives in their decisions around EC and other environmental initiatives. If the strategic decision-making capacity of firms, relative to the natural environment, is heavily influenced by executives of one functional orientation, then firms may risk making decisions that are not based on the potential benefits and challenges of environmental initiatives. Rather, firms may adopt, or not adopt, environmental initiatives based on decision biases of executives that do not give full consideration to the merits or shortcomings of initiatives. To attempt to overcome this potential decision bias, firms can seek decision input from management members with different functional orientations. Research on strategic decision-making in top management teams (TMTs), has suggested that increased TMT diversity lowers strategic consensus, which implicitly means multiple perspectives are informing strategic decisions (Knight, et al., 1999).

There is evidence that as an executive perceives a greater amount of hostility in his or her firm's business environment, he or she is less likely to decide to adopt EC. However, when perceived benefits and challenges of certification are taken into consideration, the influence of perceived hostility on the decision to adopt EC is over shadowed. Research investigating the influence of executives' perceptions of a firm's business environment on decisions about environmental initiatives, but does not take into account perceptions of the focal strategic issue

(i.e., the environmental initiative), could over state the influence of perceptions of a firm's environment.

### **Limitations and Future Research**

An inherent problem in this research is the cross-sectional analyses that were used and the associated issues of determining the direction of causality. It's possible that for firms that have adopted certification, their experience with certification has reshaped their perceptions of the benefits and challenges of certification, creating an occurrence of reverse causality. To overcome this issue, future research should utilize a longitudinal approach where perceptions of certification are measured at time 1 and then actions relative to certification are measured at time 2.

Another issue is common method bias. All the measures used in this study were self-reported measures. The aim of this research was to evaluate executives' perceptions, so self-reported measures are a must. However, this research would have benefited from a sampling approach which sought to elicit responses from groups of executives at a firm versus a single influential executive at a firm.

This study sampled only one industry, therefore placing restrictions on the generalization of findings to other contexts. However, factor analyses of the dimensions of perceived benefits and challenges of EC were conducted with data from executives from two segments of the broader industry, the wood product industry. Therefore, the framework of perceived benefits and challenges of certification may be more portable, or transferable to other settings, than the statistical results and accompanying arguments about linkages between constructs. Future research should cast a wider net and sample among multiple industries or multiple segments within an industry.



This research identified that the functional orientation of executives does influence their decision to adopt EC, but not their perceptions of the benefits and challenges of EC. Why do executives with different functional backgrounds take different action (decisions) relative to EC? Perhaps these differences in the actions (decisions) relative to EC are tied to psychological characteristics of the executive. Several researchers have stated a need to delve into the black box, or psychological mechanisms, of executive decision making (provide cites). Do executives with different functional orientations have different degrees of risk taking, uncertainty avoidance, or other psychological mechanisms that are effecting the decisions about environmental initiatives?

This research also found partial support for the influence of perceived hostility in the business environment on the decision to adopt certification. What other perceptions about the business environment, or context, in which a firm is situated influence the decision to adopt EC? Aragón-Correa and Sharma (2003) propose that perceptions of heterogeneity and dynamism in the business environment also influence firm level actions relative to the natural environment. Perhaps these perceptions of the business environment influence the decision to adopt certification, not through a direct influence, but maybe via mediation or interaction.

This work adds to a research stream which explores executives' perceptions and actions relative to the natural environment (provide cites). Research in this domain is varied and there are many opportunities for further development of theory and empirical work. Hopefully, this research helps researchers in the domain of business and the natural environment seize these opportunities by either providing an element of clarity or expanding the range of possibilities.

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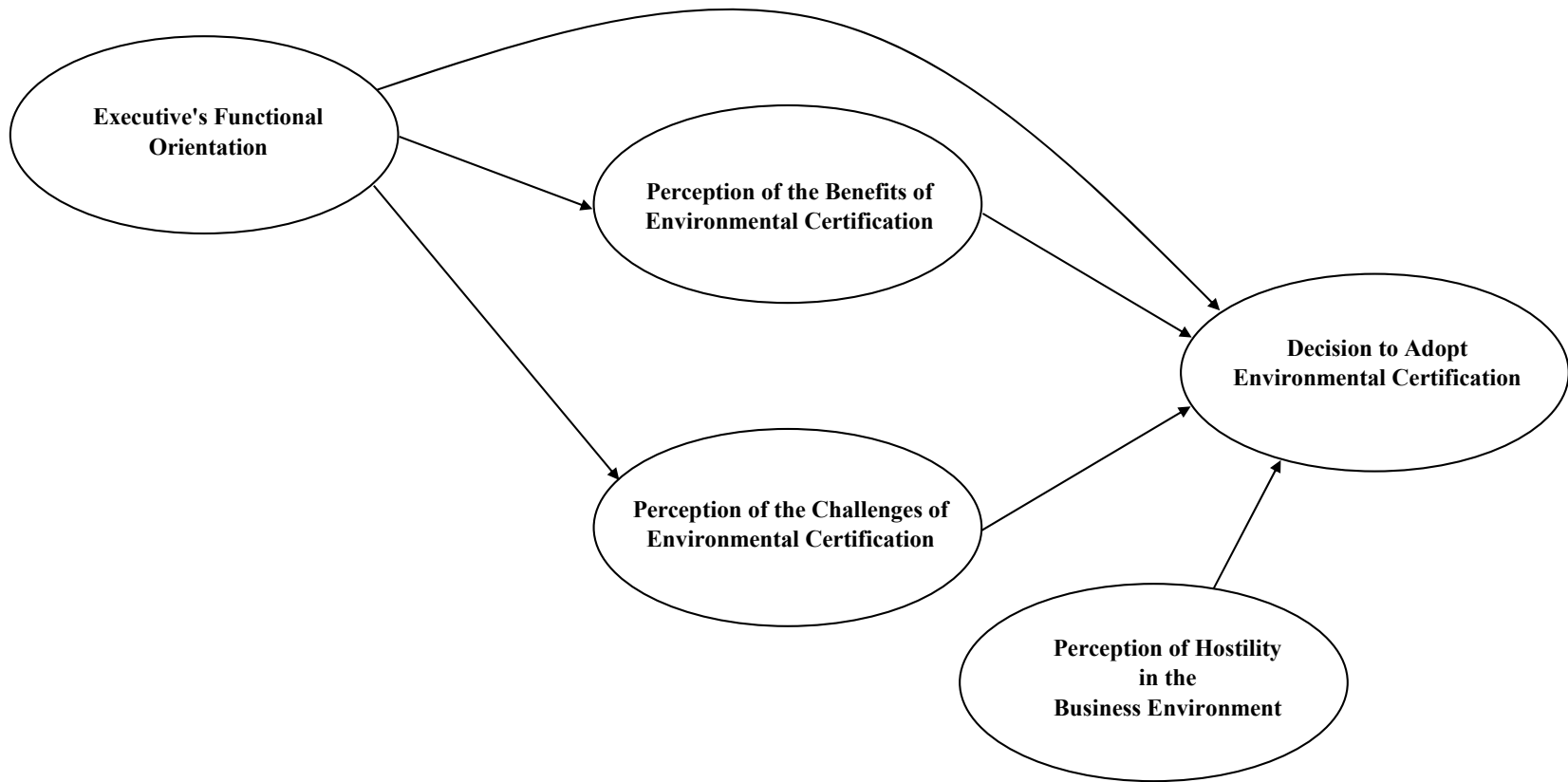


Figure 4.1. Model of the determinants of an executive's decision to adopt environmental certification

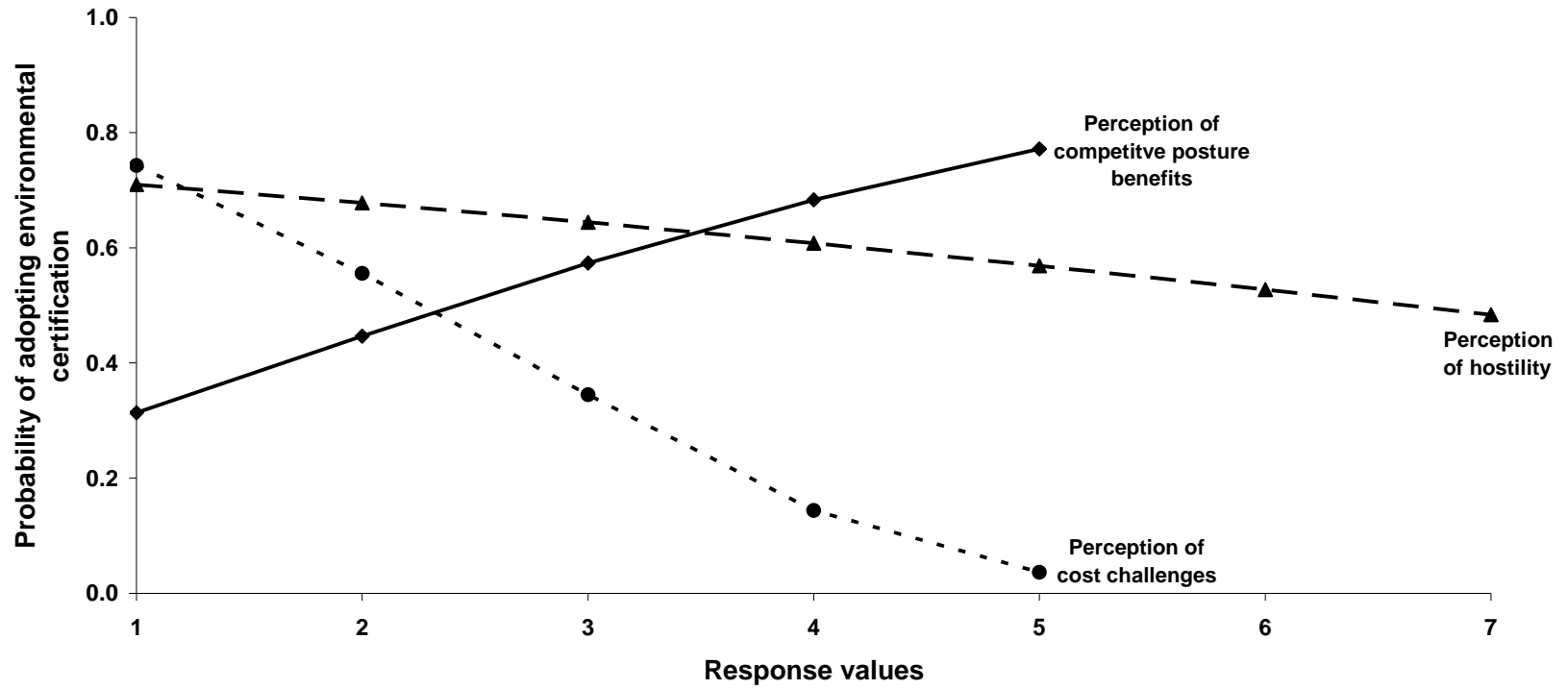


Figure 4.2. Plot of the effects of the perception of cost challenges and competitive posture benefits of environmental certification and the perception of hostility in the business environment on the probability of adopting environmental certification.



Table 4.1.  
*Descriptive Statistics and Pearson Correlations*

<b>Variable</b>	<b><i>M</i></b>	<b><i>SD</i></b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
1. Decision to adopt environmental certification	0.72	0.45						
2. Executive's industry tenure	20.55	11.90	0.26*					
3. Perception of the ability to charge a premium for environmentally certified products	2.56	1.26	0.12	0.11				
4. Firm age	5.64	1.83	0.25*	0.02	0.17			
5. Previous year's annual sales	3.07	1.34	0.34**	0.14	-0.27*	0.20		
6. Product category	0.19	0.39	-0.19	0.02	-0.21	-0.07	0.36**	
7. Previous use of environmentally certified materials	0.46	0.50	0.36**	0.21	0.08	0.24*	0.24*	-0.05
8. Perception of hostility in the business environment	4.19	1.04	-0.38***	0.02	-0.08	-0.15	-0.22*	0.08
9. Output functional orientation	0.33	0.47	0.25*	-0.02	-0.10	0.09	0.12	-0.06
10. Throughput functional orientation	0.44	0.50	-0.36**	-0.15	-0.02	-0.07	-0.21	-0.03
11. Product-market benefits	3.14	0.94	0.25*	0.18	0.26*	0.13	0.01	-0.15
12. Environmental preparedness benefits	3.14	0.95	0.37***	0.09	0.10	0.06	0.22	-0.05
13. Competitive posture benefits	3.21	0.93	0.38***	0.08	0.09	0.12	0.12	-0.14
14. Cost challenges	1.88	0.97	-0.61***	-0.11	-0.20	-0.34**	-0.22*	0.29**
15. Process adaptation challenges	1.98	0.83	-0.25*	-0.04	-0.14	-0.14	-0.03	0.26*
16. Materials supply challenges	2.29	0.97	-0.11	-0.12	-0.20	0.06	0.21	0.33**

Table 4.1 ... continued  
*Descriptive Statistics and Pearson Correlations*

Variable	7	8	9	10	11	12	13	14	15
1. Decision to adopt environmental certification									
2. Executive's industry tenure									
3. Perception of the ability to charge a premium for environmentally certified products									
4. Firm age									
5. Previous year's annual sales									
6. Product category									
7. Previous use of environmentally certified materials									
8. Perception of hostility in the business environment	-0.13								
9. Output functional orientation	0.02	-0.07							
10. Throughput functional orientation	-0.04	0.15	-0.61***						
11. Product-market benefits	0.26*	-0.12	0.09	-0.06					
12. Environmental preparedness benefits	0.27*	-0.10	0.16	-0.11	0.38***				
13. Competitive posture benefits	0.17	-0.19	0.19	-0.10	0.57***	0.42***			
14. Cost challenges	-0.47***	0.39***	-0.08	0.09	-0.22*	-0.20	-0.24*		
15. Process adaptation challenges	-0.23*	0.31**	-0.11	-0.04	-0.14	-0.04	-0.18	0.50***	
16. Materials supply challenges	-0.21	0.22	-0.05	-0.02	-0.16	-0.07	-0.09	0.34**	0.60***

Table 4.2.  
*The Decision to Adopt Environmental Certification Regressed on the Independent Variables*

<b>Determinants of the decision to adopt certification</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
	<i>mle</i>	<i>mle</i>	<i>mle</i>	<i>mle</i>
<i>Control variables</i>				
Executive's industry tenure	0.18	0.44	0.22	0.16
Executive's perception of the ability to charge a premium for environmentally certified products	0.16	0.05	0.28	0.01
Firm age (square root transformation)	0.27	-0.03	0.30	0.17
2007 Annual sales (log transformation)	0.70**	0.82	0.82*	0.77
Stock cabinet manufacturer	-0.46*	-0.38	-0.62*	-0.44
Previous use of certified materials	0.26	-0.14	0.43	-0.02
<i>Independent variables</i>				
Product-market benefits		-0.57		
Environmental preparedness benefits		0.50		
Competitive posture benefits		0.81*		0.63*
Cost challenges		-1.38**		-0.99*
Process adaptation challenges		0.25		
Materials supply challenges		0.44		
Functional orientation			-0.71**	-0.95*
Perception of hostility in the business environment			-0.50*	-0.25
Pseudo $R^2$	0.32	0.56	0.55	0.68
Incremental pseudo $R^2$ beyond controls only model	-	0.24	0.23	0.36
- 2 log likelihood	62.06	40.27	39.84	28.38
Model $\chi^2$ (likelihood ratio)	28.81***	50.60***	48.37***	59.83***
Number of firms that adopted certification	57	57	57	57

Table 4.3.  
*Perceived Benefits and Challenges of Environmental Certification Regressed on  
 an Executive's Functional Orientation*

<b>Determinants of perceived benefits and challenges of environmental certification</b>	<b>Model 1</b>	<b>Model 2</b>
	<b>(competitive posture benefits)</b>	<b>(cost challenges)</b>
	<i>b</i>	<i>b</i>
<i>Control variables</i>		
Executive's industry tenure	0.07	0.04
Executive's perception of the ability to charge a premium for environmentally certified products	0.07	-0.15
Firm age (square root transformation)	0.00	-0.20
2007 Annual sales (log transformation)	0.16	-0.25
Stock cabinet manufacturer	-0.17	0.29**
Previous use of certified materials	0.09	-0.33**
<i>Independent variable</i>		
Functional orientation	-0.07	0.05
$R^2$	0.08	0.38
Adjusted $R^2$	0.00	0.32
Incremental adj. $R^2$ beyond controls only model	0.00	0.00
$F$	0.83	6.05***

Table 4.4.  
*Maximum Likelihood Estimates and Communalities from Confirmatory Factor Analyses (N=81)*

<b>Latent factors and associated response items</b>	<b>Standardized LISREL maximum likelihood estimates by factor</b>						<b>R<sup>2</sup></b>
	$\xi^1$	$\xi^2$	$\xi^3$	$\xi^4$	$\xi^5$	$\xi^6$	
<i>Product-market benefits (<math>\xi^1</math>)</i>							
Gaining new customers in new markets	0.72						0.52
Gaining new customers in existing markets	0.91						0.83
Satisfying existing customer demand for environmentally certified products	0.90						0.81
<i>Environmental preparedness benefits (<math>\xi^2</math>)</i>							
Improving environmental groups' perception of the company		0.71					0.50
Being prepared for future environmental regulations		0.97					0.94
Improving the company's existing environmental strategy		0.66					0.44
<i>Competitive posture benefits (<math>\xi^3</math>)</i>							
Maintaining competitive position versus competitors who have adopted environmental certification			0.70				0.48
Improving competitive position versus competitors who have not adopted environmental certification			0.92				0.85
Improving competitive position with foreign (non U.S. and Canadian) competitors			0.42				0.18
<i>Cost challenges (<math>\xi^4</math>)</i>							
Justifying the initial costs of becoming certified				0.95			0.91
Justifying the cost of additional staff hours needed for the documentation requirements of certification				0.79			0.62
<i>Process adaptation challenges (<math>\xi^5</math>)</i>							
Changing existing company processes and practices to accommodate certification requirements					0.87		0.75
Providing employees with specialized training that helps them understand the requirements of certification					0.54		0.29
<i>Materials supply challenges (<math>\xi^6</math>)</i>							
Establishing relationships with new suppliers to obtain certified materials						0.87	0.75
Acquiring a consistent supply of certified materials						0.84	0.71
Altering relationships with existing suppliers to obtain certified materials						0.77	0.60

Table 4.5.  
*Fit Statistics from Confirmatory Factor Analyses*

<b>Models</b>	$\chi^2$	$\Delta\chi^2$ <sup>a</sup> <i>df</i>	<i>df</i>	<b>CFI</b> <sup>b</sup>	<b>NNFI</b> <sup>c</sup>	<b>SRMR</b> <sup>d</sup>	<b>RMSEA</b> <sup>e</sup>
Single factor model	566.09	450 (15)	104	0.588	0.524	0.187	0.231
Two factor model	301.38	185 (14)	103	0.777	0.741	0.121	0.152
Five factor model A	214.64	98 (5)	94	0.873	0.838	0.100	0.124
Five factor model B	149.74	33 (5)	94	0.930	0.910	0.083	0.085
Five factor model C	204.60	88 (5)	94	0.869	0.833	0.125	0.119
Five factor model D	194.01	77 (5)	94	0.893	0.864	0.137	0.113
Five factor model E	300.16	184 (5)	94	0.798	0.743	0.158	0.163
Five factor model F	189.12	73 (5)	94	0.900	0.873	0.099	0.110
Five factor model G	202.04	86 (5)	94	0.864	0.826	0.133	0.118
Five factor model H	193.30	77 (5)	94	0.892	0.862	0.145	0.113
Five factor model I	304.29	188 (5)	94	0.790	0.731	0.171	0.164
Five factor model J	197.69	81 (5)	94	0.873	0.838	0.117	0.115
Five factor model K	193.06	77 (5)	94	0.893	0.864	0.138	0.113
Five factor model L	235.21	119 (5)	94	0.858	0.818	0.161	0.135
Five factor model M	153.23	37 (5)	94	0.923	0.902	0.096	0.087
Five factor model N	183.04	67 (5)	94	0.887	0.856	0.103	0.107
Five factor model O	137.05	21 (5)	94	0.948	0.934	0.086	0.074
Six factor model	116.54		89	0.958	0.943	0.076	0.061
Seven factor model	121.09	5 (6)	83	0.950	0.928	0.077	0.074

<sup>a</sup> The change in  $\chi^2$  is in reference to the target, six-factor model

<sup>b</sup> Comparative Fit Index

<sup>c</sup> Non-normed Fit Index

<sup>d</sup> Standardized Root Mean Square Residual

<sup>e</sup> Root Mean Square Error of Approximation

**CHAPTER 5: THE INTENTION TO ADOPT CHAIN-OF-CUSTODY  
ENVIRONMENTAL CERTIFICATION: AN EXAMINATION OF THE NORTH  
AMERICAN WOOD COMPONENT INDUSTRY**

This is an article aimed at a journal in the research areas of either wood products business or business and the natural environment. It discusses different perceived benefits and challenges of third-party, chain-of-custody certification and how they influence the intention to adopt such certification. The role of firm size is also discussed.

## **Abstract**

Manufacturers of environmentally certified end-use products rely on component manufacturers to supply them with parts that meet certification requirements. Relative to third-party certification in the wood products industry, this means that component manufacturers must adopt chain-of-custody certification (CoC). Research on CoC in the wood products industry has focused on descriptive analyses of executives and managers perceptions and expectations of CoC. This research departs from past descriptive analyses and examines the influence of executives' perceptions of the benefits and challenges of CoC on their intentions to adopt CoC. Results indicate that the most influential perceptions of CoC on executives' intentions to adopt certification are perceptions of the environmental preparedness benefits and process adaptation challenges of CoC. The influence of firm size on executives' intentions to adopt CoC is also examined via a *post hoc* analysis. This research contributes to the understanding of factors influencing executives intentions to adopt CoC.



## INTRODUCTION

Across product-markets, consumers are continuing to demand green products (Rokka and Uusitalo, 2008). Coinciding with this demand, consumers want reassurance that these green products are adhering to environmental standards. Environmental certification addresses the issue of environmental standards, and often serves as a means by which consumers evaluate green products (Guillery et al., 2004).

For secondary manufacturers who offer environmentally certified products to consumers, it becomes critical that they can maintain a supply of certified materials (Corbett, 2006; Irland, 2007). As consumers demand more green products, there needs to be an increase in the supply of certified materials to secondary manufacturers in order to satisfy increases in this demand. Implicit in an increasing supply of certified materials is a need for an increase in suppliers who have adopted and subsequently maintain environmental certification for their products.

In North America, an example of an industry where a certified supply chain has become critical is the wood products industry (Irland, 2007). Specifically, the issue of a certified supply chain is critical to manufacturers of products such as furniture, cabinets, window trim, and doors to name a few. These manufacturers depend on a network of suppliers to provide component parts. In many cases, if a manufacturer of an end-use product, such as a dining room table, wants a product that displays an environmental certification label, the component parts (sourced from suppliers) that make-up that product must be certified.

Many researchers have investigated consumer preferences for green products (Didier and Sirieix, 2008; Hustvedt et al., 2008; Rokka and Uusitalo, 2008; Sirieix et al., 2008). Relative to environmental certification in the wood products industry, much research has been directed at examining certification of the resource base, or forested land and timber (Cashore et al., 2006;

Duery and Vlosky, 2005; Hull and Ashton, 2008; Perera et al., 2006; Phillips et al., 2006; Stone, 2006; Tikina and Innes, 2008; Vlosky, 2000). Research on environmental certification among wood products manufacturers has been limited and descriptive in nature (Hubbard and Bowe, 2005; Humphries et al., 2001; Stevens et al., 1998; Vlosky and Gazo, 2003; Vlosky and Ozanne, 1998), attempting to describe how managers and executives of industry firms perceived certification. An exception to these descriptive studies was a research by Aguilar and Vlosky (2008) that tested a predictive model of branding.

### **Research Objectives**

This current research builds on earlier descriptive work on certification among wood products manufacturers (Hubbard and Bowe, 2005; Humphries et al., 2001; Stevens et al., 1998; Vlosky and Gazo, 2003; Vlosky and Ozanne, 1998) and examines the relationships between perceptions of certification by executives and their intentions to adopt certification (shown in Figure 5.1). Specifically, this research explores wood component manufacturing firm executives' intentions to adopt third-party, chain-of-custody environmental certification. In doing so, this research draws conclusions about potential factors that could either hinder or enhance the expansion of an environmentally certified supply chain tied to manufacturers of secondary wood products.

----- Insert Figure 5.1 here -----

### **Third-party, Chain-of-Custody Certification**

Where first-party certification is approved by the organization claiming certification, and second-party certification is approved by a group associated with the organization claiming certification, third-party certification requires evaluation of certification criteria by an entity that is independent from the organization claiming certification (Dovetail Partners, 2008). In the

eyes of consumers, third-party certification is often viewed as being more legitimate in its agenda and efforts than first-party or second-party certification (Dovetail Partners, 2008).

Third-party certification relative to the forest products industry has basically two forms: forest certification and chain-of-custody certification.

Third-party forest certification promotes sustainable management of the forested land in which raw materials are drawn from for the forest products industry (SFI, 2008). Three third-party forest certification schemes that are in wide use in North America are the Sustainable Forestry Initiative (SFI), the Forest Stewardship Council (FSC), and the Canadian Standards Association (CSA). In addition to forest certification, SFI, FSC, and CSA offer third-party, chain-of-custody certification (CoC).

CoC tracks and records the possession and transfer of wood-based materials from the forest through the different stages of production to the end user (SFI, 2008). CoC is focused on the supply-chain that certified wood travels through until it reaches the end user (Miller, 2007). For wood component manufacturers who want to legitimately claim the use of wood materials from certified forests (i.e., certified under the SFI, FSC, or CSA certification schemes) in their products, CoC certification is a requirement. By qualifying for CoC certification, manufacturers can offer consumers, and other manufacturing partners, products that have a “green” label that communicates the CoC certification. Of the various product labeling under the three certification schemes mentioned, two label types are most relevant to wood component producers: a “pure” label and a “mixed,” or percentage based, label.

A pure label is for products that contain 100% certified wood, where as products carrying a mixed label contain a designated minimum portion of certified wood (FSC, 2008). For firms who sell, or are considering selling, both certified and non-certified products, both label types are

subject to similar requirements. For firms who sell, or are considering selling, only certified products, then there are differences in the requirements of products carrying a pure label versus a pure label. Assuming that most wood component firms will choose to offer both certified and non-certified products in their product portfolios, the following discussion will not distinguish between pure and mixed labels and assume the requirements of certification are similar among firms in the study.

### **Perceived Benefits and Challenges of Certification**

Potential benefits of adopting environmental certification for wood products manufacturers include addressing current customers' demands for environmentally certified products, gaining new customers who are interested in environmentally certified products, improved company image, easing the pressure from environmental groups, preparation for upcoming legislation, and improved competitiveness (Hubbard and Bowe, 2005, Vlosky and Ozanne, 1998). Not included in this list of potential benefits is the ability for a firm to charge a premium for environmentally certified products. Where some individuals in the industry believe they can charge a premium for certified products, many in the industry either believe they cannot charge a premium or that there is uncertainty as to whether they can or cannot (S. Lawser, personal communications, 2008).

There are also several potential challenges to adopting CoC. Adhering to CoC certification requires manufacturers to carefully document materials purchases and manufacturing flows (Dykstra et al., 2002). Manufacturers also must be diligent in separating certified and non-certified materials throughout the manufacturing process (Dykstra et al., 2002). Beyond issues related to documentation and material separation and tracking, there are also initial costs and on-going recertification costs associated with adopting CoC (Miller, 2007).

Additional challenges to adopting CoC include altering relationships with suppliers to secure certified material as well as the availability of certified material.

Research on environmental initiatives of firms has shown executives' perceptions of environmental initiatives are influential in their decision to, or not to, pursue such initiatives (Sharma, 1997; Sharma et al., 1999, Sharma and Nguan, 1999; Sharma and Vredenburg, 1998). Executives' perceptions of the benefits and challenges of adopting CoC are likely to be influential in their intentions to adopt CoC. Thus, this research addresses the following research questions.

1. Do executives who perceive more benefits of certification have less intention to adopt certification than executives who perceive less benefits of certification?
2. Do executives who perceive more challenges of certification have less intention to adopt certification than executives who perceive less challenges of certification?

## **METHOD**

### **The Wood Component Manufacturers Association**

Executives from member firms of the Wood Component Manufacturers Association (WCMA) were surveyed. The WCMA represents firms that manufacturer dimension lumber and wood component products. These products are used in cabinetry, furniture, architectural millwork, flooring, staircases, building materials and a wide variety of decorative/specialty applications. Manufacturers belonging to the WCMA are located throughout the U.S. and Canada.

Of the 196 firms belonging to the WCMA, only 3 firms are publicly held. Many of the member firms of the WCMA are family-owned businesses with a handful of companies owned through employee stock ownership plans. Firms belonging to the WCMA average

approximately \$4 million in annual sales and employ roughly 70 people on average (S. Lawser, personal communication, July, 2008). Since wood components are produced for wide variety of applications and sales are recorded based on end-product categories, accurate statistics from the Census Bureau are not available (S. Lawser, personal communication, July, 2008). Given this, the following discussion on end use product categories is guided through communications with the executive director of the WCMA.

The building products industry is largest consumer of goods from WCMA member firms, consuming roughly 41% of the total annual sales volume of all WCMA member firms combined. Building products include interior trim, mouldings, millwork, staircases, flooring, windows and doors, and more. The second largest consumer of goods from WCMA member firms is the kitchen cabinet industry, consuming roughly 27% of the total annual sales volume of all WCMA member firms combined. Products sold to the kitchen cabinet industry include cabinet doors, drawer boxes, face frames, stile and rails, drawer fronts, and others. The third largest consumer of goods from WCMA member firms is the furniture industry, consuming approximately 22% of the total annual sales volume of all WCMA member firms combined. Wood components are used in dining room, kitchen, occasional, and upholstered furniture. Finally, the fourth largest consumer of goods from WCMA member firms is the highly fragmented decorative/specialty industry, consuming roughly 8% of the total sales volume of all WCMA member firms combined. Decorative/specialty products include picture frames, sporting goods, toys, games, musical instruments, gift items, and others.

### **Sample and Data Collection**

The target population for this research was executives of WCMA member firms who were influential in strategic decision-making within in their respective companies. A mail

survey<sup>5</sup> was conducted targeting these executives. The WCMA provided the names and addresses of 196 executives. The leadership of the WCMA was confident that the individuals provided as executive contacts for member firms held a major influence in strategic decisions made within their firms. Considering this strategic decision-making capacity, responses from executives were deemed as representative of their firms.

Of the 196 executives, 84 responded to the mail survey for a total response rate of 42.9%. The mail survey was conducted using the methods of Dillman (2000) as a guide. The major deviations from the Dillman (2000) method were not using a post card mailing, and not mailing a third round of surveys. These two steps were not done in an effort to minimize the interruption and burden to participants.

Two mailings of surveys were conducted. For the first mailing, participants were sent the survey and a letter from the leadership of the WCMA that described the research and encouraged participation in the research. In between the first and second mailings, the leadership of the WCMA sent a brief email to participants that also described the research and encouraged participation in the project. For the second (final) mailing, participants were sent another, duplicate survey and a personally addressed and signed letter summarizing the research endeavor and asking for participation. The first mailing of surveys yielded 43 responses and the second mailing yielded 41 responses.

Non-response bias was assessed with *t*-tests that compared the mean responses of survey measures between those executives who responded to the initial mailing and those who responded to the second mailing. Non-response bias was examined using *t*-tests with all variables. At  $\alpha = .05$ , non-response bias was not significant for any of the variables.

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<sup>5</sup> The survey sent to WCMA executives is included in Appendix C of the dissertation.

## Measures

Survey measures were developed in conjunction with the executive director and board members of the WCMA. In particular, the items used to assess the perceived benefits and challenges of environmental certification went through several iterations with much input from the WCMA. This approach to developing the survey allowed the research to evaluate those dimensions of environmental certification most likely to be at the fore in the minds of participants.

*Intention to adopt environmental certification.* An executive's intention to adopt environmental certification was measured with the following question: "What is the current status of your company's (or business unit's) decision to adopt, or not adopt, environmental certification?" The five response levels for this question were: (1) have adopted environmental certification, (2) currently in the process of becoming environmentally certified, (3) have not pursued environmental certification, although currently considering doing so, (4) not currently planning to pursue environmental certification, but may do so in the future, and (5) have no intention of pursuing environmental certification. Certification was defined as third-party certification such as that of the SFI, FSC, and CSA certification schemes.

*Perceived benefits of environmental certification.* Executives' perceptions of benefits of environmental certification were measured by a newly developed measure based on reported benefits of environmental initiatives by wood industry firms, research on opportunities of environmental initiatives (Henriques and Sadorsky, 1999; Sharma and Vredenburg, 1998), and Porter's (1980) views of the structure of the business environment. The development of this measure was heavily influenced by the work of Henriques and Sadorsky (1999) and Sharma and Vredenburg (1998), but is different enough from their measures to be considered more than a



moderate modification. This measure consisted of items that gauge an executive's evaluation of issues of product-market opportunities, competitive posture, company image and reputation, and fulfillment of anticipated regulatory changes. Items in this measure had a 5 point Likert type response format anchored by (1) provides no value, (2) somewhat valuable, (3) valuable, (4) very valuable, and (5) extremely valuable. As described in the results section below, factor analysis was used to identify the underlying dimensions of perceived benefits of certification.

*Perceived challenges of environmental certification.* Executives' perceptions of challenges of environmental certification were also measured by a novel measure based on reported challenges of environmental certification by wood industry executives obtained via phone interviews. The items in this measure were verified for validity by the WCMA. Items in this measure had a 5 point Likert type response format anchored by (1) provides no value, (2) somewhat valuable, (3) valuable, (4) very valuable, and (5) extremely valuable. As previously mentioned, the executive director and board members of the WCMA provided a great deal of assistance in developing the items for the perceived benefits and challenges of certification. As described in the results section below, factor analysis was used to identify the underlying dimensions of perceived challenges of certification.

*Executive characteristics.* An executive's industry tenure was evaluated by asking executives how many years they worked in the wood industry. This variable was used in regression analyses as a control for commitment to the status quo of industry norms. Research by Hambrick et al. (1993) has shown that with an increase in tenure executives become more committed to the norms, or status quo, of their respective industry.

There does not seem to be a consensus among wood industry executives and managers as to whether firms are able to charge a higher price for environmentally friendly products versus

those that are not specifically espoused as being environmentally friendly (S. Lawser, personal communication, February, 2008). To control for this in the regression analyses, executives were also asked about their belief in the ability to charge a premium for environmentally certified products. This variable was measured with a single item that gauged the difficulty in “being able to charge a premium for environmentally certified products above the price for non-certified products.” This item had a 5 point Likert type response format anchored by (1) not difficult, (2) moderately difficult, (3) difficult, (4) very difficult, and (5) extremely difficult.

*Company characteristics.* To account for institutional effects (DiMaggio and Powell, 1991; Hannan and Freeman, 1977) of firms, both firm age and firm size were controlled for. The square root transformation of firm age was used to better approximate a normal distribution of the variable. A firm’s previous year’s annual sales was used as a proxy for firm size. The log transformation of sales was used to better approximate a normal distribution of the variable.

## RESULTS

Table 5.1 contains the means, standard deviations, and correlations of the measures of an executive’s perceptions of benefits and challenges of environmental certification, the intention to adopt certification, and all control variables. None of the correlations were exceedingly high (e.g.  $> .7$ ), which suggests the measures of the constructs are separable from one another. In relation to the variables for the intention to adopt certification and perceptions of benefits and challenges of certification, the correlations align with the nomological network of the research.

----- Insert Table 5.1 here -----

## **Factor Analyses of Perceived Benefits and Challenges of Environmental Certification**

Factor analyses<sup>6</sup> were conducted to distinguish between and within the perceptions of benefits and challenges of environmental certification. An exploratory factor analysis of the perceived benefits and challenges of environmental certification was conducted. The exploratory factor analysis was done for questionnaire items measuring the perception of benefits and challenges of environmental certification. The exploratory factor analyses yielded a six-factor target model, three factors for perceived benefits and three factors for perceived challenges. The three factors for perceived benefits of environmental certification were: product-market benefits, environmental preparedness benefits, and competitive posture benefits. The three factors for perceived challenges of environmental certification were: cost challenges, process adaptation challenges, and materials supply challenges. Table 5.2 shows the rotated factor pattern for the items of perceived benefits and challenges of environmental certification.

----- Insert Table 5.2 here -----

The factor loadings for the perceived product-market benefits of environmental certification ranged from 0.62 to 0.84. The three items that compose this factor are: (1) gaining new customers in new markets, (2) gaining new customers in existing markets, and (3) satisfying existing customer demand for environmentally certified products. The estimated reliability of these items was  $\alpha = 0.86$ .

Perceived environmental preparedness benefits of environmental certification had factor loadings ranging from 0.57 to 0.90. The four items that compose this factor are: (1) improving

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<sup>6</sup> The discussion of exploratory factor analysis is more in depth than is typically found in targeted journals. This section was purposefully written in a more detailed manner for this dissertation to demonstrate the process of developing the measures of “perceived benefits of environmental certification” and “perceived challenges of environmental certification,” which is the focus of research objective #2 of the dissertation. The discussion of factor analysis will be shortened prior to submitting this manuscript to a selected journal.

environmental groups' perception of the company, (2) improving relationships with regulatory groups, (3) being prepared for future environmental regulations, and (4) improving the company's existing environmental strategy. The estimated reliability of these items was  $\alpha = 0.75$ .

The factor loadings for the perceived competitive posture benefits of environmental certification ranged from 0.49 to 0.67. The three items that compose this factor are: (1) maintaining a competitive position versus competitors who have adopted environmental certification, (2) improving competitive position versus competitors who have not adopted environmental certification, and (3) improving competitive position with foreign (non U.S. and Canadian) competitors. The estimated reliability of these items was  $\alpha = 0.87$ .

Turning to the challenges of environmental certification, the perceived cost challenges of environmental certification had factor loadings ranging from 0.79 to 0.81. The three items that compose this factor are: (1) justifying the initial costs of becoming certified, (2) justifying the cost of additional staff hours needed for the documentation requirements of certification, and (3) justifying the annual auditing costs of maintaining certification. The estimated reliability of these items was  $\alpha = 0.90$ .

Perceived process adaptation challenges of environmental certification had factor loadings ranging from 0.53 to 0.86. The three items that compose this factor are: (1) keeping certified material streams separate from non-certified material streams within your manufacturing facility (or facilities), (2) changing existing company processes and practices to accommodate certification requirements, and (3) providing employees with specialized training that helps them understand the requirements of certification. The estimated reliability of these items was  $\alpha = 0.85$ .

The factor loadings from the exploratory factor analyses for the perceived materials supply challenges of environmental certification ranged from 0.69 to 0.76. The three items that compose this factor are: (1) establishing relationships with new suppliers to obtain certified materials, (2) acquiring a consistent supply of certified materials, and (3) altering relationships with existing suppliers to obtain certified materials. The estimated reliability of these items was  $\alpha = 0.78$ .

### **The Intention to Adopt Environmental Certification**

Table 5.3 shows results of regression analyses used to (1) test hypotheses 1 and 2, (2) evaluate the influence of perceived benefits and challenges of certification on the intention to adopt certification (Models 2 through 7), and (3) explain variance in the intention to adopt certification (Model 8). Model 1 shows the regression results of the control variables only. Models 2, 3, and 4 show the regression results for each perceived benefit of certification in addition to the control variables. Models 5, 6, and 7 show the regression results for each perceived challenge of certification in addition to the control variables. Finally, model 8 shows the regression results for all the perceived benefits and challenges of certification that were significant in models 2 through 7 and the control variables.

----- Insert Table 5.3 here -----

Model 1, the base model with only the control variables, explains 30% of the variance in executives' intentions to adopt certification ( $R^2_{\text{adjusted}} = .30$ ;  $F_{4, 67} = 8.48$ ,  $p < .001$ ). The variable making the largest contribution to the explanation in variance is firm size, as evaluated by the log transformation of 2007 annual sales ( $b_{\text{standardized}} = 0.57$ ,  $p < .001$ ). The influence of firm size on the perceived benefits and challenges of certification will be discussed below in a *post hoc* analysis.

As shown in Models 2, 3, and 4, each of the three dimensions of perceived benefits of certification had a significant influence on executives' intentions to adopt certification, supporting hypothesis 1. Perceived product-market benefits of certification, shown in Model 2, had a significant positive influence ( $b_{\text{standardized}} = 0.23, p < .05$ ) on executives' intentions to adopt certification ( $R^2_{\text{adjusted}} = .34; F_{5, 66} = 8.20, p < .001$ ). In Model 3, the perceived environmental preparedness benefits of certification had a significant positive influence ( $b_{\text{standardized}} = 0.27, p < .01$ ) on executives' intentions to adopt certification ( $R^2_{\text{adjusted}} = .35; F_{5, 66} = 8.81, p < .001$ ). Perceived competitive posture benefits of certification, shown in Model 4, had a significant positive influence ( $b_{\text{standardized}} = 0.22, p < .05$ ) on executives' intentions to adopt certification ( $R^2_{\text{adjusted}} = .33; F_{5, 66} = 8.05, p < .001$ ).

Of the perceived challenges of certification, only the perceived process adaptation challenges of certification had a significant influence on executives' intentions to adopt certification, providing partial support of hypothesis 2. Perceived cost challenges of certification (Model 5) did not have a significant influence ( $b_{\text{standardized}} = -0.11, p = .32$ ) on executives' intentions to adopt certification ( $R^2_{\text{adjusted}} = .30; F_{5, 64} = 6.85, p < .001$ ), neither did perceived materials supply challenges of certification ( $b_{\text{standardized}} = -0.05, p = .63; R^2_{\text{adjusted}} = .29; F_{5, 66} = 6.75, p < .001$ ) as shown in Model 7. Perceived process adaptation challenges of certification, as shown in Model 6, had a significant negative influence ( $b_{\text{standardized}} = -0.43, p < .001$ ) on executives' intentions to adopt certification ( $R^2_{\text{adjusted}} = .48; F_{5, 66} = 12.25, p < .001$ ).

Taking into consideration the control variables as well as all the perceived benefits and challenges of certification that each had a significant influence on the intention to adopt certification in Models 2 through 7, Model 8 explains more than 50% of the variance in executives' intentions to adopt certification ( $R^2_{\text{adjusted}} = .51; F_{8, 63} = 10.23, p < .001$ ). The three

variables that are the largest contributors in Model 8, the full model, are perceived process adaptation challenges of certification ( $b_{\text{standardized}} = -0.44, p < .001$ ), firm size ( $b_{\text{standardized}} = 0.30, p < .01$ ), and perceived environmental preparedness benefits of certification ( $b_{\text{standardized}} = 0.24, p < .05$ ). Since firm size was such a large contributor to executives' intentions to adopt certification, further *post hoc* regression analyses were conducted to examine the relationships of firm size to all the perceived benefits and challenges of certification that had a significant influence in Models 2 through 7. It should also be noted that executives' belief in the ability to charge a premium for environmentally certified products did not significantly influence their intentions to adopt certification, with standardized regression coefficients ranging from -0.03 to 0.07 in Models 1 through 8.

### **Firm Size and Perceived Benefits and Challenges of Certification**

Table 5.4 shows results of *post hoc* regression analyses used to evaluate the influence of firm size on the perceived benefits and challenges of certification. Model 1 shows the regression results with the dependent variable "perceived product-market benefits of certification." The regression results for perceived environmental preparedness benefits as the dependent variable are shown in Model 2. In Model 3, the regression results for perceived competitive posture benefits as the dependent variable are shown. Finally, Model 4 shows the regression results for perceived process adaptation challenges of certification as the dependent variable.

----- Insert Table 5.4 here -----

As shown in Model 1, firm size had a significant positive influence ( $b_{\text{standardized}} = 0.31, p < .05$ ) on the perceived product-market benefits of certification ( $R^2_{\text{adjusted}} = .09; F_{4,68} = 2.75, p < .05$ ). In Model 2, firm size had a positive but non-significant influence ( $b_{\text{standardized}} = 0.15, p =$

.23) on the perceived environmental preparedness benefits of certification ( $R^2_{\text{adjusted}} = .04$ ;  $F_{4, 68} = 1.75$ ,  $p = .15$ ). In Model 3, firm size had a significant positive influence ( $b_{\text{standardized}} = 0.26$ ,  $p < .05$ ) on the perceived competitive posture benefits of certification ( $R^2_{\text{adjusted}} = .10$ ;  $F_{4, 68} = 2.96$ ,  $p < .05$ ). Firm size, as shown in Model 4, had a highly significant negative influence ( $b_{\text{standardized}} = -0.46$ ,  $p < .001$ ) on the perceived process adaptation challenges of certification ( $R^2_{\text{adjusted}} = .16$ ;  $F_{4, 68} = 4.54$ ,  $p < .01$ ).

## DISCUSSION AND CONCLUSIONS

When considered separately, each of the perceived benefits of CoC (product-market, environmental preparedness, and competitive posture benefits) significantly influenced executives' intentions to adopt CoC. However, when the perceptions of challenges of CoC were taken into consideration, the only benefits that had a significant influence on executives' intentions to adopt CoC were perceived environmental preparedness benefits. Environmental preparedness benefits of CoC included being prepared for future environmental regulations, improving relationships with regulatory groups, improving environmental groups' perceptions of the company, and improving the company's existing environmental strategy.

Of the perceived benefits of CoC examined, environmental preparedness benefits are tied to, in part, the image of a firm and are tied only indirectly to a firm's customers and competitors via regulations, regulatory groups, and environmental groups. Perhaps wood industry firms are well aware of the consequences of damaged image (Panwar et al., 2006) and view the adoption of CoC as a means to decrease the potential for negative press, tied to the natural environment, for their firm. At the same time, perhaps firms are not as firmly convinced about those benefits tied more directly to their customers and competitors (i.e., product-market and competitive posture benefits).



As far as the perceived challenges of CoC, only process adaptation challenges of CoC had a significant influence on executives' intentions to adopt CoC. Process adaptation challenges include keeping certified material streams separate from non-certified material streams, changing existing company processes and practices to accommodate certification requirements, and providing employees with specialized training that helps them understand the requirements of certification. Unlike the other challenges of CoC that were identified (cost and materials supply challenges), process adaptation challenges of CoC require firms to go beyond simply throwing money at a problem or putting pressure on raw material suppliers. Process adaptation challenges require firms to re-evaluate, alter, and in some cases completely overhaul their manufacturing processes and practices. For some firms, this is a considerable hurdle.

During the analyses of the influence of benefits and challenges of CoC, it became obvious that firm size (as measured by annual sales) significantly contributes to executives' intentions to adopt CoC. Further *post hoc* analyses also showed that firm size significantly influences executives' perceptions of product-market and competitive posture benefits and process adaptation challenges of CoC. Firm size did not have an influence on perceived environmental preparedness benefits of CoC.

As firm size increased, executives' perceptions of product-market and competitive posture benefits of CoC increased. In the case of product-market benefits, the benefits are directly tied to maintaining and capturing market share. It's possible that for larger firms striving to maintain their position in the market, fighting for market share is very important, whereas smaller firms may find ways to comfortably settle into isolated markets and unique sales arrangements that are, at least temporarily, sheltered from the fray of market share battles. In the case of competitive posture benefits, the benefits are relative to a firm's competitors. Once

again, its possible that for larger firms fighting for market share chain-of-custody certified products are an opportunity to create market space, where as smaller firms may not feel the same drive to create market space due to isolated markets and unique sales arrangements.

Executives' perceptions of process adaptation challenges of CoC decreased as firm size increased. As previously noted, process adaptation challenges require firms to re-evaluate, alter, and in some cases completely overhaul their manufacturing processes and practices. Due to large manufacturing volumes, larger firms are likely to gain a considerable amount of money by controlling costs compared to the amount gained by smaller firms attempting to control costs. With larger sums of money tied to controlling costs, larger firms are more likely to have invested in manufacturing control systems, where as smaller firms with less potential sum gain from cost control may not justify the cost of installing such systems. With manufacturing control systems in place, larger firms are less likely to perceive process adaptation challenges as overly difficult, because they already have a means in which to track and document the flow of certified materials through their processes. Smaller firms may not have an efficient way to track and document the flow of certified materials through their processes. Thus smaller firms are likely to perceive process adaptation challenges as more burdensome because they are likely to have difficulty in meeting the materials separation and documentation requirements of CoC.

Perceptions of environmental preparedness benefits of CoC were not significantly influenced by firm size. Perhaps firms of all sizes realize the importance of not having a damaged image or reputation, and firms view CoC as a means by which to protect or improve upon their firm's image. This may especially be the case in the North American wood products industry where over the past few decades the industry has been battered with image problems

(Panwar et al., 2006). Bad publicity for the industry may be translating into industry executives having a hyper-sensitivity to firm image issues.

### **Implications for the Supply of Certified Wood Components**

Environmental preparedness benefits are the most influential benefits in executives' intentions to adopt CoC. These benefits are rooted in the image of a firm and only indirectly rooted in a firm's customers and competitors. If wood component suppliers are currently offering some chain-of-custody certified products and gaining associated image enhancement benefits (i.e., environmental preparedness benefits), they do not necessarily have a strong impetus to offer additional chain-of-custody certified products or chain-of-custody certified product volume. This could potentially serve to hamper the development of an environmentally certified supply chain by creating a low ceiling on the supply from wood component firms as they adopt CoC in a only a few product offerings, while still reaping the image benefits. Obviously, as demand for chain-of-custody certified products rises, product-market and competitive posture benefits of CoC will become more prominent in wood component executives' intentions to adopt CoC.

In a similar vein to the above argument, if wood component firms have benefited from a positive image, through community involvement and environmental initiatives not tied to CoC, their drive to adopt CoC may be low. They may not perceive CoC as providing much additional positive image for the firm and therefore choose not to adopt CoC. Once again, this could reduce the growth in the supply of environmentally certified wood components.

Process adaptation challenges of CoC were found to negatively influence executives' intentions to adopt CoC, especially among smaller firms. Secondary manufacturers who may be considering offering certified products or expanding their current offering of certified products

may need to revamp their purchasing policies. If secondary manufacturers have sought to source from many wood component suppliers in efforts to reduce supplier muscle or influence, they may find themselves in a predicament. If many of these suppliers are smaller firms, they may not want to pursue CoC due to the process adaptation challenges. Secondary manufacturers may need to consider sourcing from larger firms which can more easily overcome the process adaptation challenges of CoC.

### **Limitations and Future Research**

WCMA member firms are located across a large geographical area and these firms draw raw materials from resource bases in proximity to their locations. This distribution of firms and the resource bases they draw from made it difficult to focus on a single type of third-party, chain-of-custody certification (i.e., SFI, FSC, or CSA). Different certification schemes are more prominent in some locations versus others. So, this research considers any and all of these certification schemes. Obviously, differences do exist among these schemes, but the measures used to evaluate executives' perceptions of the benefits and challenges of CoC were designed to elicit responses relative to the core ideas embodied in CoC in general, regardless of the specific type of certification scheme.

This lack of differentiation of certification schemes means that generalizations about demand for raw materials certified by a particular certification scheme cannot be made. Likewise, generalizations about the supply of component parts certified under by a particular certification scheme cannot be made. As the demand rises for products certified by a given certification scheme, it would be beneficial for future researchers to direct their research efforts at investigating the particular certification scheme in question so that specific demand and supply issues can be addressed.

This research did not attempt to distinguish between the use of the pure versus the mixed, or percentage based, labels. The distinction between label types centers on the volume of certified material in products. Products with a pure label contain 100% certified material, where products with a mixed label contain a minimum percentage of certified material that is below 100%.

Relative to this research, the potential difference between the two label types lies in tracking materials through the manufacturing process. If a firm offers only products bearing a mixed label, then they do not have to track materials through their manufacturing processes. Rather, they need only to insure material purchasing streams into their manufacturing facilities. If a firm offers some products with a mixed label and other products which do not bear a mixed label, then the firm must track certified materials through its manufacturing processes to assure that the products bearing a mixed label do indeed contain the amount of certified material specified.

In this second scenario, the demands of CoC requirements do not differ from those of firms which offer products bearing a pure label. Since many wood component firms sell products to an array of secondary manufacturers, they are less likely to have an entire product portfolio that is certified, rather they are more likely to offer some products which are certified, whether that be products with pure or mixed labels. So, in a majority of cases, it does not matter whether the pure or mixed labels are considered, because the requirements associated with the label types will be the same. In the event that label type is central to a research problem, future researchers should distinguish between label types.

This research investigated CoC in an industry that is not well defined in terms of total market share and product scope. Specific products which firms manufactured were not

identified. Future research should seek to identify not only a firm's products, but also total sales by product category. This would allow for clearer interpretation of results as well as a better understanding of how those results can be transferred to other contexts.

Future research of certification among wood products manufacturers should also examine linkages in the supply chain. Research would benefit from an examination of the nature of supplier-buyer relationships and the number and type of firms that a supplier sells to (and vice versa that a buyer buys from. For example if a wood component manufacturer sells to a broad array of secondary manufacturers who are not demanding certified components, perhaps the component manufacturer might not have a strong impetus to become chain-of-custody certified. This type of information could help to further clarify the distinctions among firms perceptions of CoC and ultimately the adoption of CoC among specific parts of the supply chain.

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Table 5.1.  
*Descriptive Statistics and Pearson Correlations*

<b>Variable</b>	<b>M</b>	<b>SD</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
1. Intention to adopt environmental certification	3.34	1.17										
2. Executive's industry tenure	23.84	11.55	-0.17									
3. Perception of the ability to charge a premium for environmentally certified products	2.35	1.37	0.04	-0.04								
4. Firm age (square root transformation)	6.47	2.45	0.05	0.10	-0.22*							
5. Previous year's annual sales (log transformation)	2.38	1.54	0.51***	-0.05	-0.06	0.30**						
6. Product-market benefits	3.21	1.04	0.42***	-0.13	0.20	-0.05	0.25*					
7. Environmental preparedness benefits	2.59	0.98	0.28*	0.09	0.25*	-0.09	0.05	0.45***				
8. Competitive posture benefits	3.00	0.94	0.41***	-0.12	0.13	0.09	0.28*	0.60***	0.48***			
9. Cost challenges	3.33	1.07	-0.36**	0.27*	-0.24*	-0.06	-0.27*	-0.36**	-0.18	-0.23*		
10. Process adaptation challenges	2.79	1.08	-0.60***	0.13	-0.09	0.05	-0.32**	-0.27*	-0.05	-0.21	0.43***	
11. Materials supply challenges	3.21	1.07	-0.15	0.07	-0.39***	0.17	-0.03	-0.16	-0.23*	-0.26*	0.27*	0.30**

Table 5.2.  
*Factor Loadings from Exploratory Factor Analysis*

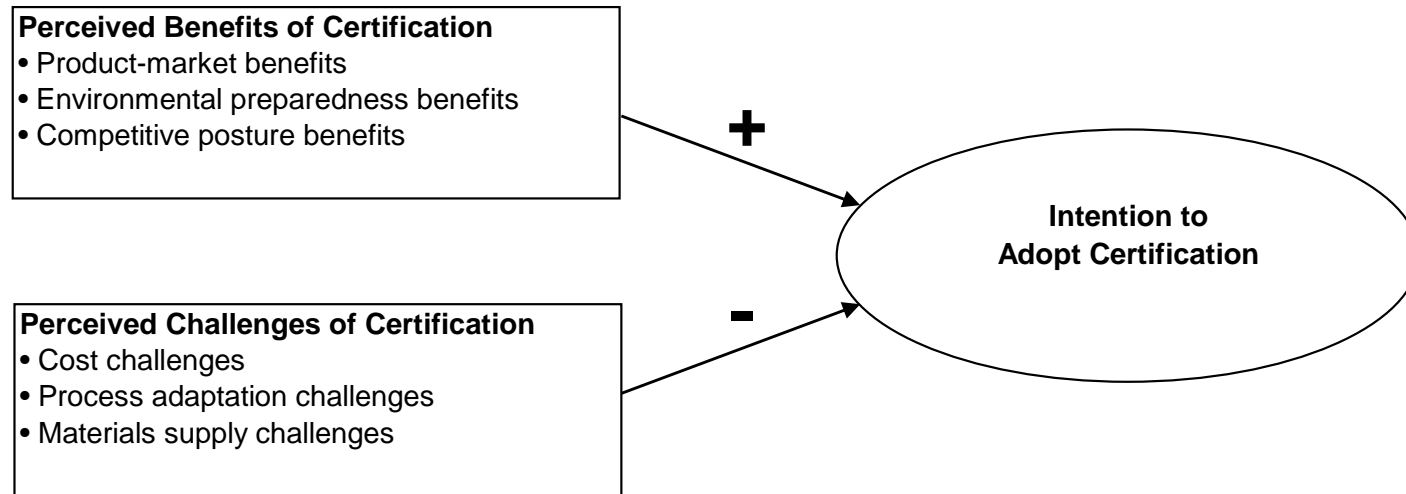
<b>Item</b>	<b>Factor 1</b>	<b>Factor 2</b>	<b>Factor 3</b>	<b>Factor 4</b>	<b>Factor 5</b>	<b>Factor 6</b>
Gaining new customers in new markets	<b>0.84</b>	-0.03	0.004	-0.12	0.23	-0.15
Gaining new customers in existing markets	<b>0.80</b>	-0.06	0.19	-0.10	0.05	-0.02
Satisfying existing customer demand for environmentally certified products	<b>0.62</b>	0.09	0.15	0.16	-0.19	0.20
Improving environmental groups' perceptions of the company	-0.14	<b>0.90</b>	0.10	0.13	0.01	-0.04
Being prepared for future environmental regulations	0.09	<b>0.77</b>	-0.08	-0.28	-0.04	0.24
Improving the company's existing environmental strategy	-0.07	<b>0.74</b>	0.06	-0.16	0.06	-0.11
Improving relationships with regulatory groups	0.13	<b>0.57</b>	0.12	0.09	0.15	-0.21
Maintaining competitive position versus competitors who have adopted environmental certification	0.08	0.16	<b>0.67</b>	0.28	-0.20	0.05
Improving competitive position with foreign (non U.S. and Canadian) competitors	-0.05	0.02	<b>0.61</b>	-0.16	0.13	-0.06
Improving competitive position versus competitors who have not adopted environmental certification	0.37	0.03	<b>0.49</b>	-0.01	-0.09	0.03
Justifying the annual auditing costs of maintaining certification	-0.10	-0.17	0.11	<b>0.81</b>	0.03	-0.06
Justifying the cost of additional staff hours needed for the documentation requirements of certification	-0.03	0.09	0.03	<b>0.80</b>	0.14	0.01
Justifying the initial costs of becoming certified	0.08	-0.12	-0.04	<b>0.79</b>	0.11	0.05
Changing existing company processes and practices to accommodate certification requirements	-0.10	0.05	0.03	0.05	<b>0.86</b>	0.05
Keeping certified material streams separate from non-certified material streams within your manufacturing facility or (facilities)	-0.03	-0.10	0.16	-0.05	<b>0.79</b>	0.13
Providing employees with specialized training that helps them understand the requirements of certification	0.22	0.23	-0.33	0.31	<b>0.53</b>	0.004
Altering relationships with existing suppliers to obtain certified wood and wood-based material	0.01	0.17	-0.10	-0.002	0.17	<b>0.76</b>
Acquiring a consistent supply of certified hardwood (non-tropical) lumber	-0.10	-0.06	0.22	-0.01	0.02	<b>0.73</b>
Establishing relationships with new suppliers to obtain certified wood and wood-based materials	0.12	-0.21	-0.10	0.02	0.01	<b>0.69</b>

Table 5.3.  
*The Intention to Adopt Environmental Certification Regressed on the Independent Variables*

<b>Determinants of the decision to adopt certification</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>	<b>Model 6</b>	<b>Model 7</b>	<b>Model 8</b>
	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>
<i>Control variables</i>								
Executive's industry tenure	-0.12	-0.10	-0.15	-0.09	-0.07	-0.08	-0.12	-0.09
Executive's perception of the ability to charge a premium for environmentally certified products	0.07	0.03	0.01	0.03	0.03	0.05	0.05	-0.03
Firm age (square root transformation)	-0.04	-0.04	-0.03	-0.08	-0.05	0.01	-0.04	0.02
2007 Annual sales (log transformation)	0.57***	0.50***	0.53***	0.51***	0.54***	0.37***	0.56***	0.30**
<i>Independent variables</i>								
Product-market benefits		0.23*						0.06
Environmental preparedness benefits			0.27**					0.24*
Competitive posture benefits				0.22*				0.06
Cost challenges					-0.11			
Process adaptation challenges						-0.43***		-0.44***
Materials supply challenges							-0.05	
$R^2$	0.34	0.38	0.40	0.38	0.35	0.48	0.34	0.57
Adjusted $R^2$	0.30	0.34	0.35	0.33	0.30	0.44	0.29	0.51
Incremental adj. $R^2$ beyond controls only model	-	0.04	0.05	0.03	0.00	0.14	-0.01	0.21
$F$	8.48***	8.20***	8.81***	8.05***	6.85***	12.25***	6.75***	10.23***

Table 5.4.  
*The Perceived Benefits and Challenges of Environmental Certification Regressed on the Independent Variables*

<b>Determinants of the decision to adopt certification</b>	<b>Model 1 (product-market benefits)</b>	<b>Model 2 (environmental preparedness benefits)</b>	<b>Model 3 (competitive posture benefits)</b>	<b>Model 4 (process adaptation challenges)</b>
	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>
<i>Control variables</i>				
Executive's industry tenure	-0.07	0.10	-0.11	0.08
Executive's perception of the ability to charge a premium for environmentally certified products	0.20	0.25*	0.20	-0.07
Firm age (square root transformation)	-0.03	-0.07	0.13	0.14
2007 Annual sales (log transformation)	0.31*	0.15	0.26*	-0.46***
$R^2$	0.14	0.09	0.15	0.21
Adjusted $R^2$	0.09	0.04	0.10	0.16
$F$	2.75*	1.75	2.96*	4.54**



*Figure 5.1.* Influence of perceived benefits and challenges of certification on executives' intentions to adopt certification

## **CHAPTER 6: CONCLUSIONS AND FUTURE RESEARCH**

This chapter provides conclusions based on the research objectives proposed for the dissertation, and recommends future research relative to environmental certification within the North American wood products industry.

## Conclusions

Conclusions stated in this chapter address the research objectives stated at the beginning of the dissertation. After addressing the research objects, future research relative to environmental certification within the North American wood products industry is recommended. The following are the research objectives stated at the beginning of this dissertation.

1. Use the upper echelons perspective of organizations to examine the decision to adopt, or not adopt, environmental certification among firms in two segments of the North American forest products industry.
2. Develop a measure of perceived benefits of environmental certification based on previously developed perceptual based measures of opportunities of environmental initiatives.
3. Empirically test the relationship between managers' perceptions of benefits of environmental certification and their decisions to adopt, or not adopt, environmental certification.
4. Empirically test the relationship between managers' perceptions of hostility in the business environment of the firm and their decisions to adopt, or not adopt, environmental certification.
5. Empirically test the relationships between managers' tolerance for ambiguity, openness to change, and functional orientation and their decisions to adopt, or not adopt, environmental certification.
6. Empirically test the relationships between managers' tolerance for ambiguity, openness to change, and functional orientation and their perceptions of benefits of environmental certification.



7. Empirically test the mediating effect of manager's perceptions of benefits of environmental certification on the relationships between managers' tolerance for ambiguity, openness to change, and functional orientation and their decisions to adopt, or not adopt, environmental certification.
8. Investigate supply and demand issues of environmentally certified materials, relative to the adoption of environmental certification, within the North American kitchen cabinet industry.

### **Objective 1: Using the Upper Echelons Perspective**

The upper echelons perspective or framework (Hambrick and Mason, 1984) was used to examine wood industry executives' decisions and intentions to adopt environmental certification, as demonstrated in chapter 4 of the dissertation. In addition to chapter 4, which used data from KCMA executives, the upper echelons perspective was also used to examine data from WCMA executives. Specifically, the variables "tolerance for ambiguity" and "functional orientation" were examined. Neither of these variables had a significant influence on WCMA executives' intentions to adopt third-party, chain-of-custody certification.

### **Objective 2: Development of Perceived Benefits Measure**

Based on previous research on both opportunities/threats of environmental initiatives and perceptions of environmental certification by wood industry executives, a measure of perceived benefits of environmental certification as well as a measure of perceived challenges of environmental certification were developed and tested. The executive director of the WCMA, Steve Lawser, and board members of the WCMA were instrumental in the development of these measures. Through an iterative process, Steve Lawser, WCMA board members, and I arrived at an agreed upon set of items that were deemed to effectively probe perceptions of the benefits and

challenges of environmental certification (third-party, chain-of-custody environmental certification) that were likely to be at the fore of the minds of executives from WCMA member firms.

WCMA executive data on the perceived benefits and challenges of environmental certification was used for an exploratory factor analysis to identify the latent constructs among the list of items used to probe benefits and challenges of certification. Exploratory factor analysis yielded three benefits dimensions and three challenges dimensions: product-market benefits, environmental preparedness benefits, competitive posture benefits, cost challenges, process adaptation challenges, and materials supply challenges. Next, these benefits and challenges dimensions were transferred to the examination of second-party environmental certification (i.e., KCMA's ESP certification) within the kitchen cabinet industry.

Applying the identified dimensions of benefits and challenges of certification to KCMA executives required a consideration of items that were suitable to third-party, chain-of-custody certification and how/if these items were also suitable to evaluate second-party certification. As a result of this consideration, several items were dropped from the KCMA survey because they were not applicable to the certification being considered by KCMA member firm executives. With this refined set of items, the KCMA executive data was used for confirmatory factor analyses.

The confirmatory factor analyses of the KCMA executive data verified the targeted factor structure from the exploratory factor analyses of the WCMA executive data. Of course, the KCMA executive data contained a few less items than the WCMA executive data, but still the remaining items held to the same factor structure in both analyses. Therefore, the basic framework of the dimensions of benefits and challenges of environmental certification that were

identified should be transferable to investigations of environmental certifications that are akin to the ones studied in this research.

### **Objective 3: Testing the Relationship between Executives' Perceptions of Certification and Their Decision to Adopt Certification**

As discussed in chapters 4 and 5, the relationship between executives' perceptions of the benefits and challenges of environmental certification and their decisions and intentions to adopt certification were tested. In both chapters, perceived benefits and challenges of certification had significant influence on executives' decisions and intentions to adopt certification. Of the hypothesized relationships within the dissertation, some of the perceived benefits and challenges of certification were very influential on executive's decisions and intentions to adopt certification.

Relative to second-party environmental certification (i.e., KCMA ESP certification), the most influential perceived benefits and challenges on executives' decisions and intentions to adopt certification were: competitive posture benefits and cost challenges. Relative to third-party, chain-of-custody environmental certification (i.e., WCMA executive data), the most influential perceived benefits and challenges on executives' decisions and intentions to adopt certification were: environmental preparedness benefits and process adaptation challenges. So, even though the dimensions of benefits and challenges of certification are transferable to different certification schemes, the influence of individual benefits and challenges dimensions varied across the two certification schemes.

### **Objective 4: Testing the Relationship between Executive's Perceptions of Hostility in the Business Environment and Their Decision to Adopt Certification**

The relationship between perceived hostility in the business environment and executives' decisions and intentions to adopt certification was examined in chapter 4 of the dissertation as well as on unreported analyses of the WCMA executive data. In chapter 4, there was partial support for influence of executives' perceptions of hostility in the business environment on executives' decisions to adopt certification, where as in the unpublished analyses of the WCMA executive data perceived hostility did not have a significant influence on executives' intentions to adopt certification.

### **Objectives 5, 6, and 7: Testing the Relationships Between Executives' Characteristics and Executives' Perceptions of Certification as well as Their Decision to Adopt Certification**

These objectives are directly tied to objective #1, use of the upper echelons perspective. Unfortunately, of the executive characteristics considered (i.e., tolerance for ambiguity, openness to change, and functional orientation) only statistical testing relative to functional orientation was suitable for publication. Different challenges were faced with the tolerance for ambiguity and openness to change measures.

The tolerance for ambiguity measure had low reliability in both the KCMA ( $\alpha = .67$ ) and WCMA ( $\alpha = .60$ ) data sets. Also, tolerance for ambiguity did not significantly influence the decision or intention to adopt certification in either data set. In the absence of significance of this relationship, testing for mediation (objective #7) became irrelevant. However, the influence of tolerance for ambiguity on perceptions of benefits and challenges of certification (objective #6) was still examined.

The openness to change measure suffered another fate. A suitable measure for this construct could not be agreed upon with WCMA board members. Ultimately, this measure was removed from the WCMA survey. At one point, it was hoped that a comparison study could be

done between the WCMA and KCMA data sets. Given this, the survey for KCMA member firms mimicked that of the WCMA. So, space on the survey was at a premium. Ultimately, the openness to change measure was not included on the KCMA survey.

The influence of executives' functional orientations and their decisions and intentions to adopt certification was tested in both the KCMA and WCMA data sets. As shown in Chapter 4 of the dissertation, executives' functional orientations influenced their decision to adopt KCMA's ESP certification. However, as also shown in Chapter 4, functional orientation did not significantly influence perceptions of benefits and challenges of certification. In the absence of significance of this relationship, testing for mediation (objective #7) became irrelevant.

The relationship between functional orientation and the intention to adopt certification was not significant in the WCMA data set. In the absence of significance of this relationship, testing for mediation (objective #7) became irrelevant. However, the influence of functional orientation on perceptions of benefits and challenges of certification (objective #6) was still examined.

### **Objective 8: Investigate Supply and Demand Issues of Environmentally Certified Materials**

Originally, this objective was intended to be tied to only the on-line survey of managers responsible for the implementation of KCMA's ESP certification within their firms. However, the dissertation also includes some certified materials implications relative to third-party, chain-of-custody certification (included in chapter 5). Chapter 3 presents supply and demand implications relative to KCMA's ESP certification, where Chapter 5 presents supply and demand implications relative to third-party, chain-of-custody certification within the wood component industry.

## **Future research**

### **A Review of Literature and Mapping**

The field of wood products would benefit from a literature review of environmental certification in the wood products industry. Specifically, the role and nature of environmental certification from the resource base (i.e., forests and timber) through various forms of manufacturing to end-use products could be reviewed. This could be an onerous task, since many certification schemes are in use across the wood products industry. A literature review should include, and distinguish between, first-party, second-party, and third-party certification schemes.

Keep in mind that a literature review would be attempting to hit a moving target. In other words, environmental certification schemes relative to the wood products industry are continually evolving. Regardless, researchers and industry observers would greatly benefit from a review that documents various certification schemes, compares and contrasts them, and shows any linkages among them. With that information, a better understanding could be gained about the context in which certain phenomenon (i.e., the adoption of a particular environmental certification) are occurring as well as what impact the outcomes of those phenomenon could have on the wood products industry.

In addition to a literature review, a mapping<sup>7</sup> of environmental certification across the wood products industry would be helpful. A map could help in identifying where different certification schemes overlap and how different certification schemes connect, or link to one another. Chapter 3 includes a simplified map of environmental certification in a portion of the

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<sup>7</sup> The idea of a literature review and mapping environmental certification in the wood industry were influenced by comments and suggestions by Paul Smith.

wood industry. Figure 6.1 shows an expanded map of environmental certification in a wider swath of the industry.

### **Using Simulations**

In chapter 4, research results showed that executives' functional orientations influenced their decision to adopt certification but not their perceptions of certification. This suggests that the difference in the decisions whether or not to adopt certification among executives with different functional orientations lies not in how they see the focal issue (i.e., environmental certification), but rather some other psychological characteristics of executives. In other words, to better understand executives' decisions relative to environmental certification, research needs to delve into the "black box" (Hambrick, 2007; Lawrence, 1997).

In chapter 2 of this dissertation, I proposed to examine two components of this "black box": tolerance for ambiguity and openness to change. Unfortunately, openness to change was not examined in this dissertation. The tolerance for ambiguity measure had low reliability, which probably contributed to non-significant findings.

One way that has been suggested to delve into the "black box" is the use of simulations<sup>8</sup> (Hambrick, 2007). Researchers could devise computer simulations that are accessible on-line. These simulations could be programmed with decision choices that are designed to identify how executives make decisions relative to environmental certification or other environmental initiatives.

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<sup>8</sup> This idea had been planted in my mind from comments made by Don Hambrick.

## Other Environmental Initiatives

Wood industry firms are likely pursuing environmental initiatives outside of certification. These initiatives could include waste reduction, land restoration, co-generation of electricity, materials recycling, the use of alternative materials, as well as others. How do these initiatives inform executives' decisions to adopt certification?

In chapter 6, wood component executives' perceptions of environmental preparedness benefits of certification influenced their decisions to adopt certification. Environmental preparedness benefits include firm image-based benefits. Perhaps firms that aggressively pursue environmental initiatives other than certification are already reaping image-based benefits, and thus there is a decreased probability that they would adopt certification. Or, perhaps firms that aggressively pursue environmental initiatives other than certification are driven to adopt certification by a heightened sense of environmental responsibility or they see a unique way to position their firm as "ultra-green."

This research approached the decision to adopt environmental certification from the strategic choice perspective. It assumed that the decision to adopt certification was not necessarily tied to an *a priori* environmental strategy of a firm. Research which seeks to identify environmental initiatives other than certification could provide understanding as to whether adopting certification is, or is not, part of a broader environmental strategy. Perhaps more importantly, research could determine how decisions about an environmental initiative inform decisions about other environmental initiatives.



## **Linkages in the Supply Chain**

As suggested in chapter 5, research on environmental certification among wood products manufacturers could benefit from an examination of how aspects of the relationships between component manufacturers and secondary manufacturers might influence both decisions relative to certification and supply and demand issues tied to certification. For example if a wood component manufacturer sells to a broad array of secondary manufacturers who are not demanding certified components, the component manufacturer might not have a strong impetus to become chain-of-custody certified. Or, given the same scenario, maybe the wood component manufacturer sees something on the business horizon that makes the adoption of certification prudent. Without delving into these supply chain relationships, researchers cannot begin to address how manufacturer to manufacturer relationships are impacting decisions to adopt certification.

## **Aspects of the Manufacturing Process**

Results reported in chapter 5 show that as firm size decreased executives perceived more process-adaptation challenges of certification. It was suggested that smaller firms may be less likely using manufacturing control systems (i.e., ERP, MRP). Regardless if manufacturing control systems are in use in small firms or not, manufacturing control systems are likely to play a role in the decision to adopt chain-of-custody certification. Two requirements inherent to chain-of-custody certification (at least always in the case of products carrying a “pure” label) are documentation and material separation. Manufacturing control systems can be used to address these requirements by allowing firms to track certified materials through their operations as well as provide documentation of material flows.

In addition to manufacturing control systems, physical aspects of operations such as floor space and material handling techniques are likely to influence the adoption of certification. Materials separation would in many cases require additional manufacturing space and an overall increase in the handling of materials. Research incorporating aspects of the manufacturing process such as those mentioned here could help to further understand the process adaptation challenges of certification.

### **Longitudinal Research**

This research was cross-sectional in nature. Due to this, causal direction of relationships between constructs cannot be confirmed. In the case of the data set involving executives from WCMA member firms, an opportunity exists for longitudinal research. The identity of WCMA member firms who have not adopted certification is known. Future research could survey these same firms at a later time and see which firms adopted certification and which did not. Longitudinal data of this sort could provide two things: (1) an understanding of the causal linkage between perceptions of certification and decisions relative to certification, and (2) identification of temporal aspects of measures used in the research (providing the same measures were used at both time 1 and time 2).

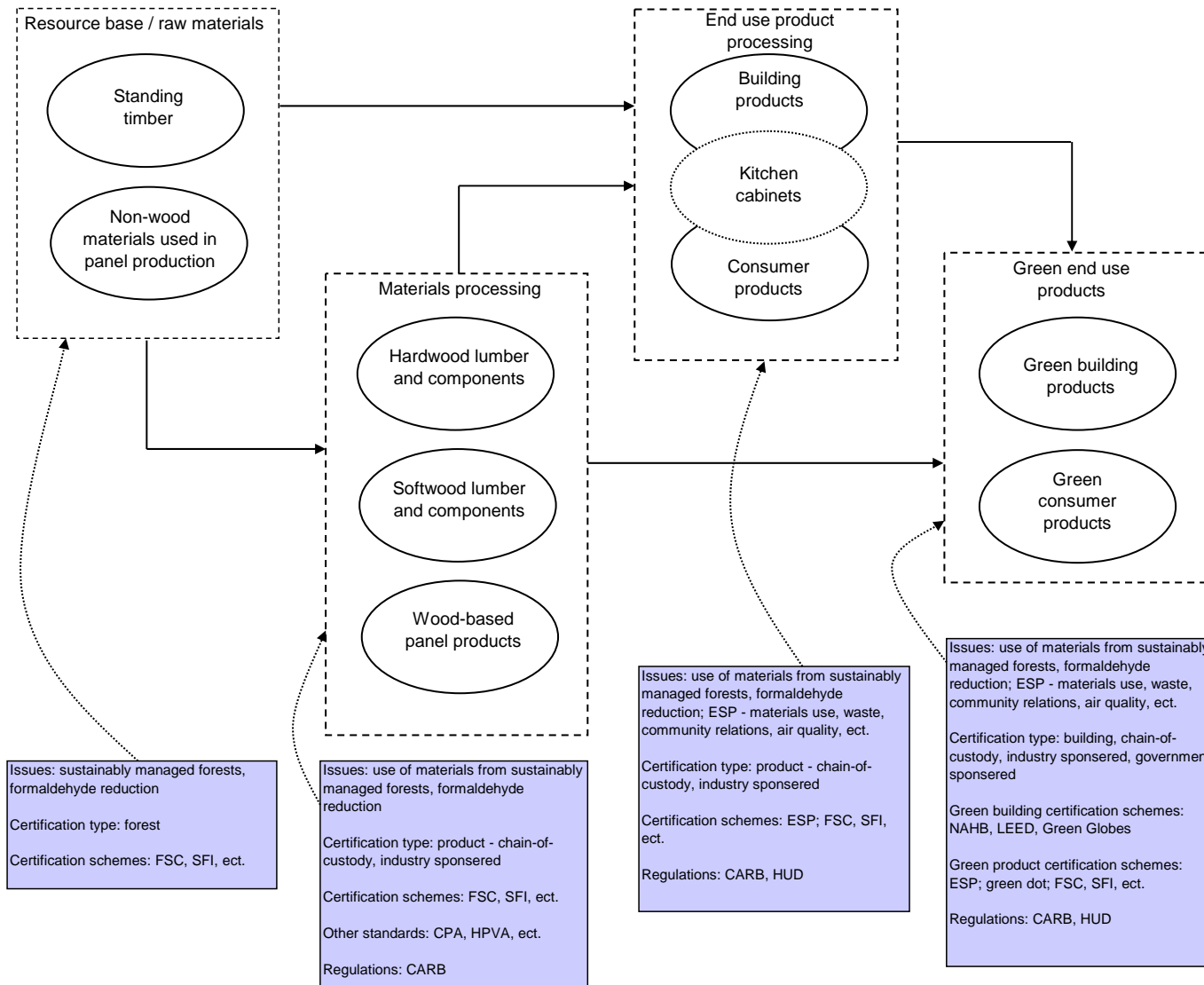


Figure 6.1. Map of environmental certification across the wood products industry

**APPENDIX A: SURVEY USED FOR MANAGERS RESPONSIBLE FOR  
IMPLEMENTING ESP CERTIFICATION IN THEIR FIRMS**

This was an on-line survey.



## Implied Informed Consent Form for Social Science Research

The Pennsylvania State University

**Title of Project:** Implementation of Environmental Stewardship Program Certification

**Principal Investigator:** Steven W. Bukowski  
206 Forest Resources Building  
University Park, PA 16802  
(814) 865-2549; [swb104@psu.edu](mailto:swb104@psu.edu)

**Advisor:** Dr. Judd Michael  
211 Forest Resources Building  
University Park, PA 16802  
(814) 863-2976; [jhm104@psu.edu](mailto:jhm104@psu.edu)

1. **Purpose of the Study:** The purpose of this research is to investigate the implementation of voluntary environmental certification within the U.S. domestic wood kitchen cabinet industry.
2. **Procedures to be followed:** You will be asked to answer 14 questions on the survey. Four questions contain multiple parts. You will be asked to answer questions about the name of your company, your functional background, the decision to adopt environmental certification, material usage, outcomes of environmental certification, and challenges of environmental certification.
3. **Benefits:** The benefits to the forest products research community include a better understanding of the difficulties and opportunities of the implementation of voluntary environmental certification within kitchen cabinet firms.
4. **Duration/Time:** It will take about 10 minutes to complete the survey.
5. **Statement of Confidentiality:** Your participation in this research is confidential. Your confidentiality will be kept to the degree permitted by the technology used. No guarantees can be made regarding the interception of data sent via the Internet by any third parties. The results of this survey will be stored and secured in password protected files in the researcher's computer. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.
6. **Right to Ask Questions:** You can ask questions about this research. Contact Steven W. Bukowski at (814) 865-2549 with questions. You can also call this number if you have complaints or concerns about this research.
7. **Voluntary Participation:** Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer. Refusal to take part in or withdrawing from this study will involve no penalty or loss of benefits you would receive otherwise.

You must be 18 years of age or older to take part in this research study.

Completion and submission of the survey implies that you have read the information in this form and consent to take part in the research.

Please print off this form to keep for your records.

1. What is the name of the company you work for? \_\_\_\_\_

2. What is your title? \_\_\_\_\_

3. What type of position did you start your career in?

- |  |  |
|--|--|
| <input type="checkbox"/> Marketing & Sales               | <input type="checkbox"/> Quality Assurance/Quality Control |
| <input type="checkbox"/> Purchasing                      | <input type="checkbox"/> Human Resources                   |
| <input type="checkbox"/> Operations/Production           | <input type="checkbox"/> Accounting/Finance                |
| <input type="checkbox"/> R&D/Engineering                 | <input type="checkbox"/> Environmental/Health and Safety   |
| <input type="checkbox"/> Other _____<br>(please specify) |  |

4. How many years have you worked in each of the following types of positions?

- |                             |   |
|-----------------------------|---|
| _____ Marketing & Sales     | _____ Quality Assurance/Quality Control |
| _____ Purchasing            | _____ Human Resources                   |
| _____ Operations/Production | _____ Accounting/Finance                |
| _____ R&D/Engineering       | _____ Other _____<br>(please specify)   |

5. How many years have you worked in your current position? \_\_\_\_\_

6. How many years have you worked for your firm? \_\_\_\_\_

7. How many years have you worked in the kitchen cabinet industry? \_\_\_\_\_

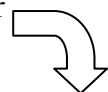
8. How many years have you worked in a higher level management position within the kitchen cabinet industry? \_\_\_\_\_

9. Please indicate your level of formal education.

- High school degree or less
- Some college/2 year degree
- College degree
- MBA or graduate degree

10. Which one person, or entity, made the final decision to pursue, or not pursue, the adoption of KCMA's Environmental Stewardship Program (ESP) certification?

- |  |  |
|--|--|
| <input type="checkbox"/> Board of directors  | <input type="checkbox"/> Executive of a parent company |
| <input type="checkbox"/> Private investor(s) | <input type="checkbox"/> COO                           |
| <input type="checkbox"/> Owner               | <input type="checkbox"/> Other (please specify) _____  |
| <input type="checkbox"/> CEO                 |  |



Are the owner and the CEO the same person?  Yes  No

11. For each of the following material types, what percentage of your facility's (or facilities') usage of the material do you estimate to be from certified\* sources **currently (2008)**?

<b>Material type</b>	<b>Not applicable</b>	<b>1 to 20%</b>	<b>21 to 40%</b>	<b>41 to 60%</b>	<b>61 to 80%</b>	<b>81 to 100%</b>
Hardwood lumber (non-tropical)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hardwood components (purchased; pre-made)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tropical lumber	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tropical components (purchased; pre-made)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plywood - softwood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plywood – hardwood (non-tropical)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plywood – tropical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plywood components (purchased; pre-made)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Particleboard	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Particleboard components (purchased; pre-made)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medium density fiberboard (MDF)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medium density fiberboard (MDF) components (purchased; pre-made)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\* Certified means materials certified in accordance with any of the following entities or rules: Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI), International Tropical Timber Organization (ITTO), ISO 14001, American Tree Farm System, Canadian Standards Association, Pan European Certification Council, CPA EPPS CPA 2-06, and ANSI/HPVA HP-1.

12. For each of the following material types, what percentage of your facility's (or facilities') usage of the material do you expect to be from certified\* sources **5 years from now (or in 2013)**?

<b>Material type</b>	<b>Not applicable</b>	<b>1 to 20%</b>	<b>21 to 40%</b>	<b>41 to 60%</b>	<b>61 to 80%</b>	<b>81 to 100%</b>
Softwood lumber	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Softwood components (purchased; pre-made)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hardwood lumber (non-tropical)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hardwood components (purchased; pre-made)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tropical lumber	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tropical components (purchased; pre-made)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plywood - softwood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plywood – hardwood (non-tropical)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plywood – tropical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plywood components (purchased; pre-made)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Particleboard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Particleboard components (purchased; pre-made)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medium density fiberboard (MDF)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medium density fiberboard (MDF) components (purchased; pre-made)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\* Certified means materials certified in accordance with any of the following entities or rules: Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI), International Tropical Timber Organization (ITTO), ISO 14001, American Tree Farm System, Canadian Standards Association, Pan European Certification Council, CPA EPPS CPA 2-06, and ANSI/HPVA HP-1.



13. The following items list some possible outcomes related to environmental certification, such as KCMA's ESP. Please indicate the extent to which you believe environmental certification will be valuable in achieving the following outcomes.

<b>Outcome</b>	<b>Provides no value</b>	<b>Slightly valuable</b>	<b>Valuable</b>	<b>Very valuable</b>	<b>Extremely valuable</b>
Satisfying existing customer demand for environmentally minded products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gaining new customers in existing markets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gaining new customers in new markets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving the marketing and selling of other existing products which are not ESP certified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintaining competitive position with competitors who have chosen to adopt environmental certification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving competitive position with competitors who have chosen not to adopt environmental certification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving competitive position with foreign competitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emulating successful firms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Charging more for environmentally minded products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving operating costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving product quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving the company's internal processes and practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Positioning the company to pursue more stringent process or product certification (example: ISO certification)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving relationships with the local community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving relationships with regulatory groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving relationships with environmental groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Being prepared for future environmental regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving the company's image and reputation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improving upon the company's existing environmental strategy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Attracting talented, young professionals who may desire to work for a environmentally minded company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Satisfying owner(s) environmentally oriented desires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Satisfying your personal environmentally oriented desires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Satisfying investor(s) environmentally oriented desires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. The following items list some potential challenges related to implementing the certification requirements of KCMA’s ESP. Please indicate the extent to which these challenges will be difficult, or have been difficult, to overcome in successfully implementing ESP certification requirements.

<b>Issue</b>	<b>Not applicable</b>	<b>Not difficult</b>	<b>Moderately difficult</b>	<b>Difficult</b>	<b>Very difficult</b>	<b>Extremely difficult</b>
Integrating certification requirements with existing company processes and practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Completing required documentation for ESP certification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Changing existing company processes and practices to accommodate certification requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Altering relationships with existing suppliers to obtain certified materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Establishing new relationships with new suppliers to obtain certified materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acquiring a consistent supply of certified plywood and/or plywood components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acquiring a consistent supply of certified particleboard and/or particleboard components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acquiring a consistent supply of certified MDF and/or MDF components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acquiring a consistent supply of certified hardwood lumber and/or hardwood components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acquiring a consistent supply of certified softwood lumber and/or softwood components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acquiring a consistent supply of certified tropical lumber and/or tropical solid wood components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having adequate cash flow to support any necessary changes as a result of certification requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Providing specialized training of employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having sufficient shop floor labor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having sufficient administrative staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Thank you.**

**We appreciate the time you have taken to answer these questions**

## **APPENDIX B: KCMA EXECUTIVE SURVEY**

# PENNSSTATE



*In cooperation with the KCMA*

## **EXECUTIVE SURVEY OF KCMA'S ENVIRONMENTAL STEWARDSHIP PROGRAM (ESP)**





**Implied Informed Consent Form for Social Science Research**  
The Pennsylvania State University

**Title of Project:** Executive Perception of Environmental Certification

**Principal Investigator:** Steven W. Bukowski  
206 Forest Resources Building  
University Park, PA 16802  
(814) 865-2549; [swb104@psu.edu](mailto:swb104@psu.edu)

**Advisor:** Dr. Judd Michael  
211 Forest Resources Building  
University Park, PA 16802  
(814) 863-2976; [jhm104@psu.edu](mailto:jhm104@psu.edu)

8. **Purpose of the Study:** The purpose of this research is to investigate environmental certification within the U.S. wood kitchen cabinet industry.
9. **Procedures to be followed:** You will be asked to answer 17 questions on the survey. Five questions contain multiple parts. You will be asked to answer questions about characteristics of your company, characteristics about yourself, the general business environment, and environmental certification.
10. **Benefits:** The benefits to the forest products research community include a better understanding of environmental certification within the U.S. wood kitchen cabinet industry.
11. **Duration/Time:** It will take about 10 to 15 minutes to complete the survey.
12. **Statement of Confidentiality:** Your participation in this research is confidential. The results of this survey will be stored and secured in password protected files in the researcher's computer. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.
13. **Right to Ask Questions:** You can ask questions about this research. Contact Steven W. Bukowski at (814) 865-2549 with questions. You can also call this number if you have complaints or concerns about this research.
14. **Voluntary Participation:** Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer. Refusal to take part in or withdrawing from this study will involve no penalty or loss of benefits you would receive otherwise.

You must be 18 years of age or older to take part in this research study.

Completion and submission of the survey implies that you have read the information in this form and consent to take part in the research.

1. Which category best describes your position in your company? (Fill-in one circle only)

- |   |  |
|---|--|
| <input type="radio"/> CEO                             | <input type="radio"/> Chief executive of a business unit or division |
| <input type="radio"/> President                       | <input type="radio"/> Engineering Manager                            |
| <input type="radio"/> COO                             | <input type="radio"/> Marketing Manager                              |
| <input type="radio"/> CFO                             | <input type="radio"/> Sales Manager                                  |
| <input type="radio"/> Operations/Production Manager   | <input type="radio"/> Human Resources Manager                        |
| <input type="radio"/> Other _____<br>(please specify) | <input type="radio"/> Vice President of _____<br>(please specify)    |

2. Are you the/an owner of the company?  Yes  No

3. Are you the/a founder of the company?  Yes  No

4. How many years have you worked in the kitchen cabinet industry? \_\_\_\_\_

5. How many years have you worked in industries other than the kitchen cabinet industry? \_\_\_\_\_

6. To what degree (on a scale from 1 to 10) do you feel each of the following functional areas have influenced your career path. Please circle one number for each functional area.

	<b>Very little</b>										<b>A lot</b>
	1	2	3	4	5	6	7	8	9	10	
Marketing	1	2	3	4	5	6	7	8	9	10	
Sales	1	2	3	4	5	6	7	8	9	10	
Product development	1	2	3	4	5	6	7	8	9	10	
Operations/Production	1	2	3	4	5	6	7	8	9	10	
Process engineering	1	2	3	4	5	6	7	8	9	10	
Accounting	1	2	3	4	5	6	7	8	9	10	

This page of the survey asks questions about your company or business unit. If you are part of a business unit of a parent company, please answer the following questions in terms of your business unit and not the parent company.

7. Approximately how many full-time production employees were working for your company (or business unit) in 2007? \_\_\_\_\_

8. How many years has your firm been in operation? (company age) \_\_\_\_\_

9. What were your company's (or business unit's) 2007 annual sales?

- |   |   |
|---|---|
| <input type="radio"/> < \$2.5 million       | <input type="radio"/> > \$40 – \$60 million   |
| <input type="radio"/> > \$2.5 – \$5 million | <input type="radio"/> > \$60 – \$80 million   |
| <input type="radio"/> > \$5 – \$10 million  | <input type="radio"/> > \$80 – \$100 million  |
| <input type="radio"/> > \$10 – \$20 million | <input type="radio"/> > \$100 – \$250 million |
| <input type="radio"/> > \$20 – \$30 million | <input type="radio"/> > \$250 million         |
| <input type="radio"/> > \$30 – \$40 million |   |

10. Which of the following categories best describes your company's (or business unit's) products?

- Custom                       Semi-custom                       Stock

The following questions refer to environmental certification. **Environmental certification** refers to KCMA's Environmental Stewardship Program (ESP) certification.

11. The following question refers to all of your company's (or business unit's) brands and facilities. What is the current status of your company's (or business unit's) decision to adopt, or not adopt, ESP certification?

- at least one brand or facility has adopted ESP certification
- at least one brand or facility is currently in the process of becoming ESP certified
- no brands or facilities have pursued ESP certification, although they are currently considering doing so
- no brands or facilities are currently planning to pursue ESP certification, but they may do so in the future
- no brand or facility has the intention of pursuing ESP certification

12. If your company's (or business unit's) brands or facilities have become ESP certified, what year and month did the first one do so? \_\_\_\_\_

13. Prior to July 2006, was your company (or business unit) purchasing environmentally certified\* materials?

Yes  No

\* Certified means materials certified in accordance with any of the following entities or rules: Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI), International Tropical Timber Organization (ITTO), ISO 1400, American Tree Farm System, Canadian Standards Association, Pan European Certification Council, CPA EPPS CPA 2-06, and ANSI/HPVA HP-1.

14. Please respond to the following statements regardless of whether or not any of your brands or facilities have become ESP certified. The following items list some potential challenges related to adopting ESP certification. Please indicate how difficult you believe it has been (or would be) to overcome these challenges.

Challenge	Not difficult	Moderately difficult	Difficult	Very difficult	Extremely difficult
Justifying the initial costs of becoming certified	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Justifying the cost of additional staff hours needed for the documentation requirements of certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being able to charge a premium for ESP certified products above the price for non-certified products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Changing existing company processes and practices to accommodate certification requirements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing employees with specialized training that helps them understand the requirements of certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Altering relationships with existing suppliers to obtain certified wood and wood-based materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Establishing relationships with new suppliers to obtain certified wood and wood-based materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring a consistent supply of certified wood and wood-based materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



15. Please respond to the following statements regardless of whether or not any of your brands or facilities have become ESP certified. The following items list some possible outcomes related to ESP certification. Please indicate the extent to which you believe ESP certification is (or could be) valuable in achieving each of the following outcomes.

<b>Outcome</b>	<b>Provides no value</b>	<b>Somewhat valuable</b>	<b>Valuable</b>	<b>Very valuable</b>	<b>Extremely valuable</b>
Satisfying existing customer demand for environmentally certified products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gaining new customers in existing markets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gaining new customers in new markets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving the marketing and selling of other products which are not ESP certified	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maintaining competitive position versus competitors who have adopted ESP certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving competitive position versus competitors who have <b>not</b> adopted ESP certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving competitive position with foreign (non U.S. and Canadian) competitors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Charging more for ESP certified products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving the company's image and reputation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving relationships with the local community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving relationships with regulatory groups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving environmental groups' perception of the company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being prepared for future environmental regulations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving the company's existing environmental strategy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lowering operating costs through improved inventory management and process monitoring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Positioning the company to pursue other process or product certification (example: ISO certification)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attracting talented, young professionals who may desire to work for an environmentally minded company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satisfying the company's owner's environmentally oriented desires	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satisfying your personal environmentally oriented desires	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Please evaluate your level of agreement with the following statements.

	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
The failure rate of firms in my industry is high.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My industry is very risky such that a few bad decisions could threaten the viability of my company or business unit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Competitive intensity is high in my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer loyalty is low in my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Severe price wars are characteristic of my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tough price competition is a characteristic of my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Markets are dwindling for existing products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is a scarce supply of suitable labor in my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is government interference in my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The availability of raw materials is an issue in my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low profit margins are characteristic of my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. Please evaluate your level of agreement with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I enjoy working in uncertain situations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The uncertainty surrounding my firm prevents me from doing my best	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I often get irritated when unexpected events ruin my plans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy the challenges of uncertain situations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Thank you.**

**We appreciate the time you have  
taken to answer these questions.**

**Please fold this survey in half, place it in the enclosed business reply mail  
envelope, and mail your survey back.**

FOLD HERE

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FOLD HERE

**Please provide any additional comments, suggestions, or questions here.**

If you have further comments, suggestions, or questions, please contact  
Steve Bukowski at (814) 865-2549 or [swb104@psu.edu](mailto:swb104@psu.edu).

## **APPENDIX C: WCMA EXECUTIVE SURVEY**

PENNS<sup>T</sup>ATE

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*In cooperation with the WCMA*

**EXECUTIVE SURVEY OF  
ENVIRONMENTAL CERTIFICATION**



**Implied Informed Consent Form for Social Science Research**  
The Pennsylvania State University

**Title of Project:** Executive Perception of Environmental Certification

**Principal Investigator:** Steven W. Bukowski  
206 Forest Resources Building  
University Park, PA 16802  
(814) 865-2549; [swb104@psu.edu](mailto:swb104@psu.edu)

**Advisor:** Dr. Judd Michael  
211 Forest Resources Building  
University Park, PA 16802  
(814) 863-2976; [jhm104@psu.edu](mailto:jhm104@psu.edu)

15. **Purpose of the Study:** The purpose of this research is to investigate environmental certification within the North American wood products industry.
16. **Procedures to be followed:** You will be asked to answer 14 questions on the survey. Five questions contain multiple parts. You will be asked to answer questions about characteristics of your company, characteristics about yourself, the general business environment, and environmental certification.
17. **Benefits:** The benefits to the forest products research community include a better understanding of voluntary environmental certification within the North American wood products industry.
18. **Duration/Time:** It will take about 10 to 15 minutes to complete the survey.
19. **Statement of Confidentiality:** Your participation in this research is confidential. The results of this survey will be stored and secured in password protected files in the researcher's computer. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.
20. **Right to Ask Questions:** You can ask questions about this research. Contact Steven W. Bukowski at (814) 865-2549 with questions. You can also call this number if you have complaints or concerns about this research.
21. **Voluntary Participation:** Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer. Refusal to take part in or withdrawing from this study will involve no penalty or loss of benefits you would receive otherwise.

You must be 18 years of age or older to take part in this research study.

Completion and submission of the survey implies that you have read the information in this form and consent to take part in the research.

1. Which category best describes your position in your company? (Fill-in one circle only)

- |   |  |
|---|--|
| <input type="radio"/> CEO                             | <input type="radio"/> Chief executive of a business unit or division |
| <input type="radio"/> President                       | <input type="radio"/> Engineering Manager                            |
| <input type="radio"/> COO                             | <input type="radio"/> Marketing Manager                              |
| <input type="radio"/> CFO                             | <input type="radio"/> Sales Manager                                  |
| <input type="radio"/> Operations/Production Manager   | <input type="radio"/> Human Resources Manager                        |
| <input type="radio"/> Other _____<br>(please specify) | <input type="radio"/> Vice President of _____<br>(please specify)    |

2. Are you the/an owner of the company?  Yes  No

3. Are you the/a founder of the company?  Yes  No

4. How many years have you worked in the wood industry? \_\_\_\_\_

5. To what degree (on a scale from 1 to 10) do you feel each of the following functional areas have influenced your career path. Please circle one number for each functional area.

	Very little										A lot
	1	2	3	4	5	6	7	8	9	10	
Marketing											
Sales											
Product development											
Operations/Production											
Process engineering											
Accounting											

This page of the survey asks questions about your company or business unit. If you are part of a business unit of a parent company, please answer the following questions in terms of your business unit and not the parent company.

6. Approximately how many full-time production employees were working for your company (or business unit) in 2007? \_\_\_\_\_

7. How many years has your firm been in operation? (company age) \_\_\_\_\_

8. What were your company's (or business unit's) 2007 annual sales?

- |   |   |
|---|---|
| <input type="radio"/> < \$2.5 million       | <input type="radio"/> > \$40 – \$60 million   |
| <input type="radio"/> > \$2.5 – \$5 million | <input type="radio"/> > \$60 – \$80 million   |
| <input type="radio"/> > \$5 – \$10 million  | <input type="radio"/> > \$80 – \$100 million  |
| <input type="radio"/> > \$10 – \$20 million | <input type="radio"/> > \$100 – \$250 million |
| <input type="radio"/> > \$20 – \$30 million | <input type="radio"/> > \$250 million         |
| <input type="radio"/> > \$30 – \$40 million |   |

The following questions refer to environmental certification. **Environmental certification** refers to third-party programs such as: the Forest Stewardship Council (FSC), the Sustainable Forestry Initiative (SFI), or the Canadian Standards Association (CSA).

9. What is the current status of your company's (or business unit's) decision to adopt, or not adopt, environmental certification?

- have adopted environmental certification
- currently in the process of becoming environmentally certified
- have not pursued environmental certification, although considering doing so
- not currently planning to pursue environmental certification, but may do so in the future
- have no intention of pursuing environmental certification

10. If your company (or business unit) has become environmentally certified, what year did it



do so? \_\_\_\_\_

11. The following items list some possible outcomes related to environmental certification. Please indicate the extent to which you believe environmental certification is valuable in achieving each of the following outcomes.

<b>Outcome</b>	<b>Provides no value</b>	<b>Somewhat valuable</b>	<b>Valuable</b>	<b>Very valuable</b>	<b>Extremely valuable</b>
Satisfying existing customer demand for environmentally certified products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gaining new customers in existing markets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gaining new customers in new markets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving the marketing and selling of other products which are not environmentally certified	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maintaining competitive position versus competitors who have adopted environmental certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving competitive position versus competitors who have <b>not</b> adopted environmental certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving competitive position with foreign (non U.S. and Canadian) competitors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Charging more for environmentally certified products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving the company's image and reputation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving relationships with the local community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving relationships with regulatory groups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving environmental groups' perception of the company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being prepared for future environmental regulations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving the company's existing environmental strategy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lowering operating costs through improved inventory management and process monitoring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Positioning the company to pursue other process or product certification (example: ISO certification)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attracting talented, young professionals who may desire to work for a environmentally minded company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satisfying the company's owner's environmentally oriented desires	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satisfying your personal environmentally oriented desires	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. The following items list some potential challenges related to adopting environmental certification. Please indicate how difficult you believe it is to overcome these challenges.

<b>Challenge</b>	<b>Not difficult</b>	<b>Moderately difficult</b>	<b>Difficult</b>	<b>Very difficult</b>	<b>Extremely difficult</b>	
Justifying the initial costs of becoming certified	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Justifying the cost of additional staff hours needed for the documentation requirements of certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Justifying the annual auditing costs of maintaining certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Being able to charge a premium for environmentally certified products above the price for non-certified products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Keeping certified material streams separate from non-certified material streams within your manufacturing facility or (facilities)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Changing existing company processes and practices to accommodate certification requirements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Providing employees with specialized training that helps them understand the requirements of certification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Altering relationships with existing suppliers to obtain certified wood and wood-based materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Establishing relationships with new suppliers to obtain certified wood and wood-based materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<b>Not applicable</b>
Justifying the costs of consultants in the transition to becoming certified	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring a consistent supply of certified <b>hardwood</b> (non-tropical) <b>logs</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring a consistent supply of certified <b>hardwood</b> (non-tropical) <b>lumber</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring a consistent supply of certified <b>softwood logs</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring a consistent supply of certified <b>softwood lumber</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Please evaluate your level of agreement with the following statements.

	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
The failure rate of firms in my industry is high.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My industry is very risky such that a few bad decisions could threaten the viability of my company or business unit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Competitive intensity is high in my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer loyalty is low in my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Severe price wars are characteristic of my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tough price competition is a characteristic of my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Markets are dwindling for existing products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is a scarce supply of suitable labor in my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is government interference in my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The availability of raw materials is an issue in my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low profit margins are characteristic of my industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Please evaluate your level of agreement with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I enjoy working in uncertain situations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The uncertainty surrounding my firm prevents me from doing my best	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I often get irritated when unexpected events ruin my plans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy the challenges of uncertain situations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Thank you.**

**We appreciate the time you have  
taken to answer these questions.**

**Please fold this survey in half, place it in the enclosed business reply mail  
envelope, and mail your survey back.**

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**Please provide any additional comments, suggestions, or questions here.**

If you have further comments, suggestions, or questions, please contact  
Steve Bukowski at (814) 865-2549 or [swb104@psu.edu](mailto:swb104@psu.edu).

## **Vita**

### **Steven W. Bukowski**

Steve was born near Pittsburgh, Pa during the summer of 1975. He earned a BS degree in Wood Products Processing and Manufacturing in 1997 and a MS degree in Forest Resources (focusing on the physical properties of wood-based materials) in 1999 from the Pennsylvania State University. After graduating with a MS degree, he worked in various roles within the secondary wood products industry. He was a preventative maintenance advisor for a dimension mill, a quality assurance technician for a kitchen cabinet manufacturer, and a shift manager and process improvement coordinator for another kitchen cabinet manufacturer. Steve eventually made his way back to Penn State to pursue education related to business and management applied to the wood products industry. His PhD dissertation focuses on the role of executives' perceptions in deciding whether or not to adopt environmental certification. During his pursuit of a PhD, he provided consultation to the kitchen cabinet industry in the areas of production processing and activities-based costing.