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How an Organization's Environmental Orientation Impacts Environmental Performance and its Resultant Financial Performance through Green Computing Hiring Practices: An Empirical Investigation of the Natural Resource-Based View of the Firm

Andrew Aken

Southern Illinois University Carbondale, ajaken@akenbros.com

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HOW AN ORGANIZATION'S ENVIRONMENTAL ORIENTATION IMPACTS
ENVIRONMENTAL PERFORMANCE AND ITS RESULTANT FINANCIAL
PERFORMANCE THROUGH GREEN COMPUTING HIRING PRACTICES:
AN EMPIRICAL INVESTIGATION OF THE NATURAL RESOURCE BASED VIEW

by

Andrew Joseph Aken

B.S., Southern Illinois University, Carbondale, IL, 1991
M.S., Southern Illinois University, Carbondale, IL, 1993

A Dissertation
Submitted in Partial Fulfillment of the Requirements for the
Doctor of Philosophy Degree.

Department of Business Administration
in the Graduate School
Southern Illinois University Carbondale

December, 2010

DISSERTATION APPROVAL

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Fulfillment of the Requirements

for the Degree of

Doctor of Philosophy

in the field of Business Administration

Approved by:

Dr. Michael Michalisin, Chair

Dr. Steve Karau

Dr. Peter Mykytyn

Dr. Chuck Litecky

Dr. Dunren Che

Graduate School
Southern Illinois University Carbondale
July 23, 2010

AN ABSTRACT OF THE DISSERTATION OF

ANDREW JOSEPH AKEN, for the Doctor of Philosophy degree in Business Administration,
presented on Friday, July 23, 2010 at Southern Illinois University Carbondale

TITLE: How an Organization's Environmental Orientation Impacts Environmental Performance
and its Resultant Financial Performance through Green Computing Hiring Practices: An
Empirical Investigation of the Natural Resource-Based View

MAJOR PROFESSOR: Dr. Michael D. Michalisin

This dissertation uses the logic embodied in Strategic Fit Theory, the Natural Resource-Based View of the Firm (NRBV), strategic human resource management, and other relevant literature streams to empirically demonstrate how the environmental orientation of a firm's strategy impacts their environmental performance and resultant financial performance through the firm's Information Technology hiring practices. Specifically, it was hypothesized that firms with a strong relationship between the environmental orientation of their strategy and their green computing hiring practices will achieve higher environmental performance, and, as a result, higher levels of financial performance than firms lacking such fit.

The organization's environmental orientation was measured via content analysis of the annual report texts (ARTs). Environmental performance was measured using KLD's award-winning environmental performance metrics. I triangulated across efficiency, effectiveness, and

market-based metrics to capture a more holistic measure of the firm's financial performance using data from Compustat/Research Insight.

The firm's green computing hiring practices were measured utilizing a web content data mining application that pulled job ads for computing graduates and then extracted the environmentally-oriented skills identified in such ads using content analytic techniques. Various control variables were employed to eliminate possible alternative explanations of my research findings. A number of statistical and analytical techniques were used to assess the nature and strength of the relationships in my theoretical model as are articulated in the proposed hypotheses.

The sample size of firms is fairly large, thus increasing the statistical power of the empirical tests. Previous empirical testing of the relationship between environmental strategy and financial performance is still in the developmental stages and has produced mixed results, partly because important intervening mechanisms, such as green computing hiring practices, has not received adequate attention in the empirical literature. The combination of using a large sample of real world firms, a powerful combination of qualitative and quantitative methodological techniques to tap into key trace evidence not available through other methodological techniques, and leveraging an award-winning environmental data set has enhanced the robustness of the empirical findings in addressing this important gap in the literature.

The results of the analyses show that there is a strong relationship between an organization's environmental posturing and its environmental performance. Additionally, this effect is mediated by the organization's environmental hiring practices, indicating that implementing the organization's environmental strategy through its hiring practices is important in achieving improved environmental performance. The current research also shows that there is

a strong and positive relationship between an organization's environmental performance and financial performance. Surprisingly, these relationships are not significantly impacted by the organization's industry affiliation, which broadens the generalizability of the results of this study.

Keywords: Environmental Sustainability, Green IT, Resource-Based View (RBV), Natural Resource-Based View (NRBV), Strategic Fit, Strategic Human Resource Management, Knowledge-Based View, Content Analysis

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CHAPTER 1

INTRODUCTION

Environmental concerns are at the forefront of today's social anxiety. There are hundreds of laws and treaties pending, and organizations are at the center of both the causes and the solutions to today's environmental crisis (Carroll & Bucholtz, 2006). However, economic growth is going to occur whether environmentalists want it to or not (Cairncross, 1995). This research attempts to provide empirical evidence as to whether or not a relationship between an organization's assertions about its environmental practices, its environmental performance, and its financial performance exist and whether other conditions and actions affect that relationship. However, there is no reason that organizations cannot be profitable or successful while also preserving the habitat in which they are intertwined.

Unfortunately, many researchers dealing with environmental issues espouse a point of view relating to these issues that pursues a particular ideological path along moral and ethical grounds. These articles often focus on prescriptive measures to be taken by an organization to address environmental concerns (Banerjee, 2002) utilizing anecdotal evidence instead of proposing hypotheses of relationships and testing whether or not they are supported.

1.1 Problem Statement

While more people acknowledge that climate change exists and are concerned about the ecological environment, organizations have subsequently ensued on a public relations campaign to highlight their environmental friendliness in an effort to enhance their corporate image (Parguel, Benoit-Moreau, & Larceneux, 2009; Porter & Kramer, 2006) and address ever increasing societal requirements for increased environmental accountability (Al-Tuwaijri, Christensen, & Hughes II, 2004). Unfortunately, many of the claims made by organizations to

the public are not exactly what they purport regarding their commitment to improving the environment (known as “greenwashing”). Because many of these claims come from organizations known to have contributed to significant environmental problems, the public and stakeholder groups have often become skeptical about their claims of environmental friendliness that makes truthful statements by organizations less effective (Parguel, Benoit-Moreau, & Larceneux, 2009; Banerjee, 2002).

However, as businesses have become aware of the concern the public has for preserving our natural environment, they have faced considerable difficulty understanding what to do about the problems. Consequently, the response from many organizations has been to promote their environmental stewardship prior to accomplishing anything strategic or operational to actually address the issue. As of 2005, 64% of the 250 largest multinational corporations had published Corporate Social Responsibility (CSR) reports within their annual report or in a standalone CSR report (Porter & Kramer, 2006).

How these CSR reports have impacted organizations’ financial performance is unclear (Parguel, Benoit-Moreau, & Larceneux, 2009). Although there appears to be some connection between an organization’s environmental orientation and the financial performance of the organization (Al-Tuwaijri, Christensen, & Hughes II, 2004), there has been little consistency in measuring the environmental orientation and demonstrating a link it to its financial performance (Banerjee, 2002).

1.2 Research Questions

This research attempts to determine what relationship exists between an organization’s environmental strategy, its green computing hiring practices, its environmental performance, and its financial performance across different industries.

Consequently, this dissertation addresses the following questions:

1. Is there a relationship between the assertions of the top management team regarding its environmental focus and its organization's environmental performance?
2. Does better environmental performance improve financial performance?
3. How do the hiring practices of the organization affect the environmental performance of the firm?
4. How does industry affiliation affect its environmental and financial performance?

1.3 Contributions

This research extends the literature on the Natural Resource-Based View of the Firm as well as the Strategic Human Resource Management literature. It also applies the NRBV to the strategic fit research to develop a model of strategic fit through the lens of the NRBV that also serves to provide confirmatory support to the strategic fit literature as it applies to human resources. Additionally, it provides information and processing details for innovations in data collection and analysis using automated content analysis software. Thus, there are certainly ramifications for researchers of environmental issues of organizations. There are also practical contributions of this research for theorists, empiricists, organization executives, policy makers, analytic software developers, and the community at large.

1.4 Limitations

This study only includes information and analysis of data collected for publicly traded companies in the United States. It likewise only provides analyses of organizations in the Russell 3000 index so it is limited to only large organizations. This study is also limited to those organizations that provide annual report data (e.g., publicly traded firms). Letters to the

shareholders contain significant amounts of strategic information that the organization wants to influence stakeholders' beliefs regarding the organization. Consequently, they do address the primary purpose of this research in regards to the *environmental posturing* concept even though it may be an inadequate representation of the organization's actual strategy. It is, however, a better representative proxy of environmental strategy than single-source item-based questionnaires that could have a significant desirability bias (Krippendorff, 2004; Banerjee, 2002).

My selection of organizations to be analyzed was also limited to those organizations from which I was able to retrieve computing job ads (job ads that are looking for new hires with computing degrees in Computer Science, Management Information Systems, or Information Technology). Since environmental systems are often technologically-based and Information Technology is often a significant early component of any environmental strategy (Murugesan, 2008), this limitation should not significantly impact the results of the study.

As with most studies involving financial performance, there are significant issues related to how any independent variable affects any financial performance measure. It is not plausible to create an environment in which other causal factors that contribute to financial performance have been accounted for (Capon, Farley, & Hoenig, 1990). Nonetheless, I attempted to control for possible alternative explanations using a combination of controls.

1.5 Organization of the Dissertation

The next chapter reviews the literature in four primary areas: the Resource-Based View of the Firm (RBV), the Natural Resource-Based View of the Firm (NRBV), Strategic Fit, and Strategic Human Resource Management. This is followed by a detailed description of the research model and the hypotheses used to answer the research questions. Chapter 3 describes

the methodologies used in this research in more detail. Chapter 4 covers the results of the research and analysis of the data that was collected. Finally, Chapter 5 discusses the limitations of the research, implications for researchers and practitioners, conclusions, and suggestions for future research based upon this study.

CHAPTER 2

LITERATURE REVIEW

Much of the current literature that focuses on the theoretical nature of environmental stewardship has its foundation in a theory of the Natural Resource-Based View (NRBV) of the firm which is a natural extension of the Resource-Based View of the Firm (RBV). The RBV specifically relates to those resources that can give an organization a competitive advantage based upon its relationship to the ecological environment (Hart, 1995).

2.1 Resource-Based View of the Firm

Prior to the Resource-Based View of the Firm (RBV), the dominant paradigm for understanding competitive advantage was the Industrial Organizational (IO) view (Porter, 1981). In the IO view, an organization's success was determined by its external environment. There were five competitive forces that determined the returns an organization was capable of: threat of new entrants, bargaining power of buyers, rivalry among existing competitors, threat of substitute products, and the bargaining power of its suppliers. In the subsequent years, however, researchers such as Barney (1991), Prahalad & Hamel (1990), Dierickx & Cool (1989), and Wernerfelt (1984) internalized the assumptions (looked inwardly towards the organization instead of externally at the competitive environment) of what gives organizations a competitive advantage and focused on the resources controlled by the organization. The basic premise of the RBV is that an organization's resources and capabilities produce superior performance and are the source of an organization's competitive advantage (Grant, 1991; Barney, 1991). Although the dominant paradigm for the view of the organization in much of the current literature is based upon the RBV and it is the basis of much of the theoretical development in this research, it has not completely supplanted the IO view of the firm and aspects of the IO view are also utilized

within this research. The RBV is not a theory relating to the firm's structure and behavior inasmuch as it attempts to explain why some firms are able to achieve a sustainable competitive advantage so that it can earn superior returns (Grant, 1996).

Since Barney's seminal work on the Resource-Based View (RBV) of the Firm (1991), researchers have spent innumerable hours attempting to define what resources could give firms a sustainable competitive advantage. Although much debate has ensued regarding the empirical testability of the fundamental tenets of the RBV (Priem & Butler, 2001) and even the original author recognizes methodological issues regarding this theory (Barney, Wright, & Ketchen, 2001), it remains one of the most significant theories of how firms can gain and sustain a competitive advantage.

In Barney's original work, a firm's resources are defined to include: "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" (Barney, 1991, p. 101). Resources are additionally classified as tangible or intangible in nature (Grant, 1991; Barney, 1991). Tangible resources would include money, equipment, and raw materials. Intangible resources would include reputation, technology, and personnel (including their culture, training, and expertise) (Russo & Fouts, 1997).

One of the longstanding issues with these definitions of resources is that they are so broad that it is unquantifiable (Priem & Butler, 2001). Attempts to limit the definition of an asset have been proffered by various researchers including restricting it to just the assets and capabilities used to detect and respond to market opportunities (Wade & Hulland, 2004; Sanchez, Heene, & Thomas, 1996). It is from this perspective that I define resources within this context.

In addition to the resources controlled by an organization, it must also have the capabilities to manage its resources. Capabilities can be categorized as inside-out, outside-in, and spanning. Inside-out capabilities are those which are deployed from within the firm to respond to market requirements and opportunities. Outside-in capabilities are externally focused, emphasizing anticipated market requirements. Spanning capabilities are those which involve both internal and external analyses and are required to integrate the organization's inside-out and outside-in capabilities (e.g., managing partnerships, Information Services management, etc.) (Wade & Hulland, 2004).

2.1.1 RBV Theory of Competitive Advantage

Although resources are a necessity for every organization to function, the fundamental tenet of the RBV is that for resources to be able to provide a competitive advantage (when a firm is “implementing a value creating strategy not simultaneously being implemented by any current or potential competitors” (Barney, 1991, p. 102)), they must be valuable and rare.

2.1.1.1 Valuable resources

A valuable resource is one which enables an organization to develop or implement strategies that improve its efficiency or its effectiveness. Although other attributes of a firm may also be sources of a competitive advantage, they are only considered resources when they exploit opportunities or neutralize threats from its competitors (Barney, 1991). It has also been suggested that all Information Systems (IS) assets possessed by an organization are considered valuable since they improved the organization's efficiency (Wade & Hulland, 2004) and improve the organization's ability to scan for threats and other opportunities. Consequently, in this context, the value is internal to the organization, not necessarily monetarily valuable.

2.1.1.2 Rare resources

If a resource is available to many of an organization's competitors (even if it's valuable), it cannot help the organization to achieve a competitive advantage. Thus, for a valuable resource to provide a competitive advantage, it must also be rare. A rare resource is one which is not necessarily unique to the organization, but must be possessed by fewer than the organization's competitors necessary to generate "perfect competition dynamics" (Barney, 1991, p. 107). Indeed, there may be unique instances where one or a few organizations possess a highly-potent resource that is unavailable to their competitors due to property rights, mobility barriers, or due to the nature of the resource itself (e.g., organizational culture). However, it is generally recognized in the Resource-Based literature that rarity is a relative term such that the ability of a resource to generate economic rents will dissipate as more firms in the industry possess it.

For example, Automated Teller Machine (ATM) technology is necessary for banks to compete efficiently and successfully in today's environment. Consequently, to banks, ATMs are valuable. However, since they are possessed by most banking institutions, they cannot be considered rare and thus are not able to provide a competitive advantage to the bank. On the other hand, if a bank were able to develop a technology within its ATMs that other banks did not possess and that technology was also valuable (e.g., the ability to pay bills through the ATM), that resource combination could provide the bank with a competitive advantage.

2.1.2 Sustainable Competitive Advantage

If resources are valuable and rare, they can provide organizations a competitive advantage. However, this advantage may not be long-lasting if other organizations are able to replicate the resources underlying the firm's strategy or its effects. To provide a sustainable competitive advantage (a competitive advantage that other firms have ceased trying to duplicate

(Barney, 1991)), the resources must also be inimitable, immobile, and non-substitutable (Wade & Hulland, 2004). Although many researchers have attempted to affix a calendar time for the duration of a competitive advantage for what constitutes sustainability (e.g., it must last a particular number of years), Barney argues that the issue of sustainability is wholly within the perception of the competitors of the firm and its efforts to duplicate that resource.

2.1.2.1 Resource inimitability

If competing firms were able to replicate or imitate the resource that gives an organization a competitive advantage, it would no longer be rare and the competitive advantage gained by the originating organization would be relatively short-lived. Consequently, to achieve a sustainable competitive advantage, resources must also be difficult to imitate.

One of the ways inimitability is achieved is through causal ambiguity since these types of resources are likely to be idiosyncratic to the organization in which they are currently located (Barney, 1991; Peteraf, 1993). Causal ambiguity occurs whenever the source of the competitive advantage from the resource is unknown or difficult to understand (intrinsic).

Resources that are outside-in or spanning (particularly Information Systems partnerships) are more inimitable because each set of resources will evolve distinctively for each firm in the arrangement. Additionally, these resources are very likely socially complex (Wade & Hulland, 2004) as in the cohesion of a Top Management Team (TMT) (Michalisin, Karau, & Tangpong, 2004).

2.1.2.2 Resource immobility

Another attribute of resources that is required for sustainable competitive advantage is immobility (or imperfect mobility). If the resources were capable of leaving the organization or being appropriated by another organization with their capabilities fully intact, the originating

organization may lose that competitive advantage (Peteraf, 1993). Although Barney (1991) did not classify immobility as an attribute of resources but considered it a core part of the definition of a resource, this is not entirely inconsistent with Barney's assumptions of the Resource-Based View in that it is clear that resources that are immobile are less likely to be imitated by competitors (Peteraf, 1993; Barney, 1991).

2.1.2.3 Resource non-substitutability

The final requirement for an organization's resources to provide a sustainable competitive advantage is that the resource lacks strategically equivalent substitutes. In other words, resources may be substitutable if there are similar resources that enable an organization to conceive of and implement similar strategies. (Barney, 1991)

It is unlikely that outside-in and spanning resources have readily strategic substitutes. It may be possible, however, for organizations with a subset of these capabilities to compete with firms controlling a different subset of these capabilities (Wade & Hulland, 2004).

2.2 Natural Resource-Based View of the Firm

Since the end of World War II, the population has grown from around 2 billion to almost 7 billion (World Bank, 2010). Additionally, use of fossil fuels has increased over 25 times and industrial production has increased over 40 times since WW II. The environmental impact of all of this activity has also increased inordinately. Pollution, toxic emissions, chemical spills, and other industrial accidents have created real crises for civilizations around the world. More carbon has been added to the atmosphere in the past 100 years than in the previous 18,000 which is producing climate changes and may cause other catastrophes such as coastal erosion/submersion, desertification, and erratic weather patterns (Hart, 1995; Sutherland & Woodroof, 2009).

The next few decades present unprecedented challenges. We must, consequently, alter the nature of industrial activity or risk irreversible damage to vital ecological systems. This opens up opportunities for organizations to alter their corporate strategy in ways that may even provide them with a competitive advantage over those organizations that do not (Hart, 1995).

The Resource-Based View of the Firm can be applied readily to Corporate Social Responsibility (CSR) issues. This gives the RBV even more applications in studying the strategic capabilities of organizations (Russo & Fouts, 1997). However, leading approaches to CSR have been so fragmented and set apart from the core business strategy, it obscures their ability to benefit society as well as their own bottom line. If organizations looked at CSR as a component of their core business goals, it could become a source of opportunity, innovation, and competitive advantage (Porter & Kramer, 2006) as well as improved financial performance (Al-Tuwaijri, Christensen, & Hughes II, 2004). It may even become the biggest opportunity for new enterprises and inventions that the world has seen (Cairncross, 1990; Menguc & Ozanne, 2005).

The Natural Resource-Based View of the Firm (NRBV) is a natural extension of the RBV that specifically relates to those resources that can give an organization a competitive advantage based upon its relationship to the ecological environment. The RBV presumes that valuable and difficult to copy resources and capabilities are the primary sources for creating a sustainable competitive advantage. It does not, though, consider the constraints of the ecological environment. Consequently, the NRBV recognizes that many of the earth's resources and the services that they afford are finite, and that the cost of such resources will increase over time at their current rate of consumption. Moreover, given the increasing concern over damage to the natural environment, organizations that don't make requisite changes could impact their competitiveness through sanctions, taxes, losses related to environmental catastrophes, carbon

trading, etc. The resources particular to the NRBV revolve around three strategies interconnected with each other: pollution prevention, product stewardship, and sustainable development (Hart, 1995) (See Table 1 below).

Table 1: A Natural Resource-Based View Conceptual Framework (Hart, 1995: Reprinted with Permission)

Strategic Capability	Environmental Driving Force	Key Resource	Competitive Advantage
Pollution Prevention	Minimize emissions, effluents, & waste	Continuous improvement	Lower costs
Product Stewardship	Minimize life-cycle cost of products	Stakeholder integration	Preempt competitors
Sustainable Development	Minimize environmental burden of firm growth and development	Shared vision	Future position

A differentiated product creates loyalty and a positive reputation that can lead to premium pricing for that product (Hart, 1995; Porter, 1998). The resources (including the brand loyalty and reputation of an organization) are the units of analysis for any theory derived from the RBV. These also include physical and monetary assets, and particularly germane to this discussion, employees’ skills and organizational processes (Hart, 1995).

In addition to being valuable (as in the above examples), resources must also be difficult to replicate in order to sustain a competitive advantage. Resources can be difficult to replicate because they are tacit (causally ambiguous) or they can also be socially complex. Tacit resources are generally skill-based and dependent upon human resources (see the following discussion in section 2.4, Strategic Human Resource Management). These knowledge-based types of resources are difficult to observe and based upon participation in the tasks where the particular knowledge is required. They are only created through experience and developed through continual use.

Socially complex resources are dependent on large groups of people or teams working in coordination so that only a few people, if any, understand the entire task well enough to understand the entire phenomenon (Barney, 1991; Hart, 1995) and are also based on the unique personalities, experiences, and path dependent knowledge of the group (Michalisin, Karau, & Tangpong, 2004). These tacit skills and socially complex process are particularly germane in the context of environmental processes. Thus, the Resource-Based View can help us understand a strategy for organizations that grasps how environmentally-oriented resources and capabilities can provide them with a sustainable competitive advantage (Hart, 1995).

2.2.1 NRBV Strategies

2.2.1.1 Pollution Prevention

In 1986, the Superfund Amendments and Reauthorization Act (SARA) became law in the United States. This act requires that all public companies disclose the emission levels of about 300 toxic and hazardous chemicals using the Toxic Release Inventory (TRI). The legislators recognized that pollution frequently results from inefficient material use. The most affected industries included the petrochemical, pulp & paper, automotive, and electronics industries (Hart, 1995). The TRI index reports are frequently utilized by researchers as a proxy for environmental performance

Reduction in pollution can be attained through either pollution control or pollution prevention.

- **Pollution Control:** Emissions and waste are trapped, stored, treated, and disposed of using equipment to control the pollution (also known as “end-of-pipe” control).

- Pollution Prevention: Emissions and waste are reduced, changed, or prevented through better handling, using different materials, recycling, or other process innovations (Cairncross, 1995)

Pollution control only affects the physical resources including the “physical technology used in a firm, a firm’s plant and equipment, its geographic location, and its access to raw materials” (Barney, 1991, p. 101). Compliance with end-of-pipe control directives is achieved primarily by including pollution-removing or filtering equipment to the existing equipment of a firm. This form of pollution control typically does not require the organization to develop in-house expertise or skills to manage new technologies or processes. It is typically self-contained, off-the-shelf hardware (Russo & Fouts, 1997).

Conversely, pollution prevention is analogous to Total Quality Management processes. It requires extensive employee involvement and substantive changes to the processes used in handling materials. However, pollution prevention can help companies achieve significant savings that can lead to a competitive advantage (Hart, 1995). In many cases, this can eliminate the costs often associated with pollution control and may even lead to overall savings throughout the value chain.

If new resources are used in a way that an organization can capitalize on its own internal methods for pollution reduction and also improve operational and fuel efficiency, such improvements are easier to see (Hart, 1995; Russo & Fouts, 1997; King & Lenox, 2002). This will typically only occur with organizations pursuing pollution prevention rather than a pollution control strategy. Prevention strategies are also likely to be causally ambiguous because they often require modifications to the rest of the value chain as well as vertical linkages making it

more difficult for competitors to imitate the process which can give the organization a sustainable competitive advantage (Russo & Fouts, 1997).

At Dow Chemical, for example, end-of-pipe solutions are estimated to lose 16% of every dollar invested. On the contrary, pollution prevention projects resulted in 60% savings over 10 years (Buzzelli, 1994). However, as organizations' environmental performance improves, further emissions reductions become more difficult and often require substantive process or product changes (Hart, 1995). Pollution prevention also frequently provides unexpected innovation offsets (process improvements that result in additional savings) while pollution control often provides unexpected costs (King & Lenox, 2002).

A pollution prevention strategy attempts to reduce emissions utilizing continuous-improvement methods with specific environmental objectives instead of end-of-pipe equipment to control emissions. Strategies such as this are human resource intensive and require tacit knowledge that is heavily dependent on employee involvement. Because this strategy is typically decentralized and dependent upon tacit knowledge, it makes this strategy causally ambiguous and consequently difficult to duplicate relative to end-of-pipe pollution controls.

Pollution can be considered just another form of waste (unused and discarded resources) that can be eliminated in the pursuit of quality (also known as Total Quality Environmental Management or TQEM). Waste prevention should consequently give organizations an opportunity to develop a sustained competitive advantage through the accumulation of a diverse set of tacit knowledge. So the NRBV proposes that organizations with tacit Total Quality Management (TQM) knowledge will be able to collect the necessary resources required for pollution prevention more readily than firms without TQM capabilities. Additionally, firms with pollution prevention strategies will see concurrent reductions in emissions and expenditures for

pollution control. Over time, successful pollution prevention strategies will eventually become apparent to stakeholders and thus increase the external awareness of the strategy resulting in external legitimacy of the organization's environmental proactiveness (Hart, 1995).

2.2.1.2 Product Stewardship

While pollution prevention focuses on developing new capabilities in production and operations, activities at each step of the value chain (including provisioning of raw materials, production processes, and disposal of used products) have impacts on the environment. These impacts will need to be "internalized" in the future (Costanza, 1991) in order for organizations to be able to maintain control over their environmental impact. Product stewardship requires involving those that are environmental stakeholders into the product design and development process (Hart, 1995).

Private organizations rate products utilizing environmental criterion including Green Cross and Green Seal that perform a life-cycle analysis (LCA) of the products entire value chain. These organizations use LCA to determine what kind of environmental impact a product has from the time its raw resources are extracted through the destruction or disposal of the product (Hart, 1995). To lower the total product life-cycle environmental costs, product developers need to:

1. Minimize the use of non-renewable raw materials
2. Avoid the use of toxic materials
3. Use renewable resources no faster than they can be replaced (e.g., timber)
4. Reduce the environmental impact of the product while it's in use
5. Make the product easy to compost, reuse, or recycle at the end of its life (Shrivastava & Hart, 1995)

Other strategies for implementing product stewardship include leaving businesses that are hazardous to the environment, redesigning products and their value chain to reduce environmental liabilities, and developing new products with lower lifecycle costs.

Although innovation in environmental product design might not yield substantive market gains initially, there are other reasons that environmental product innovation might give organizations a sustainable competitive advantage. Competitive preemption (first-mover advantages) can be achieved particularly through new product innovation in progressive directions like environmental product engineering. In particular, first-mover advantages can be achieved within environmental product strategy by gaining preferred or exclusive access to valuable and rare resources (e.g., raw materials, locations, production capacity, and a discriminating customer base) and by establishing rules, regulations, or standards that are unique to the capabilities of that organization (Hart, 1995). For example, to preempt a proposed ‘take-back’ policy regulation by the German government, BMW developed a design for its automobiles that allowed them to be disassembled easily and have their components recycled. This process also called for the creation of an infrastructure to handle the dismantling process which tied up a significant portion of the extant German recycling infrastructure. Competitors, consequently, had to rely on smaller, more expensive, organizations or build their own infrastructure to accomplish the same goals which were now a part of the governmental regulation. BMW also was able to reap the rewards for being a first-mover in a significant environmental program that garnered a tremendous reputation within its market (Shrivastava & Hart, 1995).

At a minimum, Life-Cycle Analysis (LCA) must be incorporated into the organization’s product development process in order for the organization to achieve a product stewardship

strategy. Product stewardship also requires organizations to be proactive with their suppliers to ensure that they also minimize their impact on the environment. Consequently, this strategy also means that organizations must not only be able to coordinate groups within the organization, but also coordinate with external environmental stakeholders, community leaders, and business partners on the design and development of their products.

Consequently, organizations that have demonstrated cross-functional management skills (socially complex) will be able to implement a product stewardship strategy more efficiently and effectively than organizations lacking such skills. They will also have demonstrated inclusion of external stakeholders in the product development and planning processes. Including the input of external stakeholders also helps to socially legitimize the environmentally-friendly products being developed (Hart, 1995).

2.2.1.3 Sustainable Development

Whereas emissions reduction is the fundamental goal of pollution prevention and product stewardship leads to raw material selection and product design innovation in order to minimize life-cycle environmental impact, a sustainable development strategy attempts to minimize the environmental impact throughout the world including in the developing countries in the southern hemisphere from whence many of the raw materials are extracted (Hart, 1995). The ecological environment in developing countries is considerably more impacted than in the countries where most products are produced. This has the ultimate effect of deepening the poverty and degrading the environment because they must have the financial input brought about by the haphazard removal of their natural resources (Ruckelshaus, 1992; Hart, 1995).

Although Malthus' prediction of catastrophic famine because of population explosion back in 1798 (Briggs, 1998) has not come to pass, there is again concern that our current rapid

population growth will have significant environmental, social, and economic consequences such as the spread of disease, deforestation, soil erosion, water depletion & contamination, and air pollution. Menguc & Ozanne were certainly understated when they suggest that “this will certainly create new challenges for business, if they are to meet future consumer demands” (2005, p. 431).

As uncharacteristically understated as Menguc & Ozanne (2005) were regarding their outlook for businesses given the dire warnings they were making regarding the environment, one of the problems facing environmentalists in public opinion is their typically overstated predictions of the future which thankfully have not yet come to fruition. This is not to say that current alarms regarding the environment are unsubstantiated. But, with the severe rhetoric that typically accompanies environmental warnings and the impending doom that accompanies them, the public has become cynical about many of their claims (Lauer, 2003).

However, the environment is in danger and there are actions that organizations can take to minimize their impact on the environment by creating a sustainable development strategy. This can be accomplished by building markets in the southern hemisphere for their products while reducing the ecological burden created by their economic activity (Hart, 1995).

A sustainable development strategy begins with an extraordinary social-environmental purpose that forms the foundation of its corporate and competitive strategies. The organization’s pursuit of environmental sustainability requires a long-term commitment to develop and implement technologies with minimal environmental impact. This type of commitment will also likely be visible in all of its communications to stakeholders and the community as a whole. Considering the difficulty of establishing such a consensus as is necessary to actually implement

this strategy, it would be a rare, organization-specific, resource that few companies have been able to develop or maintain for any long period of time (Hart, 1995).

Consequently, organizations that have previously demonstrated the ability to establish a shared vision will be able to develop the resources necessary for a sustainable development strategy quicker than organizations without such capacity. They will also be able to develop such strategies utilizing development of new technologies and competencies with low environmental impact. These strategies will subsequently move beyond the organization to incorporate collaboration with public and private organizations necessary to develop these technological changes (Hart, 1995). Additionally, proximity to supporting industries and services improves responsiveness, communication, and innovations in addition to lowering the ecological impact of transportation and inventory (Porter & Kramer, 2002).

2.2.2 Path Dependence

The theory and associated propositions of the Natural Resource-Based View of the Firm revolve around two major themes:

1. The linkage between the NRBV and a sustainable competitive advantage
2. The interconnection between the three strategic capabilities of pollution prevention, product stewardship, and sustainable development (Hart, 1995)

According to the RBV, in order for a resource to be able to provide the firm a sustainable competitive advantage, it must be valuable, rare, inimitable (tacit, causally ambiguous, or socially complex), and non-substitutable. A purely internal approach (such as an internally developed pollution prevention technology providing a competitive advantage) may be less than adequate because issues of social legitimacy (external) and reputation are also extremely important especially in regards to environmental issues.

As can be seen in the model for a NRBV sustained competitive advantage (Figure 1), each NRBV strategy (pollution prevention, product stewardship, and sustainable development) is mapped to internal (competitive advantage) and external (social legitimacy) components.

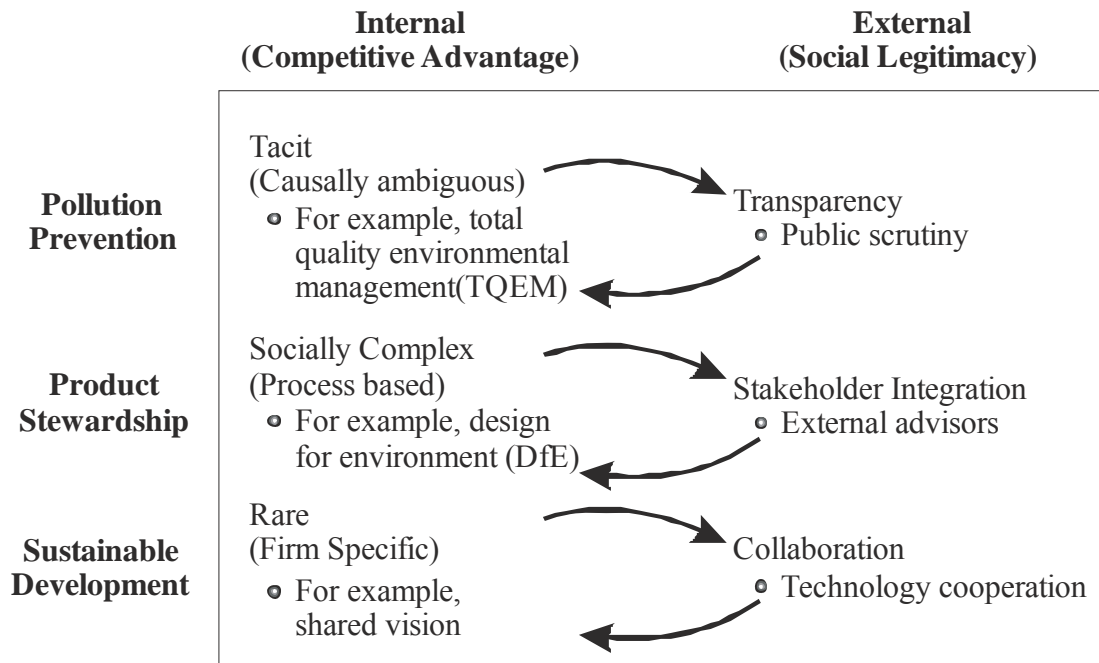


Figure 1: Sustained Competitive Advantage (Hart, 1995: Reprinted with permission)

The three NRBV strategies have obvious interconnections. According the RBV, interconnectedness means that acquiring a particular resource is typically dependent on the previous development of other resources or that a particular capability is dependent upon the concurrent existence of other resources because of a particular path through history (Barney, 1991). Thus there are two dimensions to interconnectedness: path dependence and embeddedness. Path dependence may denote a particular sequence of resource development (e.g., pollution prevention may pave the way for product stewardship). Embeddedness, however, may impede the development of new resources without other resources already being present.

Wherefore, the resources and capabilities that are needed to implement a new strategy are built upon each other and consequently become more complex.

In the strategies of the NRBV, there is a progressive logic. Without first developing a pollution prevention strategy, it is unlikely that an organization could adopt a product stewardship strategy since the product stewardship strategy entails the entire life-cycle of the product including the selection of resources used in the manufacture of the product. In order to pursue a sustainable development strategy, organizations may have had to first demonstrate a competent product stewardship strategy. Otherwise, the organization will lack the external legitimacy of being an environmental leader capable of influencing policy changes. In fact, a sustainable development strategy may also benefit from the early accumulation of resources necessary to implement pollution prevention and product stewardship strategies (Hart, 1995).

In certain cases, the reverse direction of the path dependencies may also come into play. For example, in the product redesign process, it may require the selection of resources that have less waste which would then reduce the amount of pollution generated. “For example, nanotechnology ... is widely predicted to become a huge industry. As well as social and economic benefits, there are potential environmental benefits, for example, self-cleaning clothes could reduce water pollution, whereas nanofibres could be used to ameliorate pollution incidents” (Sutherland & Woodroof, 2009, p. 525). Figure 2 demonstrates the path dependence model of the NRBV.

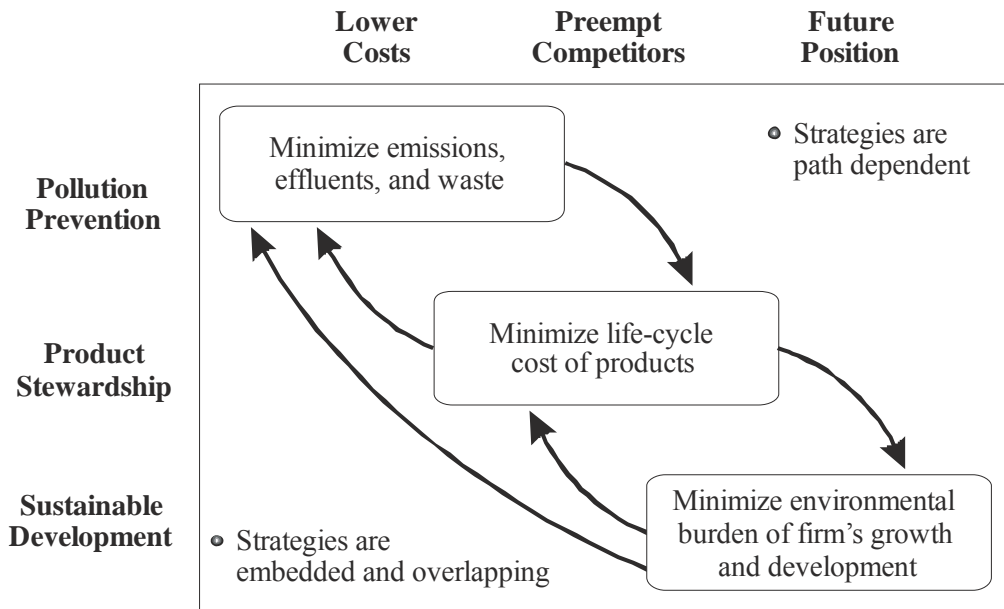


Figure 2: Interconnectedness (Hart, 1995: Reprinted with permission)

2.2.3 Implications of the NRBV for future research

Questions that Hart (1995) suggested for future research include empirical testing of the theory exploring whether or not an NRBV strategy would result in improved market position and exploring whether there are industry-specific implementation strategies.

Hart (1995) also suggests that testing of his hypotheses can begin immediately since environmental performance data is available from multiple sources and these can be combined with conventional measures of firm performance to test the propositions directly by relating pollution prevention practices to emissions and cost savings. He also suggested segmenting organizations by industry to see if there were substantive differences between industries. Early empirical testing has shown that indeed there is support for the hypothesis that better environmental performance will lead to better firm performance, but these results have been fairly moderate (Sharma, 2000; King & Lenox, 2001) and testing of the NRBV is still in the developmental stage.

2.3 Strategic Fit

One of the most widely shared and enduring assumptions in the strategy formulation literature is that the appropriateness of a firm's strategy can be defined in terms of its fit, match, or congruence with the environmental or organizational contingencies facing the firm. ... Strategic fit is a core concept in normative models of strategy formulation, and the pursuit of strategic fit has traditionally been viewed as having desirable performance implications. (Zajac, Kraatz, & Bresser, 2000)

Certain organizational structures, cultures, and leadership styles are only appropriate in particular strategic situations. Essentially, "Strategic Fit" focuses on the degree of alignment between the current competitive environment, the organization's strategy, and its resources and capabilities (Hitt, Bierman, Shimizu, & Kochhar, 2001). Alignment in this context refers to the appropriateness of each of the different elements to one another. It is only when this alignment occurs that superior performance can ensue (Chorn, 1991; Venkatraman & Camillus, 1984; Amit & Schoemaker, 1993).

An organization's performance and effectiveness will be optimal when the organization responds with an appropriate strategy (Prescott, 1985). However, strategic fit is an ideal state that should be continuously sought, but rarely perfectly achieved. It is also possible that at a particular moment in time, an organization may wish to purposefully misalign its strategy from the environment the organization is operating in so that it can handle what it perceives as an unmet future requirement. However, when misalignment occurs (whether purposefully or not), the performance of the organization will decrease (Chorn, 1991; Prescott, 1985) at least in the short term.

One of the things that researchers and practitioners have learned from the strategic fit literature is in understanding the ways in which management relates to the competitive environment and organizational culture. The best strategy for this relationship is to operate in an

interactive style by simultaneously creating and responding to different situations (contingency theory). This is counter to the reactive style that takes action after a critical event, or the proactive style that attempts to take action prior to the perceived critical event. Consequently, a particular strategy is appropriate for a particular set of competitive conditions. Additionally, an organization's culture and leadership style are likewise appropriate for a particular configuration of strategic situations. It is thus the primary task of senior managers to handle the interdependencies between the current competitive contexts, strategy, culture, and leadership techniques (Chorn, 1991).

2.3.1 Strategic Change

A significant component to strategic fit is determining how an organization is to succeed when the environment around them is changing. In the context of this research, it is how an organization changes in order to deal with the constraints imposed by the natural environment that is of primary focus. It is fairly surprising that little research has been devoted to discovering what environmental and organizational situations may make a strategic change more or less beneficial. This is possibly due to the complexity of that type of study and also concerns over generalizability of the results (Zajac, Kraatz, & Bresser, 2000).

Zajac, et al.'s (2000) approach to developing a generalizable theory of strategic change relies upon a set of organizational and environmental factors that define strategic fit and that when these factors vary, the strategy should also change. Additionally, identifying when change is imperative and when it is unnecessary will also impact strategic fit which will subsequently impact organizational performance. Management often makes decisions with insufficient evidence to justify those changes even in the context of conservation and the environment. (Sutherland & Woodroof, 2009).

In Zajac, et al.'s (2000) model of dynamic strategic fit (see Figure 3 below), the connections between Environmental and Organizational contingencies impact the desirability to make a strategic change. As is represented in the model, when changes occur in the environment in which an organization is operating, that alone should not be enough to invoke a desire to change the organization's strategy. It must also be matched by the resources and capabilities in the organization or the organization must make requisite changes to their resources and capabilities.

In much of the literature on organizational theory, fit and adaptation have long been associated with structural contingency theory (Donaldson, 1995). This theory emphasizes the relationship between the environment and the structure of the organization rather than the relationship between the environment and the strategy that an organization is pursuing. Additionally, contingencies are both related to the environment and the organization and so a tension exists when organizations attempt to develop a strategy based upon its current environmental situation without accounting for its own unique competencies (Zajac, Kraatz, & Bresser, 2000; Chorn, 1991).

This includes contingencies that are based upon understanding the industry to which an organization belongs and the organization's hiring practices do address its needs. In this context, environmental contingencies include changes in customer demands, government policy, competitors' actions, technological changes, and other changes external to the organization that impact the viability of the organizations current strategy. Organizational contingencies include the discovery that the organization lacks the resources or competencies required to successfully implement a part of its current strategy, necessitating changes either to its strategy or its resources. Proper scanning and interpretation of the natural environment also ensures that

organizations have the appropriate strategies and access to the appropriate resources necessary to implement those strategies (Sutherland & Woodroof, 2009)

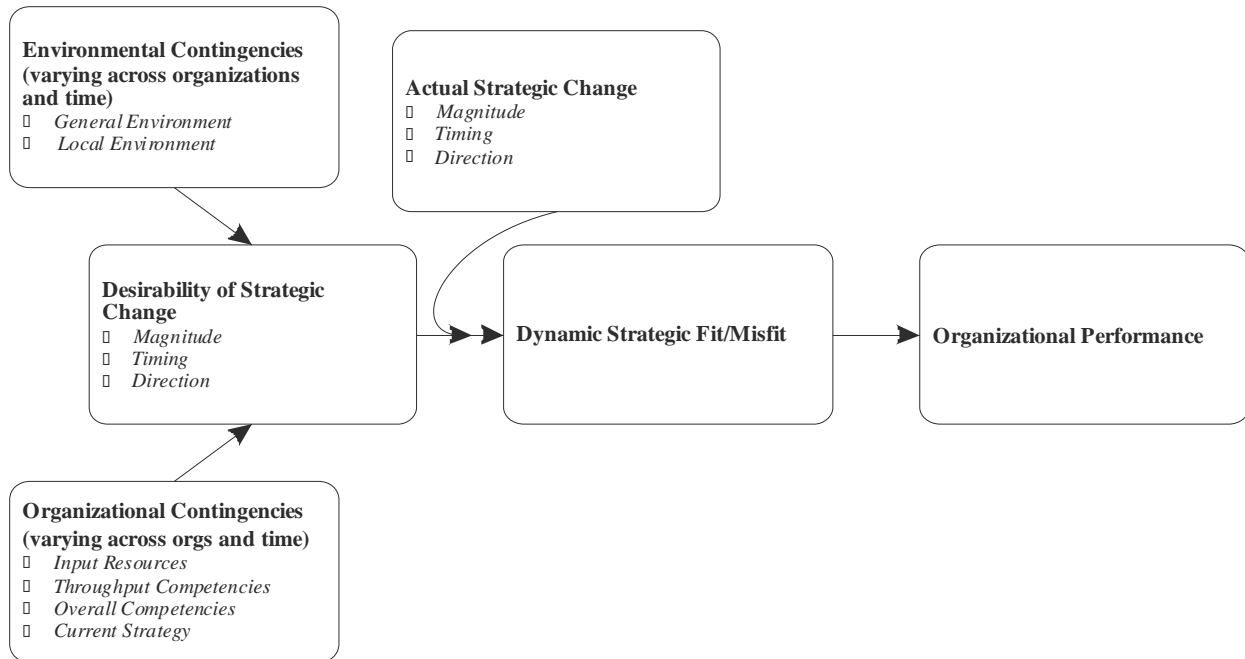


Figure 3: A Generic Model of Dynamic Strategic Fit (Zajac, Kraatz, & Bresser, 2000: Reprinted with permission)

Several problems, though, exist with utilizing theories based upon the structural contingency model. One of the issues with this model is that it assumes that there are a discrete set of organizational strategies that are best applied across a large collective of organizations (e.g. for an entire industry). However, within a group of organizations, there are likely significant cross-sectional and longitudinal differences in their available resources and environmental conditions that will consequently create different situations that they attempt to adapt to through modifications to their strategy. These different situations can be classified in terms of a matrix of strategic situations and responses which imply either a strategic fit or a strategic misfit (see Figure 4 below).

The inability to properly identify and respond to future concerns can cause decision-makers to make inappropriate choices. For example, in the 2006 State of the Union address, President Bush committed to the pursuit of biofuels to reduce the country's dependence on foreign oil. The European Union subsequently made a similar commitment. Unfortunately, research on the process of developing, creating, and transporting biofuels was incomplete. This resulted in significant negative ecological and social impacts which were unforeseen because of the lack of strategic planning to implement the otherwise honorable undertaking (Sutherland & Woodroof, 2009).

Strategy, consequently, should be grounded in aligning an organization's resources with the threats it is facing as well as the opportunities presented in the current environment. Conversely, if the organization's resources and capabilities are not adaptable to a strategic shift, then its current performance will be better if it doesn't change its strategy and continues with its current organizational inertia (Zajac, Kraatz, & Bresser, 2000). Consequently, in the interest of strategic fit, it could be argued that if an organization does not have a proclivity towards ecological issues or it does not have the resources and capabilities to address them, its financial performance will suffer should it pursue an environmental strategy (e.g., organizations in certain industries may find it more difficult to get improved financial returns by following an environmental strategy unless they already have the resources and capabilities to do so).

Since dynamic strategic fit is at the center of Zajac, et al.'s (2000) conceptual model in Figure 3, a related matrix of scenarios identifying the four situations that comprise the dynamic strategic fit scenarios (in Figure 4 below). In this matrix, the horizontal dimension represents when a strategic change is required to address the relevant environmental and organizational contingencies. The vertical dimension represents whether or not the strategic change occurred.

The quadrants highlight the expected results that match the intersection of each of the dimensions for organizations in a given context. These results should be predictable based upon prior assessment of the contingencies evoking the desire to change the organizational strategy.

		Does Strategic Change Occur?	
		Yes	No
Is Strategic Change Needed to Establish Dynamic Strategic Fit?	Yes	Beneficial Strategic Change (Dynamic Fit)	Insufficient Strategic Change (Dynamic Misfit)
	No	Excessive Change (Dynamic Misfit)	Beneficial Inertia (Dynamic Fit)

Figure 4: Four Possible Scenarios in Pursuit of Dynamic Strategic Fit (Zajac, Kraatz, & Bresser, 2000: Reprinted with permission)

In the quadrant that shows a positive match between the need to change strategy based upon organizational and environmental contingencies and that a strategic change was implemented (Beneficial Strategic Change), a positive change to performance will occur. In the quadrant representing when the contingencies change and the organization’s strategy does not change (Insufficient Strategic Change), a dynamic misfit occurs resulting in degraded performance. This would include situations where the organizations strategy has become obsolete, outdated, or inappropriate in the current environment. This can be caused by the organization’s inability or unwillingness to change (or even ignorance of the changing environment).

Juxtaposed from the Beneficial Strategic Change quadrant is the scenario when the organizational and environmental contingencies do not require a change in strategic direction and the organization does not change. This is known as Beneficial Inertia and also results in

comparably better performance for the organization. This could occur when the external environment is relatively unchanging, the internal environment shields it from changes in the industry, or the organization has resources that offset external demands to change. This could be because the organization has inimitable resources providing a source of sustained competitive advantage which may be difficult to replicate with a change in strategy.

The final quadrant in the scenarios of dynamic fit represents when the organizational and environmental contingencies do not require a change, but the organization makes the change anyway (Excessive Change). This will also result in degradation to performance. This occurs when an organization has well-intentioned but misplaced visions of what would be a strategic fit or when the organization goes too far in its desire to change. This also occurs when an organization makes a valid change to one part of the context (e.g., the competitive environment), but doesn't account for how this change will impact other aspects of the environment (e.g., available resources) (Zajac, Kraatz, & Bresser, 2000).

Management teams may interpret problems in the natural environment as either threats or opportunities and may also believe that pressures from different stakeholder groups should impact their strategy. However, to maintain alignment between the exogenous business environment and the internal resources and capabilities, organizations should only carefully pursue a proactive environmental strategy (Aragon-Correa & Sharma, 2003). Given this representation of strategic fit, it is clear that not all situations call for a change in strategy for all organizations (even for environmental strategy) at least from the perspective of always seeking to improve financial performance.

2.4 Strategic Human Resource Management

Of the resources discussed in the context of the Resource-Based View of the Firm, human resources have received considerable attention. One of the reasons for all of this attention is that knowledge is generally tacit and located within the individual. One of the roles of an organization is to apply the knowledge of its human resources rather than creating the knowledge (Grant, 1996). Therefore, it is imperative that organizations hire workers with the knowledge it needs and has the capabilities to apply. The individual human resources know how to do things (tacit knowledge) while the organization knows about things (explicit knowledge). According to Grant (2002), knowledge is the clearly the most critical resource in terms of increasing market value and accruing Ricardian rents. Leveraging of human resources has also been shown to have a positive effect on an organization's performance and moderating the relationship between the organization's strategy and its performance (Hitt, Bierman, Shimizu, & Kochhar, 2001).

2.4.1 Knowledge-Based View of the Firm

The distinction in the differences between the primary types of knowledge as it pertains to the Resource-Based View of the Firm is in its transferability. Explicit knowledge can be transferred relatively easily (once transcribed it can be utilized by others at a marginal cost). Tacit knowledge, however, is only revealed when it gets used. It is generally acquired through practice so its transferal is costly, slow, and unpredictable (Grant, 1996; Kogut & Zander, 1992).

According to Grant (1996), there is limited ability of the human brain to acquire, store, and process knowledge. Consequently, the creation of new knowledge or the acquisition of extant knowledge and their subsequent storage (i.e., knowledge production) requires personnel who specialize in the areas of knowledge being pursued. Therefore, the experts are almost always specialists in that specific area instead of people who have broader knowledge-base.

Consequently, human resource management (HRM) becomes even more imperative since as Simon (1991, p. 125) states: “All learning takes place inside individual human heads; an organization learns in only two ways: (a) by the learning of its members, or (b) by ingesting new members who have knowledge the organization didn't previously have”. Of course one of the primary goals of successful HRM activities is to achieve both synergies with the organizational strategy (Zajac, Kraatz, & Bresser, 2000) and procure resources necessary to implement the organization's strategy (Barney, 1991).

Knowledge transfer, however, is an inefficient method for integrating knowledge into an organization. To effectively integrate knowledge, the establishment of an interaction method by which personnel who have the specific necessary knowledge can communicate and collaborate without needing to cross-train in each others' specialty areas is fundamental to efficient knowledge integration (Grant, 1996). These communications pathways as well as the knowledge to which they facilitate the integration can both result in a competitive advantage for the organization.

This view of organizational capability explains its link with competitive advantage. Since employees are mobile, although their specialized knowledge is valuable, it can only be used to achieve a competitive advantage when integrated with the organization's capabilities. In this context, a competitive advantage can only be achieved with both the valuable specialist's knowledge and the rare organization's capabilities. To sustain this competitive advantage, the knowledge must also be broad enough in scope to achieve a higher-level integration across a broad context of the organization in an effort to sustain its inimitability (Grant, 1996).

This view of the specialized knowledge of human resources within an organization contributing to a competitive advantage has been amplified in the current post-industrial

knowledge-based economy particularly with its heavy reliance on Information Technology (particularly networking & digitization) (Grant, 2002).

2.4.2 Strategic Human Resource Management

Within the strategic human resource management field, scholars focus on “the pattern of planned human resource deployments and activities intended to enable the firm to achieve its goals” (Wright & McMahan, 1992, p. 298). This requires linking the HRM practices to the strategic management processes (vertical fit). It also suggests a horizontal fit with the other human resource activities through a defined plan.

Fit is the basis for many theories at the individual, group, and organization levels (Zajac, Kraatz, & Bresser, 2000). Consequently, this entails a consistency with the different needs, objectives, and structure of the organization and the human resources themselves. The traditional view is that “fit” always improves the performance of firms. However, there are also indications that fit may not always be desirable. If the entire focus is on ensuring fit within the HRM process, pursuing new strategies becomes more difficult (Wright & Snell, 1998; Zajac, Kraatz, & Bresser, 2000). Another trait of Strategic HRM is that organizations require particular sets of skills in order to achieve the goals of the organization. These skills are frequently aligned with specific strategies within the organization. Consequently, both the goals of fit and flexibility must be met for a successful human resource strategy (Wright & Snell, 1998).

Therefore it is the organization’s strategy that dictates the necessary skills and behaviors that must be conveyed to the human resource managers to improve their performance. This points out one of the potential pitfalls within human resource management. The HR managers have a particular perception of the skills and behaviors that are required and that determine the HRM practices. However, the accurate transmittal of the requirements of the organizational

strategy to the HR managers is not always dependable. This could have significant performance impacts on the organization particularly as they are embarking on a new strategy (Wright & Snell, 1998). Consequently, organizations should view the HRM function as an integral investment in capital assets instead of viewing them as simply an operating expense (Wright, McMahan, & McWilliams, 1994). It is only when HRM is able to effectively provide the human resources to implement the organization's strategy that the resources are capable of contributing to a competitive advantage.

“Thus, the key role of strategic HRM is to ensure fit among a subset of strategically relevant variables while simultaneously seeking to build generic organizational capabilities that can be applied toward both discovering and implementing a variety of diverse strategic initiatives” (Wright & Snell, 1998, p. 767). Although resource mobility (which is implicit in the ability to acquire human resources on the open market) would normally negate the ability to achieve a sustainable competitive advantage, acquiring human resources to fulfill the strategic needs of the organization allows it to reap the benefits of skills needed by the organization that were developed elsewhere while keeping them within the organization. Consequently, the acquiring organization realizes the immediate benefits of being able to utilize the skills acquired while not having the expense of otherwise necessary training (particularly if those skills were not already present within the organization) (Lepak & Snell, 1999). When these acquired resources are complementary to the organization's existing resources and capabilities, they can then become a source of a competitive advantage (Lepak & Snell, 1999; Barney, 1991; Wright, McMahan, & McWilliams, 1994) particularly when they are integrated into an organization's strategy (Wright, McMahan, & McWilliams, 1994).

Consequently, because achieving fit is difficult, organizations that are able to effectively do so will be able to use the HRM process as source of a competitive advantage. If the organization can simultaneously incorporate flexibility to handle dynamic strategic needs into its hiring practices, its ability to gain and/or sustain a competitive advantage is strengthened. Additionally, potential employees' views regarding the organization's environmental performance affects their willingness to work for them (Dechant & Altman, 1994) if they have similar values.

One other opportunity to improve the hiring practices is to make a strong environmental stance a part of the organization's image. That type of image can also influence HR policies that will shape the design of the jobs, recruitment and hiring practices, and personnel training & development. This is because having a strong, positive environmental posture can attract better candidates because an employee's view of the organization's social responsibility is more likely to match their own values. Antithetically, organizations with poor environmental records find it more difficult to attract top employees (Russo & Fouts, 1997). Previous research also suggests that companies that are environmentally proactive have top management who are involved in environmental issues, provide internal and external environmental reports, and encourage employees to get environmental training (Menguc & Ozanne, 2005).

2.4.3 Strategic hiring of computing personnel

Even in the context of alliances, organizations need to duplicate some of the knowledge of the overall system integrator in order to efficiently integrate across multiple areas of knowledge (Grant, 2002). This is particularly true in areas where one organization may be specializing in a particular area of expertise (e.g., environmental sustainability) and is considered the system integrator for development of that capability within another organization. The

subordinated organization for this capability must have knowledge workers with the ability to communicate effectively with the system integrator in order to efficiently integrate their capabilities.

Information Technology is at the heart of an organization's environmental efforts (in a survey, 89% of responding organizations feel that IT is likely to have a significant role in reducing the organization's environmental footprint and 96% are preparing for a Green IT strategy (Symantec Corporation, 2009)). Banerjee (2002) likewise recognized the importance of the use of science and technology to resolve environmental problems utilizing a "technocentric" paradigm. One of the things that differentiates information systems is that they can facilitate significant changes to the processes utilized by organizations (Aken, 2008). As a result, the development of information technology and information systems has become necessary for business to compete in today's environment similar to how the assembly line process became necessary for manufacturing firms to compete during the industrial revolution (Aken, 2009).

2.4.3.1 Computing Job Ads

Miller, et al. (1988) have suggested that innovation requires a high degree of role specialization to perform a broad array of tasks related to the innovation. Consequently, innovation will require a high degree of specialization as experts are employed to perform a wide variety of innovation-related tasks. This is further supported by other researchers (Jelinek, 1977; Burack, 1967) who found that as technical complexity increases, the complexity of the organization will increase since jobs become more specific to handle adjusting the processes and protecting the technology rather than working directly with the products themselves (Aken, 2009).

Understanding what skills are needed within computing professions has been an important topic in research since the 1980's. Archer (1983) utilized a survey administered to organizations to determine what skills and coursework were needed for Computer Science graduates. Subsequent similar studies have tracked and extended this research (Trauth, Farwell, & Lee, 1993; Aken & Michalisin, 2007). A different approach was utilized by Athey & Plotnicki (1988) who examined skills listed in job advertisements for IT positions from various newspapers. Litecky, et al (1992), expanded on Athey & Plognicki's research by applying a more systematic sampling of job ads from major metropolitan markets throughout the US (Gallivan, Truex, & Kvasny, 2004; Prabhakar, Litecky, & Arnett, 2005; Litecky, Prabhakar, & Arnett, 2008). Methods used by other researchers include using interviews and surveys and have focused on the importance of managerial and technical skills in computing jobs (Noll & Wilkins, 2002; Goles, Hawk, & Kaiser, 2008).

Study of job descriptions is important because there are significant differences between the skills and tasks associated with similar position titles from different employers. Consequently, empirically derived computing job skills could be very helpful to career planning. In the O*NET project (US Department of Labor, 2008), the computing job descriptions seem to lack support for their expected skill requirements and the timeliness of the number of available computing jobs is a consistent problem. Specific definitions of computing skills demanded for particular job types are also often inaccurate (e.g., for Database Administrators, O*NET has listed "knowledge of circuit boards", but does not mention Oracle). In contrast, this research methodically identifies the skills as defined by what employers actually have listed in their computing job ads and classifies these collections of skills to make this myriad of data

meaningful and accessible to the general public (Chen-Chuan Chang, He, & Zhang, 2004; Litecky, Aken, Ahmad, & Nelson, 2010).

2.5 Hypothesis Development

Based upon the previous research, certain conclusions can be drawn about the relationships between an organization's environmental posturing, its environmental performance, its hiring practices, the industry the organization competes in, and its ultimate financial performance.

2.5.1 I think I'm green, therefore I am

A corporate social agenda works on a progression from doing no harm through updating the corporate strategy to improve social conditions on a global scale (see Figure 5: Model of a Corporate Social Agenda). "It is through strategic CSR [Corporate Social Responsibility] that the company will make the most significant social impact and reap the greatest business benefits" (Porter & Kramer, 2006, p. 7).

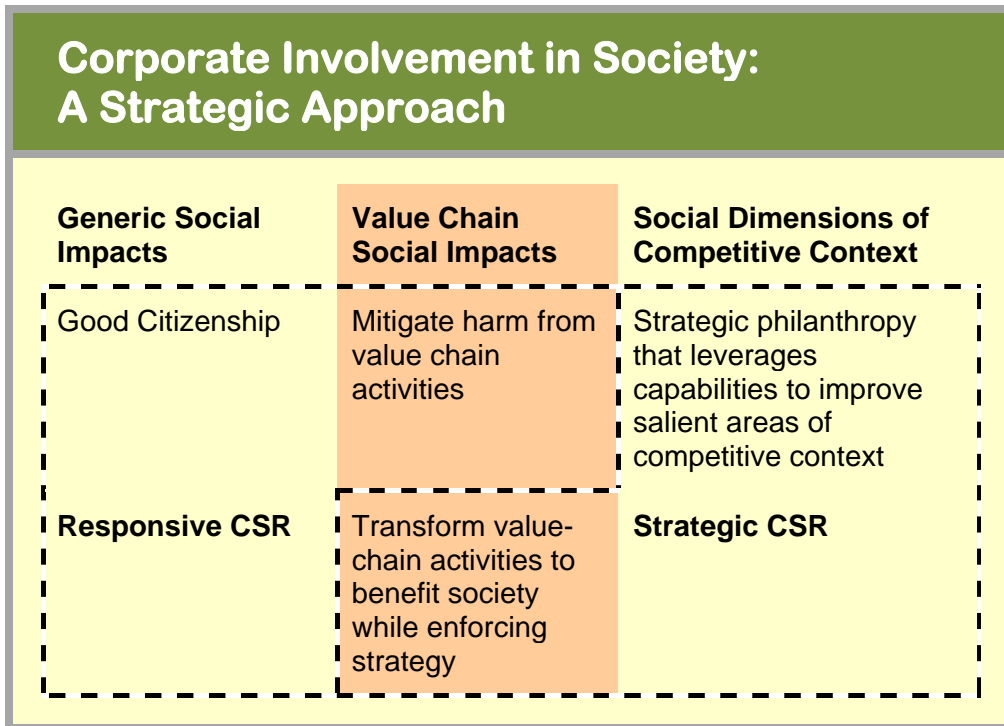


Figure 5: Model of a Corporate Social Agenda (Porter & Kramer, 2006: Reprinted with permission)

In this model, there are two primary strategies for implementing a strategy of Corporate Social Responsibility (CSR): Responsive CSR and Strategic CSR. These strategies are not mutually exclusive (an organization can work towards implementing both) and both of these strategies have an impact on the value chain from mitigating harm (Responsive CSR) through transforming the value-chain to benefit society.

Given the significant social gains and potential performance improvements, many organizations at least profess to follow an environmental strategy. According to a Symantec survey (2009), 86% of surveyed organizations indicated a desire to qualify as being “green” as being very important. 67% responded that improving the company’s reputation was important.

Sustainable development and social responsibility are the current buzzwords in the corporate world. Not surprisingly, therefore, the websites, annual reports, and brochures of top international organizations are full of carefully crafted accounts of ‘sustainable’ and ‘socially

responsible' projects such as poverty alleviation, protection of human rights, and the use of the four Rs (Reduce, Re-use, Recycle, and Re-think) (Munshi & Kurian, 2005).

The abundance of environmental sustainability claims, whether valid or not, has made it difficult for stakeholders to tell the difference between firms with an actual environmental strategy and those that are just taking advantage of the renewed public interest in the global ecology. As a result of attempts by some organizations to mislead stakeholders about their environmental practices or the environmental benefits of particular products or services (known as “greenwashing”), the desired impact of these communications has been diminished even for companies that are fulfilling their pledges (Parguel, Benoit-Moreau, & Larceneux, 2009).

Although there is evidence to suggest that statements regarding environmental strategy in various corporate assertions may be hyperbole and a form of “greenwashing” (Parguel, Benoit-Moreau, & Larceneux, 2009), empirical testing in other research has indicated validity in such statements regarding corporate policy (Parguel, Benoit-Moreau, & Larceneux, 2009; Bowman, 1978; D'Aveni & MacMillan, 1990; Michalisin, 1999) and that top management teams' assertions in annual report texts are manifestations of the values that are deemed important by top management (Michalisin, 1999). Previous studies have also found that socially responsive organizations are more likely to talk more about social responsibility in their Annual Report Text than less responsive firms (Bowman, 1978). Furthermore, it has been found that companies that are proactive in environmental issues utilize self-reported managerial perceptions (Banerjee, 2002). Presuming that environmentally proactive organizations will achieve at least some of their goals, I propose the following hypotheses:

H 1: There is a positive relationship between an organization's environmental posturing and its environmental performance.

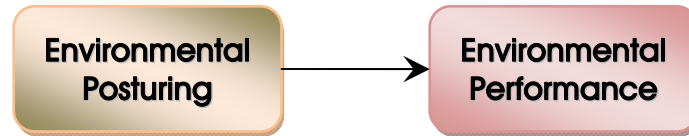


Figure 6: Relationships in Hypothesis 1

2.5.2 It's not easy being green – Hiring practices as mediators of performance

Being environmentally proactive can become a part of an organization's image and identity and can provide direction for the actions of its employees. Such an image can also influence HR policies which will impact job design, recruitment and hiring, as well as other HR support systems. Such HR policies can also improve productivity and attract top recruits who are looking for organizations practicing environmental stewardship (Russo & Fouts, 1997; Dechant & Altman, 1994).

The hiring practices of the firm, thusly, represent matching the requisite resources to an organization's environmental strategy. Not only, then, can performance suffer because organizations are gaining a reputation for "greenwashing" while not hiring employees with the appropriate skills to implement a Green IT strategy, but it may also be that the HRM function in the organization does not properly understand the strategy of the organization. Either way, it is expected that the results would be poorer environmental and financial performance if there is not a fit between an organization's environmental strategy and its hiring practices (Hitt, Bierman, Shimizu, & Kochhar, 2001).

Strategic fit also states that performance will suffer for organizations that behave differently than their strategy dictates. Whenever an organization exhibits a misfit between its environmental and its organizational context, performance will suffer (Zajac, Kraatz, & Bresser, 2000). Therefore, I propose the following hypotheses:

H 2: The relationship between environmental posturing and the organization's environmental performance is mediated by its environmental hiring practices.

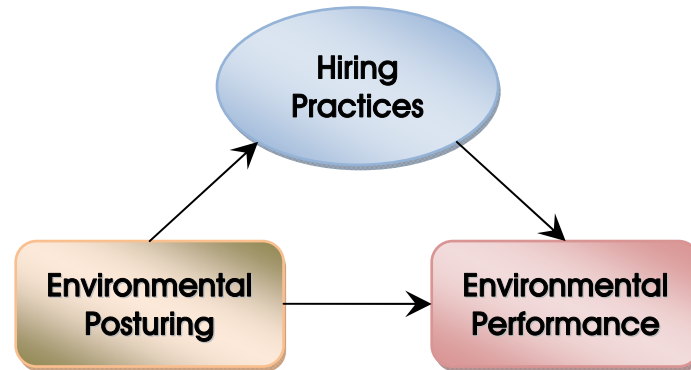


Figure 7: Mediation Relationships in Hypothesis 2

2.5.3 It pays to be “green”

For an organization to implement an environmentally-oriented strategy, it will require the utilization of technology and socially complex human capital resources. Multiple organizations may possess the same technologies (making them not rare), but only some of the firms may have the social relations, culture, and complementary human capital resources to utilize these technologies to implement their strategies. If the social processes are inimitable, and no substitutes exist, these organizations may achieve a sustained competitive advantage yielding improved performance (Barney, 1991). It has also been found that environmentally proactive organizations develop unique IT-intensive capabilities that enhance stakeholder integration, higher order learning among employees (Sharma, 2000), and continuous innovation to enhance strategic competitiveness (Banerjee, 2002).

Additionally, there are intangible factors that suggest performance improvements when an environmental strategy is adopted. One intangible resource is the development of an environmental leadership reputation that will increase sales to environmentally conscientious

customers. Public concern about the environment has grown faster than most national problems. A strong environmental reputation can itself be a source of market advantages (Russo & Fouts, 1997) even among small and medium-sized enterprises (Aragon-Correa, Hurtado-Torres, Sharma, & Garcia-Morales, 2008). Conversely, organizations that have developed a reputation for negative environmental activities will either be hurt in the marketplace or will have to spend inordinate resources to counter the negative reputation (e.g., Exxon, tobacco companies, etc.) (Parguel, Benoit-Moreau, & Larceneux, 2009; Porter & Kramer, 2002; Dechant & Altman, 1994). Therefore I propose the following hypothesis:

H 3: There is a positive relationship between an organization's environmental performance and its financial performance.

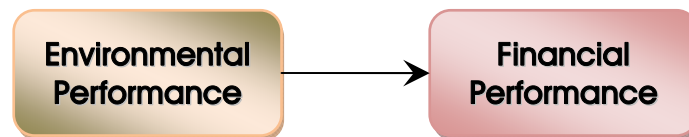


Figure 8: Relationships in Hypothesis 3

2.5.4 Industry Effects

Michalisin (1999) found that innovative firms talk more about innovativeness in their annual report texts than less innovative firms. Russo & Fouts (1997) found that the growth rate within an industry moderated the relationship between environmental performance and profitability. They also found that industry growth impacted the environmental performance of an organization. Since empirical studies have determined that the relationship between environmental performance and financial performance varies across industries (Aragon-Correa & Sharma, 2003), impacts on financial performance (King & Lenox, 2001; Prescott, 1985) and certain environmental factors may be relevant in one industry and not another (Zajac, Kraatz, &

Bresser, 2000). In particular, organizations that are in environmentally-intensive industries (Parguel, Benoit-Moreau, & Larceneux, 2009) would be expected to discuss their environmental policies to a greater extent than other organizations without a corresponding increase in environmental performance and would also be more likely to be participating in “greenwashing.” Additionally, those organizations which are in environmentally-intensive industries that are able to achieve greater environmental performance would be expected to financially outperform other organizations at the same environmental performance level. Thus, I propose the following hypotheses:

H 4: The relationship between an organization’s environmental posturing and its environmental performance is moderated by its industry.

H 5: The relationship between an organization’s environmental performance and its financial performance is moderated by its industry.

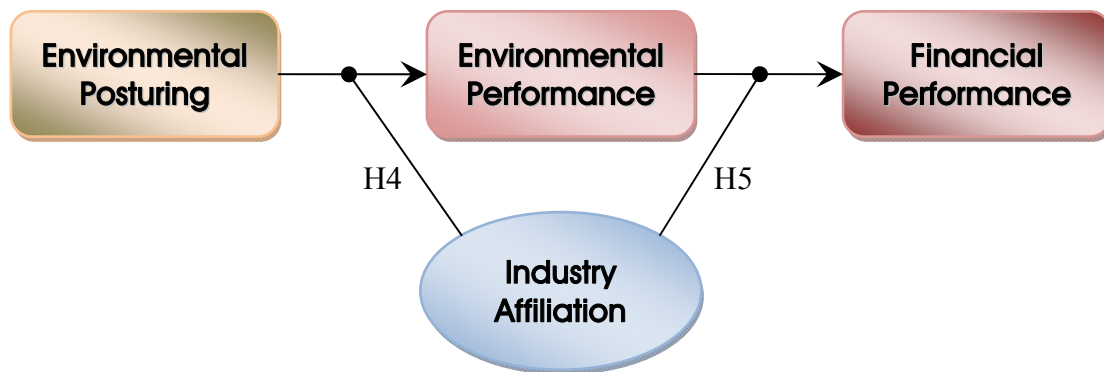


Figure 9: Moderation Relationships in Hypotheses 4 and 5

2.5.5 Model of Human Resource Contingencies in Organizational Performance

Based upon the previous research and the hypotheses developed, the proposed model for this study is illustrated in Figure 10.

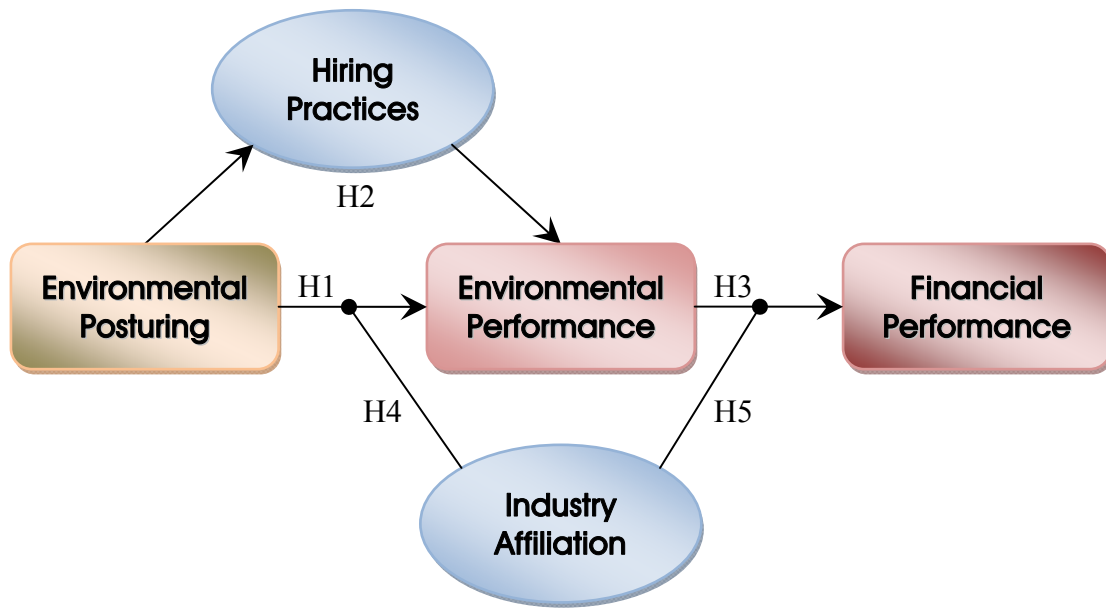


Figure 10: Model of Strategic Fit Through the Lens of the NRBV

CHAPTER 3

RESEARCH METHODOLOGY

This section describes the research methodology undertaken for this dissertation. Details are provided to understand the variables, how the data was gathered, how the variables were measured, and how the relationships between the variables were analyzed. First, I begin with a discussion of the population frame and the sample from which it was drawn.

3.1 Population Frame

The population frame for this study is publicly-traded organizations. To be selected for this study, an organization must exist in the independent ratings company Kinder, Lydenberg, Domini Research & Analytics, Inc.'s KLD STATS dataset which rates all organizations in the Russell 3000 index on various corporate social responsibility (CSR) criteria (Chatterji, Levine, & Toffel, 2009). Additionally, only organizations that have publicly posted at least ten job ads from for personnel with computing degrees are included. The organization must also have its annual report text accessible for the period under empirical examination. The sample drawn from the population frame is discussed in section 4.2 on page 77.

3.2 Constructs

3.2.1 Environmental Posturing

Integrating environmental issues into an organization's strategic plan is a key component of improved environmental performance (Banerjee, 2002). Previous research suggests that companies that are proactive environmentally have top management support involved in environmental issues, use internal and external reporting methods, and encourage environmental training and involvement from their employees (Menguc & Ozanne, 2005).

Organizations that have a commitment to the environment typically have a written environmental plan and communicate their plan to their organizational, product market, and capital market stakeholders. This type of commitment also requires that the organizations take a long-term perspective on their policies and strategies to support their environmental goals (Menguc & Ozanne, 2005). Consequently, from the stakeholder's perspective, an organization's environmental strategy involves recognition of its concerns which are then communicated to them (Banerjee, 2002).

The environmental orientation of an organization has two dimensions: internal orientation which reflects managers' perceptions of environmental issues and external orientation which is reflected in the need to share these views with the stakeholders (Banerjee, 2002). Additionally, attribution theory proposes that the amount of effort put forth to indicate an environmental strategy indicates its inherent motives in carrying out that strategy (Parguel, Benoit-Moreau, & Larceneux, 2009).

3.2.1.1 Annual Report Assertions

For the reasons previously stated, Annual Reports are the primary communications mechanism between the organization's management and its stakeholders (Michalisin, 1999), and thus for purposes of this study environmental posturing were measured by analyzing the Annual Report Text (including the Letters to the Shareholders, Company Report, and Management Discussion and Analysis) of the organizations being studied. Extracting environmental statements from Annual Report Texts has also been utilized successfully in prior research (Al-Tuwaijri, Christensen, & Hughes II, 2004; Cho & Patten, 2007).

Components of annual reports typically contain a Letter to the Shareholders (LtS), Company Report, Management Discussion & Analysis, Financial Statements, and Footnotes

(Michalisin, 1999). The LttS, Company Report, and Management Discussion & Analysis components provide the primary source of data for this analysis (hereafter, Annual Report Text is referred to as ART).

The LttS and the Company Report typically contain information about the organization's overall performance, its outlook for the future, corporate citizenship, new products, achievements, business philosophy, and other things management considers important. The Management Discussion and Analysis section focuses on changes to the organization's financial condition and operating results (Michalisin, 1999). Although these sections are not audited, Chief Executive Officers must sign them, and they are held legally responsible for their accuracy (D'Aveni & MacMillan, 1990).

While analyzing the text of annual reports does not tell us why particular aspects of the environment were mentioned, it does indicate that the authors were paying attention to it. Since the letters can be attributed to top managers and CEOs must sign them and are responsible for their accuracy, they can be assumed to have final authorization over their content. LttS have been seen as manifestations of the intent of the leaders of the organization and are good representations of the things that the leaders find important. They also reveal how much attention is paid to different components of its environment relative to other components (D'Aveni & MacMillan, 1990) (e.g., the frequency with which a topic is mentioned relative to other topics has significance).

Organizational communication research has successfully inquired into how organizations arise in the communications among members and develop nourishing organizational cultures. Content analysis of what is said and written within an organization provides the key to understanding that organization's reality (Krippendorff, 2004).

In Bowman's (1978) study of annual reports, he found that they can provide rich sources of information when analyzed using content analysis. For example, he found that companies that were successful in the computer industry had a stronger focus on adroitness in coping with their environment, customer orientation, international activity, and vertical integration than companies that were less successful. D'Aveni & MacMillan (1990) analyzed the LttS of the 1000 largest bankruptcies between 1972 and 1982 and found that surviving bankrupt companies had the same focus on the internal environment as they did on the external environment. Failing firms, however, focused mostly on the internal environment. Michalisin (1999) found that content analysis of innovation statements made in annual report text (ART) accurately reflected the innovation strategy of organizations. Michalisin and White (2001) compared emphasis on quality in annual reports to independent measures of quality across one hundred Fortune 500 and Service 500 firms and found that there was a strong, positive relationship.

The results of these studies indicate that assertions made in annual report texts accurately reflect the values, strategies, and beliefs that top management of the organization considers important and focuses their attention on. They are, therefore, an important resource for management research (particularly for variables that resist empirical testing). They also provide a rich data set for researchers in that they are accessible for a broad sample of organizations that are publicly traded (no issues regarding response rate) that improves the generalizability of the empirical results (Michalisin, 1999). They also provide the ability for researchers to pursue longitudinal or causational studies in research areas that would otherwise be difficult or impossible to achieve otherwise. Other areas in which study of ARTs has shown it can be fruitful is in the study of organizational culture (inasmuch as it provides a current manifestation of the values, beliefs, and ideologies of top management as well as their future goals) and in testing the

relationship between intangible resources and firm performance (which are also typically difficult to test utilizing other forms of empirical testing) (Michalisin, 1999).

Consequently, annual report texts offer relatively accurate reflections of the organizations' focus on different elements of their environment. Additionally, the amount of emphasis placed on a particular topic in the ARTs is reflected in the strategy and the performance related to that topic. This makes them particularly useful in identifying the strength of environmental focus and strategies within an organization.

3.2.1.2 Content Analysis

Content Analysis has been defined as “analysis to determine the meaning, purpose, or effect of any type of communication, as literature, newspapers, or broadcasts, by studying and evaluating the details, innuendoes, and implications of the content, recurrent themes, etc.”

(Random House, Inc., 2009, p. 1). Krippendorff (2004, p. 18) narrows that definition to describing content analysis as “a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use.”

Content analysis came into vogue within the social sciences in the 1980's, but had been used by researchers since the 19th century. At that time, it required a significant amount of effort to collect, transcribe, and code the textual data which made content analysis a labor-intensive, time-consuming activity. Content analysis has subsequently become an efficient means to conduct public opinion research, track markets, analyze politics, discover emerging trends, and study organizational theory (Krippendorff, 2004; Michalisin, 1999).

Whenever a socially-charged topic is being researched (e.g., environmentalism, racism, etc.) utilizing a survey instrument, construct validity in the form of social response bias may become problematic (Banerjee, 2002; Krippendorff, 2004). However, content analysis of annual

report texts is an unobtrusive technique which has been shown to be a valid representation of corporate strategy (D'Aveni & MacMillan, 1990; Krippendorff, 2004; Michalisin, 1999). Content analysis can likewise be used to reconstruct the perceptions and beliefs of the authors (Holsti, 1969) without prejudice or bias. Consequently, Michalisin (1999, p. 155) has summarized content analysis as “a research technique used to analyze textual information. It is the objective, systematic and quantitative description of attributes of communication occurring earlier in time ... and is a proven research technique for studying communication at a distance, as opposed to face-to-face interview, questionnaire, or [direct] observation.”

Krippendorff (2004) describes six attributes of texts from the perspective of content analysis:

1. Texts have no objective (text entails an invitation, if not a commitment, to read it.)
2. Texts do not have single meanings that could be “found,” “identified,” and “described” for what they are.
3. The meanings invoked by texts need not be shared (e.g., different people can interpret the texts differently).
4. Meanings (contents) speak to something other than the given texts, even where convention suggests that messages “contain” them or texts “have” them.
5. Texts have meanings relative to particular contexts, discourses, or purposes.
6. The nature of text demands that content analysts draw specific inferences from a body of texts to their chosen context. (Krippendorff, 2004)

As humans, we typically measure observed phenomena against particular standards to identify the kinds of phenomena that are being observed (identification/categorization), how good or bad the observed phenomena are (evaluations), or how close the phenomena

approximate our expectations (judgments). Identifications are primarily concerned with what something is, what it is called, or to what category it belongs. In content analysis, this is the simplest task in that it seeks to determine if something has occurred, was said, or was written (Krippendorff, 2004). This type of observation requires the data to be encoded in a binary format, either it occurred or it didn't.

An index is a slightly more complicated variable that can be utilized within content analysis. Its significance is determined by its correlation with other phenomena of interest, not necessarily the verbatim meaning of the text being selected. Krippendorff (2004) refers to five types of indices, two of which are particularly germane to this analysis:

- The frequency with which a symbol, idea, reference, or topic occurs in the texts being analyzed is taken to indicate the importance of, attention to, or emphasis on that symbol, idea, reference, or topic.
- The frequency of co-occurrence of multiple concepts (excluding those that have synonymous meanings) is taken to indicate the strength of associations between those concepts

Too frequently, however, researchers simply declare an index without demonstrating its empirical validity. Simply counting the numbers of mentions of terms would be totally meaningless if the frequencies could not be related to something such as political, cultural, or economic trends. At a minimum, a correlation needs to be demonstrated or hypothesized so that it can be tested. A couple of generalizations regarding texts can be assumed, however. One is that every communication not only says something to its intended audience, but also about the institution of which it is a part. Another generalization is that the communications tend to reinforce the institution's explanations and processes that created and disseminated them.

Krippendorff (2004) also defines six steps to be followed when performing content analyses which are laid out in Figure 11:

1. *Unitizing*: systematic distinguishing of segments of text that are of interest to an analysis. Content analysts must justify their methods of unitizing, and to do so, they must show that the information they need for their analyses is represented in the collection of units.
2. *Sampling*: allows the analyst to economize on research efforts by limiting observations to a manageable subset of units that is statistically or conceptually representative of the set of all possible units.
3. *Recording/coding*: bridges the gap between unitized texts and someone's reading of them, between distinct images and what people see in them, or between separate observations and their situational interpretations.
4. *Reducing* data to manageable representations: relying on established statistical techniques or other methods for summarizing or simplifying data. Serves analysts' need for efficient representations, especially of large volumes of data.
5. Abductively *inferring* contextual phenomena: relying on analytical constructs or models of the chosen context as warrants. This moves the analysis outside of the data, bridging the gap between the descriptive accounts of texts, what they mean, refer to, entail, provoke, or cause.
6. *Narrating* the answer to the research question: relying on narrative traditions or discursive conventions established within the discipline of the content analyst. Makes their results comprehensible to others. Means arguing the appropriateness of the use of content analysis rather than direct observational techniques (Krippendorff, 2004).

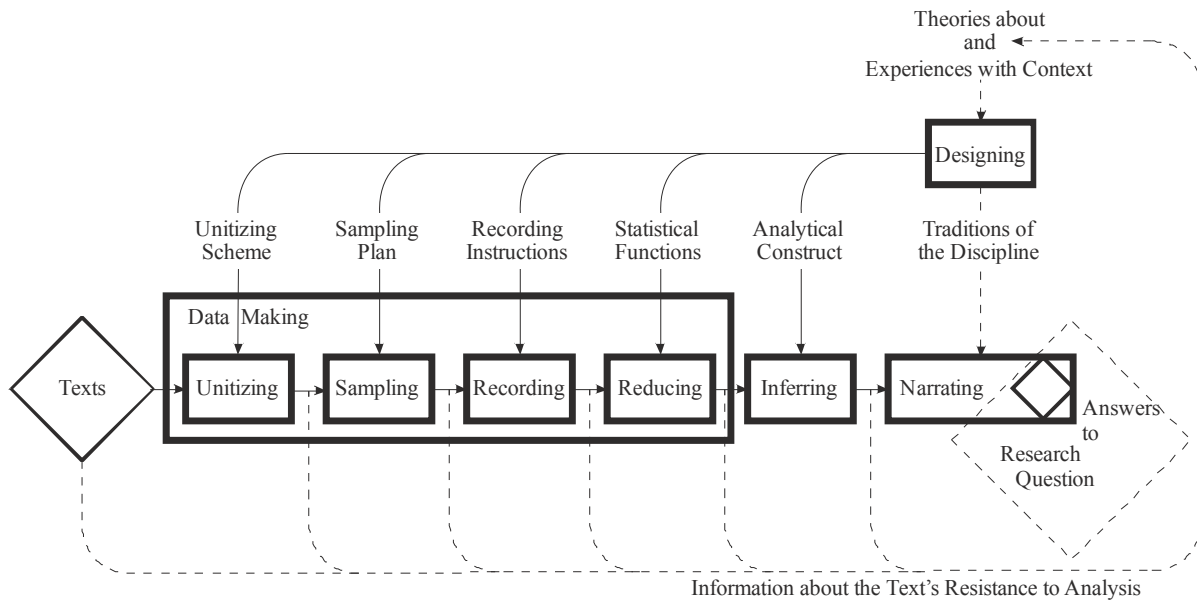


Figure 11: Components of Content Analysis (Krippendorff, 2004: Reprinted with permission)

One important concept to note in Krippendorff's model of the components of a content analysis process are the feedback loops that allow the researchers to revisit any of the steps based upon information uncovered during the analysis or problems that need to be addressed (information about the text's resistance to analysis). Consequently, the design is done iteratively. The content analyst compares initial inferences from a content analysis of text to the relevant observations of the context (e.g., Key Word in Context Analysis or KWIC (Michalisin, 1999)) and any discrepancies are used to incrementally change the appropriate parts of the analysis. This process eventually results in a best fit of the analysis techniques to the texts being analyzed (Krippendorff, 2004). This process should also be well-documented since the ability to repeat the tests with the same results is an important component of content analysis techniques (Krippendorff, 2004; Michalisin, 1999).

For the content analysis of the annual reports the units of text will be the following sections of the annual report: Letter to the Shareholder, Company Report, and Management

Discussion & Analysis. The sample selected is drawn from those organizations that are publicly traded and are required to file annual reports (within the 10K Report) with the Securities and Exchange Commission.

For the Recording/Coding step, the instructions must contain everything needed to replicate the analysis somewhere else. The language used to record the data must also meet three criteria:

- Must be free of syntactical ambiguities (what the content analysts are looking for must be absolutely clear) and inconsistencies
- Must satisfy the requirements of the analytical techniques to be used (right types and ranges of variables)
- Must provide enough information to draw the appropriate inferences for the phenomena of interest (Krippendorff, 2004)

For the coding of the environmental statements made within the ARTs, I used a weighted value that was calculated as the number of environmental statements found relative to the size of the ART (Al-Tuwaijri, Christensen, & Hughes II, 2004). This controls for the size of the ART which varies substantially across organizations in the sample.

3.2.1.2.1 Computer-Aided Text Analysis

Computer software, however, can circumvent the first two criteria since it has no ambiguities (it records exactly and only what it is told) and can easily be programmed to ensure the correct format of data is recorded to support the analytical techniques to be used (Krippendorff, 2004; Michalisin, 1999). This dissertation relied upon a custom computerized retrieval and content analysis application called Arachnid. Computerized content analysis applications have many advantages over manual, human-based, content analysis for the reasons

above as well as the ability to analyze large amounts of data with perfect reliability (Krippendorff, 2004).

When using computers in content analysis, a methodological shift must occur. Instead of being concerned with the ability of human coders to be able to encode a large volume of text at a reasonable rate and with consistency, the content analyst must now be concerned with ensuring that the context of the terms being sought matches the meaning that is intended (Krippendorff, 2004). To overcome this obstacle, this research attempted to ensure that the terms sought have very discrete meanings. For example, the term “environment” may refer to a variety of things in different contexts. It could be referring to the economic environment, the working environment, the ecological environment, or any of a number of other meanings. Consequently, only terms and phrases with discrete meanings that are explicitly tied to the concepts sought are used. So, instead of searching for environment, a series of more specific phrases were utilized (e.g., “environmentally friendly”, “environmental management system”, etc.). This process subsequently eliminated false positives (Type I errors) at the expense of errors of omission (Type II errors).

The first place to begin creating the list of terms related to environmental strategy and Green IT was the academic and practitioner literature and textbooks (Michalisin, 1999). I first went to the literature to discover what terms were used to describe environmental issues, strategies, and processes. I then went to documents that were distributed by organizations relating to their environmental strategies and technologies to find relevant terms. I then redacted the list to remove those terms that frequently were used in contexts other than environmental concerns.

With the custom software application (Arachnid), the ability to discover matches of concepts is significantly more complex than a simple matching/searching algorithm. Because computers are only capable of determining whether a match of 1's and 0's has occurred during a basic search, spelling variations, word forms, capitalization, and synonyms would not normally be matched (e.g., if searching for the term "environmentally" using a simple search technique, occurrences of environmental, Environmentally, and ecologically would not be found). Arachnid performs several variations of root word analysis and lemmatization (what Krippendorff (2004) refers to as "computational content analyses"). One variation that is typically utilized in more complex Computer-Aided Text Analysis (CATA) systems is converting all terms in the source text and the search text to their root word form (e.g., environmentally would be converted to environment) prior to the count to be conducted. However, one of the issues with blind root word conversions is that sometimes significant meaning can be lost (e.g., environmental almost always refers to the meaning of the term in the ecological sense, whereas environment is more frequently used in other contexts as was illustrated earlier). Therefore, Arachnid has the ability to tag the search terms so that they are only compared to the original text without converting it to the root word form.

It should also be pointed out that there are two primary forms of root word analysis that are utilized in CATA applications. The most basic form is known as "stemming." Using this process, common traits are eliminated from the ends of words to presumably reduce them to their root word form. For example, plurals of nouns are typically indicated by adding an 's' to the end of the word. Consequently, stemming algorithms would simply look for all words that end in 's' and delete it. Root forms of verbs are also often created by removing 'ing' and "ed" from the end of words. So long as the same algorithm is run on the search text, matches would still be found

(would not result in Type II errors). However, this introduces a number of Type I errors. For example, “red” and “ring” would both be converted to “r” (Krippendorff, 2004). Searches for “ring” would then be converted to searches for the word “r” that would still return all occurrences of “ring” from the original text, but would also return references to “red” from the original text. Type II errors can also be introduced using this algorithmic process in root word analysis. Typically, in order for the algorithms to not strip too much information from a word, only the first criteria met is executed. Consequently, ‘readings’ would have the ‘s’ removed, but not the ‘ing’. The other form of root word analysis is dependent on a form of dictionary conversion. For example, the open-source WordNet (Princeton University, 2006) source code utilizes a lexical database for the English language to enable it (and applications that utilize its source) to do a more accurate conversion of text into its root word form.

Another form of root word analysis that is not typically utilized in other CATA applications deals with word combinations (Krippendorff, 2004). For example, if the term “environmentally friendly” were one of the search terms and the source text had the hyphenated version of the term “environmentally-friendly”, most CATA programs would not be able to detect a match. Commonly used phrases are also frequently concatenated together to form new word forms (e.g., EnvironmentallyFriendly) either purposefully or by accident which would likewise not be found as a match in most CATA software. Therefore, in the custom software application utilized for performing content analysis for this dissertation, word phrases are searched for in the source text in several variations including as written (environmentally friendly), hyphenated (environmentally-friendly), concatenated (environmentallyfriendly), and underscored (environmentally_friendly). This is significantly more computationally intensive, but results in fewer Type II errors.

Utilizing Arachnid, data regarding the environmental posturing of an organization was recorded as ratios to the total size of the ART to capture the relative importance environmental rhetoric has within the annual report text compared to the rest of the text (Krippendorff, 2004; Michalisin, 1999). This procedure also controls for differences in the amount of text in the ARTs across the sample firms.

3.2.1.2.2 Content Analysis Validation

According to Krippendorff (2004, p. 313), “Validation provides compelling reasons for taking the results of scientific research seriously.” There are several forms of validation that are utilized in content analysis research:

- Face validity: obvious or common knowledge
- Social validity: research findings a palatable because of their contribution to discussions of important social concerns
- Empirical (internal) validity: available evidence and a priori research support the methodologies
- Content validity: parametric testing validates the claims that the analysis is claiming to measure
- Construct validity: the scale measures or correlates with the theorized construct that it attempts to measure
- Criterion-related (instrument) validity: the degree to which a measure correlates with something external to it
 - Concurrent instrument validity: demonstrated by the degree to which the results obtained through one method correlate to findings on other variables that have already had validity established

- Predictive instrument validity: relates to variables that attempt to estimate events that may occur in the future, successful classification of new items, or accurately predicts the current state of affairs (Krippendorff, 2004)

Krippendorff (2004) suggests three forms of validating evidence that relate specifically to content analysis: treatment justification (a form of empirical validity), abductive inference (a form of construct validity), and results justification (a form of criterion-related validity). Treatment justification relies on evidence concerning the degree to which the sample of texts accurately represents the phenomena it is supposed to represent. This can be attested to by ensuring a firm theoretical foundation for the selection of the appropriate texts and their subsequent recording. Abductive inference validation basically states that you can infer that the construct is valid if the relationship it is supposed to confirm is supported by the analysis. Results justification validation states that if the proposed relationships are significant, they are valid.

In this research the population of texts (Krippendorff, 2004) is all of the written and spoken texts on behalf of the organization being studied. I have selected a sample of the annual report text based upon prior research (Bowman, 1978; D'Aveni & MacMillan, 1990; Al-Tuwaijri, Christensen, & Hughes II, 2004; Michalisin, 1999) that thus supports the treatment justification evidence. Construct validity was ascertained by reviewing a sample of the output of the CATA application and verifying that it was appropriately cataloguing the phrases of interest (for both Type I and Type II errors) (Krippendorff, 2004; Michalisin, 1999). This process was done iteratively to improve the construct validity by tweaking the CATA parameters as necessary in order to achieve the desired validity (Krippendorff, 2004; Litecky, Aken, Ahmad, & Nelson, 2010; Michalisin, 1999)

3.2.2 Hiring Practices

Since hiring practices are a key indicator of an organization's attempt to implement a corporate strategy and Information Technology is at the heart of an enterprise's environmental efforts (Symantec Corporation, 2009), this research focused on IT hiring practices as the measure of an organization's attempts to implement an environmental strategy.

3.2.2.1 Green IT

An organization's Information Technology (IT) related environmental efforts often incorporate what has become known specifically as "Green IT" or "Green Computing." Green IT is:

the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems – such as monitors, printers, storage devices, and networking and communications systems – efficiently and effectively with minimal or no impact on the environment. Green IT also strives to achieve economic viability and improved system performance and use, while abiding by our social and ethical responsibilities. Thus, green IT includes the dimensions of environmental sustainability, the economics of energy efficiency, and the total cost of ownership, which includes the cost of disposal and recycling. It is the study and practice of using computing resources efficiently (Murugesan, 2008, pp. 25-26).

Murugesan (2008, p. 33) goes on to state that "Green IT is an economic as well as an environmental imperative."

Previously, Green IT was superfluous to most organizations. This, however, is no longer the case. Organizations are now looking for Green IT solutions for a variety of reasons.

According to the most recent Symantec survey on Green IT (2009), at least 96% of companies are discussing Green IT, 52% are in the discussion or trial stages of implementation, while 45% have actually implemented a Green IT strategy. One of the reasons that organizations are seeking to implement Green IT is to cut costs through reduction of energy consumption (90%) and

cooling costs (87%). However, organizations also expressed a desire from top management to qualify as being “green” (86%) and to improve their corporate image (67%). Many organizations also expressed an explicit desire to implement Green IT as a method of reducing their carbon footprint (74%). Therefore, I selected an organization’s computer personnel hiring practices as the key indicator of its implementation of an environmental strategy.

3.2.2.2 Data Collection

For this research, job ads are extracted from job search websites (Monster, SimplyHired, HotJobs, Dice, CareerBuilder, and Indeed) and are filtered to retrieve only ads requiring IT degrees (e.g., Computer Science, Management Information Systems, and Information Technology). Over two million ads have been obtained by this method from the jobs advertised on the Internet since April, 2007.

To collect and analyze these job ads, this study utilizes a web content mining technique previously described in the discussion of content analysis in section 3.2.1.2.1 on page 56. This allows the software to automatically read large and diverse documents written in natural language and derive knowledge from them (Becerra-Fernandez, 2006). Data mining techniques such as this are generally utilized to “discover something new from the facts recorded in a database” (Glymour, Madigan, Pregibon, & Smyth, 1996, p. 35). To collect the data for the analysis of the job postings on websites, the author developed Arachnid to perform two primary functions:

1. Find all of the job postings for graduates in Computer Science (CS), Management of Information Systems (MIS), and Information Technology (IT) degree programs and store the text of the job ads.

2. Extract and store the skills and other significant attributes from the job ads (Zhang, Lakshmanan, & Zamar, 2004).

To find the job postings, I have automated the task of performing a search on the Monster.com, HotJobs.com, CareerBuilder.com, Dice.com, SimplyHired.com, and Indeed.com websites looking for references to the phrases synonymous with CS (e.g., “Computer Science” and “CS”) which also have references to degree synonyms (e.g., Bachelors, BS, Masters, BA, Degree, etc.). Likewise, the software performs other searches for references to MIS (e.g., “Management Information Systems”, “Management of Information Systems”, “Computer Information Systems”, MIS, and CIS) combined with the degree synonyms and “Information Technology” combined with the degree synonyms. One issue related to the available search features of the online websites includes use of common abbreviations often used for these types of degree programs. For example, searching for “IS degree”, returned job ads with the verb forms of “is”, not just the ads for “Information System” degrees. Similar problems were associated with “IT degree.” Consequently, errors of omission (Type II errors) are expected but previous analyses (Litecky, Aken, Ahmad, & Nelson, 2010) have shown that there is little difference between the excluded ads and the extracted ads.

Each search is also limited to jobs that have been posted within the last day so that the entire list of jobs returned from each unique search result includes less than 1000 postings (the limit to the number of jobs that can be retrieved with any of the job websites being used). The searches have been automated to run daily to retrieve the appropriate listings. Duplicated listings (based upon the website-specific job ID and the URL for the job ad) are excluded. The original HTML for each of the job ads are subsequently stored in the database together with a version of the ads with the HTML tags stripped out.

Prior research (Prabhakar, Litecky, & Arnett, 2005; Aken & Michalisin, 2007), analysis of job ads, and interviews were used to construct an initial collection of skill terms. These skills included soft skills (e.g., leadership, oral communications, etc.), business skills (e.g., project management, supply chain management, etc.), technical skills (e.g., agile development, user interface design, etc.), and programming skills (e.g., c/c++, java, etc.). Skills that relate specifically to environmentally-oriented tasks were also added. Skills that could also be used in common language were excluded from the search so that their importance as skills would not be exaggerated (e.g., agile could refer to the software development methodology as well as a descriptive word for other types of work to be performed (Liu, Chin, & Ng, 2003)) to reduce Type II errors. Subsequent to the original list of 269 skills, additional skills were extracted from those listed in the O*NET database and an initial analysis of the job ads to generate a current list of 1,743 skills. The skills and synonyms of these skills (e.g., visual basic & vb) are also stored in the database in their word root forms. For each job ad retrieved in the previous step, the postings are searched for the skills and their synonyms (e.g. visual basic, visual_basic, & visualbasic, etc.). Information on the occurrences of these skills is also stored in the database. Job ads are also parsed for references to other attributes such as salary information, location information, job title, and references to certifications (Litecky, Aken, Ahmad, & Nelson, 2010).

Within the context of the computing job ads, this technique was used to classify ads as either having environmental skills as a part of the job description or not. The score for the Environmental Hiring Practices construct is the percentage of job ads placed by the organization that included environmental skills relative to the total number of job ads placed by that organization. Thus, the value for Environmental Hiring Practices ranges from zero to one with

organizations that are placing a greater emphasis on hiring employees with environmental skills approaching a value of one.

3.2.3 Environmental Performance

One of the questions that has concerned researchers is whether society can regulate Corporate Social Responsibility (CSR) communications to deter greenwashing. Parguel, et al. (2009), studied consumers' responses to environmental ratings on their perceptions of CSR and found that poor environmental ratings indeed did influence their opinions of positive CSR messages making them more cynical of positive CSR messages.

Other researchers have attempted to use the Total Quality Environmental Management (TQEM) framework or a plethora of other experimental measures to create measurement standards for environmental performance. However, most of these measures have met with skepticism in the scientific community (Banerjee, 2002). Consequently, third party organizations have developed their own methods of calculating environmental performance.

3.2.3.1 KLD dataset

Since 1994, the independent ratings company Kinder, Lydenberg, Domini Research & Analytics, Inc. (KLD) has been evaluating corporations and disseminating this information through a proprietary database (Cho & Patten, 2007). KLD's environmental ratings system is one of the most widely used because it has been shown to capably predict environmental performance (Chatterji, Levine, & Toffel, 2009). Moreover, KLD's methodology has won various awards, which enhances the validity of the KLD environmental performance data used in this study. One limitation of the KLD data is that it uses a proprietary research process in order to create its ratings on each of the items measured. More transparency in the creation of these values would lend even more credibility to the data (Chatterji & Levine, 2005).

KLD Research and Analytics creates yearly assessments of companies' corporate social responsibility performance in their KLD STATS (Statistical Tool for Analyzing Trends in Social and Environmental Performance) product. The KLD data is comprised of a series of ratings for items in Environment, Social, and Governance factors. There are eight groups of ratings that the KLD data is clustered into: Community, Corporate Governance, Diversity, Employee Relations, Environment, Human Rights, and Product. It also has data regarding a number of Controversial Business Issues. Within each group of data (other than the Controversial Business Issues), the items are further subdivided into Strengths and Concerns. Within the Environmental group of items, the KLD scores each company on the following items (KLD Research & Analytics, Inc., 2008, pp. 9-11):

STRENGTHS

- Beneficial Products and Services (ENV-str-A):** The company derives substantial revenues from innovative remediation products, environmental services, or products that promote the efficient use of energy, or it has developed innovative products with environmental benefits. (The term "environmental service" does not include services with questionable environmental effects, such as landfills, incinerators, waste-to-energy plants, and deep injection wells.)
- Pollution Prevention (ENV-str-B):** The company has notably strong pollution prevention programs including both emissions reductions and toxic-use reduction programs.
- Recycling (ENV-str-C):** The company either is a substantial user of recycled materials as raw materials in its manufacturing processes, or a major factor in the recycling industry.
- Clean Energy (ENV-str-D):** The company has taken significant measures to reduce its impact on climate change and air pollution through use of renewable energy and clean fuels or through energy efficiency. The company has demonstrated a commitment to promoting climate-friendly policies and practices outside its own operations. KLD renamed the Alternative Fuels strength as Clean Energy Strength.
- Management Systems (ENV-str-G):** The company has demonstrated a superior commitment to management systems through ISO 14001 certification and other voluntary programs. This strength was first awarded in 2006.
- Other Strength (ENV-str-X):** The company has demonstrated a superior commitment to management systems, voluntary programs, or other environmentally proactive activities.

CONCERNS

Hazardous Waste (ENV-con-A): The company's liabilities for hazardous waste sites exceed \$50 million, or the company has recently paid substantial fines or civil penalties for waste management violations.

Regulatory Problems (ENV-con-B): The company has recently paid substantial fines or civil penalties for violations of air, water, or other environmental regulations, or it has a pattern of regulatory controversies under the Clean Air Act, Clean Water Act or other major environmental regulations.

Ozone Depleting Chemicals (ENV-con-C): The company is among the top manufacturers of ozone depleting chemicals such as HCFCs, methyl chloroform, methylene chloride, or bromines.

Substantial Emissions (ENV-con-D): The company's legal emissions of toxic chemicals (as defined by and reported to the EPA) from individual plants into the air and water are among the highest of the companies followed by KLD.

Agricultural Chemicals (ENV-con-E): The company is a substantial producer of agricultural chemicals, i.e., pesticides or chemical fertilizers.

Climate Change (ENV-con-F): The company derives substantial revenues from the sale of coal or oil and its derivative fuel products, or the company derives substantial revenues indirectly from the combustion of coal or oil and its derivative fuel products. Such companies include electric utilities, transportation companies with fleets of vehicles, auto and truck manufacturers, and other transportation equipment companies. In 1999, KLD added the Climate Change Concern.

Other Concern (ENV-con-X): The company has been involved in an environmental controversy that is not covered by other KLD ratings. materials in its manufacturing processes, or a major factor in the recycling industry.

KLD STATS encodes the information for each of these items in a binary format. In this dataset, if an item is scored as a '1', then the organization met the criteria for that item (whether it is a positive or negative item). If an item is scored as a '0', then that organization did not meet KLD's criteria for that item. Basically a '1' for an item in a strengths sub-group would indicate a positive attribute, whereas a '1' for an item in a concerns sub-group would indicate a negative attribute.

Two of the items utilized in the KLD Environmental Concerns dataset are set to have a value of '1' if an organization belongs to a particular industry ("Agricultural Chemicals" and "Climate Change"). In order to eliminate any tautological relationships, these are excluded from

the calculation of its environmental performance score since industry affiliation is a moderating variable.

For this research, I focus on three performance measures: the number of strengths (between 0 and 6), the number of concerns (between 0 and 5), and the number of strengths minus the number of concerns (the “net” environmental performance score is consequently between -5 and 6) (Fisher-Vanden & Thorburn, 2008). For the net environmental performance measure, the values are rescaled to scores between 0 and 11 with representative meanings of underperforming (causing environmental harm), outperforming (improving the environment), and neutral environmental performance.

Table 2: Classifications of Net Environmental Performance

Environmental Performance Score:	0 – 4	5	6 – 11
Classification:	Underperforming (Causing environmental harm)	Neutral (Nominal environmental impact)	Outperforming (Improving the environment)

3.2.4 Financial Performance

3.2.4.1 Tobin’s q

In prior literature, innumerable measures of financial performance of organizations have been utilized. These measures have included stock prices, return on assets (ROA), return on equity (ROE), market share, etc (Capon, Farley, & Hoenig, 1990). When financial data was first being used to explore issues related to organizational structure, Lindenberg & Ross (1981) theorized that comparing accounting data and financial valuation data offered a better opportunity to examine the financial performance of an organization. The primary premise of

their calculation was to compare the difference between the market value of the organization and the replacement costs of its assets as a measure of monopoly rents. Their subsequent formula was based on the insights of Tobin who introduced a variable ' q ' (equilibrium) as the ratio of market value to replacement cost (Brainard & Tobin, 1968; Tobin & Brainard, 1977). In essence, if the market value of the firm's assets was equal to the replacement cost of the firm's assets, resulting in a ratio of 1, then the firm was achieving normal levels of performance. If Tobin's q was above 1, then it was achieving above normal performance because the market value of the firm's assets exceeded that of its replacement cost. Conversely, if the market value of the firm's asset was less than its replacement cost, then Tobin's q was below 1, indicating below normal performance and suboptimal management of the firm's assets (Lindenberg & Ross, 1981).

For this analysis, I rely on a simplified measure of Tobin's q normalized across the industry of the organization. Tobin's q reflects the expected future gains and has been utilized in other studies where financial performance is the dependent variable. It shows what cash flows the market believes an organization will supply per dollar invested in assets. If future cash flows are expected to be greater, then it should be reflected in an increase in Tobin's q (King & Lenox, 2001). The simplified version of Tobin's q is calculated by taking the sum of the company's equity value, the book value of its long-term debt, and its net current liabilities and dividing it by its total assets. Prior research has found that there is no qualitative difference between Tobin's q and the simplified version of Tobin's q (King & Lenox, 2002; Chung & Pruitt, 1994) and that Tobin's q is the best available market-based measure (Huselid, 1995).

3.2.5 Industry Concentration

Industry Concentration is categorized based upon the top-level groups in the United States government's North American Industry Classification System (NAICS). The NAICS is

the “standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy” (US Census Bureau, 2008, p. 1). It was developed with guidance from the US Government’s Office of Management and Budget and was adopted in 1997 to replace the Standard Industrial Classification (SIC) system that had been in use since 1938 for classification of companies into specific industries (Pearce, 1957). The NAICS codes are organized as a 2-6 digit hierarchical classification system with five different levels of detail. Each digit after the first two in the code is part of a series of progressively more discrete categories. Consequently, the more digits there are in the code, the greater the detail regarding the industry being represented by the code. The first two digits represent the “economic sector”, the 3rd digit represents a subsector, the 4th digit represents the industry group within that subsector, the 5th digit represents the NAICS industry, and the 6th digit represents the national code since three countries are participating in this structure (US Census Bureau, 2007).

For this research, I utilize the top-level categories for industry represented by the first two digits of the NAICS codes. The 20 NAICS Top Level Codes are:

- 11: Agriculture, Forestry, Fishing and Hunting
- 21: Mining, Quarrying, and Oil and Gas Extraction
- 22: Utilities
- 23: Construction
- 31-33: Manufacturing
- 42: Wholesale Trade
- 44-45: Retail Trade
- 48-49: Transportation and Warehousing

- 51: Information
- 52: Finance and Insurance
- 53: Real Estate and Rental and Leasing
- 54: Professional, Scientific, and Technical Services
- 55: Management of Companies and Enterprises
- 56: Administrative and Support and Waste Management and Remediation Services
- 61: Educational Services
- 62: Health Care and Social Assistance
- 71: Arts, Entertainment, and Recreation
- 72: Accommodation and Food Services
- 81: Other Services (except Public Administration)
- 92: Public Administration

3.2.6 Control Variables

To control for effects of other influencing factors, prior research has primarily looked at seven causal variables wherein financial performance was a dependent variable. Control variables are those that prior research has identified as having an influence on the dependent variable. They are entered into the analysis in order to ensure that the effects being measured are explained better through the addition of the new variables being considered. Prior research has identified industry concentration, firm growth rate, firm size, capital intensity, research and development intensity, advertising intensity, and market share (Russo & Fouts, 1997; Capon, Farley, & Hoenig, 1990) as control variables where financial performance was the outcome. For this research, industry concentration is a separate moderating variable. The lack of consistent data for advertising intensity caused me to drop this as a control variable. Additionally, because

market share and the measurement for financial performance utilize similar source data, market share was dropped to eliminate tautological concerns.

This research operationalized these constructs in the following manner: growth rate is the organization's annual change in sales expressed as a percentage (Russo & Fouts, 1997); number of employees is used as a proxy for firm size (Bharadwaj, 2000); and capital intensity is calculated by dividing the total assets of the organization by its sales volume (Hurdle, 1974).

3.3 Data Analyses

For the analyses of the relationships between the different variables in the theoretical model and the controls, multiple analysis techniques were utilized. For all of these analyses, SPSS version 15 was utilized unless otherwise specified.

3.3.1 *Mediation effect of Hiring Practices*

In the theoretical model (Figure 10 on page 22) the hiring practices (a continuous variable) mediates the relationship between the environmental posturing variable and the environmental performance variable. Mediation occurs when the independent variable (environmental posturing) causes the mediator (hiring practices) which then causes the outcome (environmental performance) (Holmbeck, 1997).

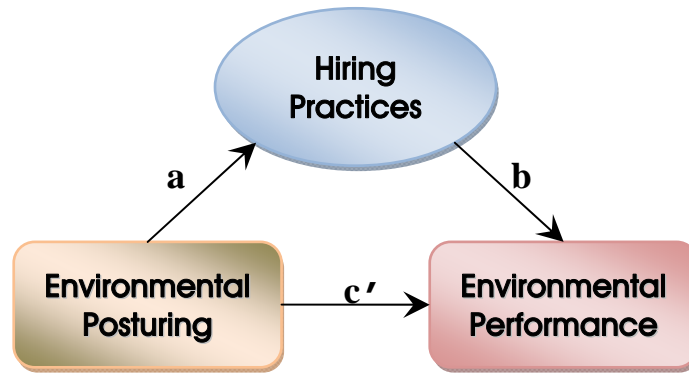


Figure 12: Mediation Effect of Hiring Practices on Environmental Posturing and Environmental Performance

In this simple mediation model, it has been theorized that the total effect of environmental posturing on environmental performance through the hiring practices of the organization is the sum of the direct and indirect effects, where $c = c' + ab$ (Preacher & Hayes, 2008). To test the proposed mediating effect on the relationship between environmental posturing and environmental performance, I utilized the four-step technique established by Baron & Kenny (1986):

1. Show that environmental posturing is correlated with environmental performance using environmental performance as the criterion in a regression equation and environmental posturing as a predictor (estimate and test the path 'c'). This step should show that there is an effect that may be mediated.

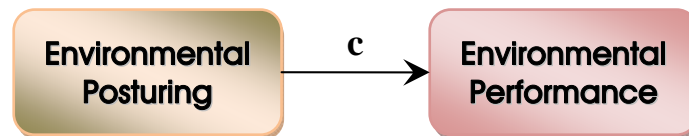


Figure 13: Direct Relationship Between Independent and Dependent Variables

2. Show that environmental performance is correlated with hiring practices using hiring practices as the criterion in the regression equation and environmental performance as

- a predictor (estimate and test the path 'a'). This step essentially treats the mediator as if it were a dependent variable.
3. Show that hiring practices affects environmental performance using environmental performance as the criterion in a regression equation and environmental posturing and hiring practices as predictors (estimate and test the path 'b'). In this step, it is not sufficient just to correlate hiring practices with environmental performance; hiring practices and environmental performance may be correlated because they are both caused by environmental posturing. Thus, the independent variable must be controlled in establishing the effect of the mediator on the dependent variable.
 4. To establish that hiring practices completely mediates the environmental posturing-environmental performance relationship, the effect of environmental posturing on environmental performance controlling for hiring practices (path c') should be zero. This basically estimates the effects from both steps 3 and 4 within in the same equation (Kenny, 2009).

The four conditions were tested with three multiple regression analyses (Holmbeck, 1997). There is no need for hierarchical or stepwise regressions in these analyses. If these conditions all hold in the directions that are predicted, then the effect of environmental posturing on environmental performance will be less in the fourth step than it was in the third step (Kenny, 2009). Full mediation occurs when environmental posturing has no effect when hiring practices are controlled for and partial mediation is indicated when steps one through three are met but the fourth is not (Baron & Kenny, 1986; Kenny, 2009). However, it has been suggested that differentiating between partial and complete mediation and applying statistical significance to this differentiation is unnecessary (Preacher & Hayes, 2008).

3.3.2 Moderating effect of Industry Affiliation

According to Baron & Kenny (1986, p. 1174): “In general terms, a moderator is a qualitative (e.g., sex, race, class) or quantitative ... variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable.” Moderation, consequently, implies that the relationship between two variables changes as a function of the value of the moderator (Baron & Kenny, 1986; Holmbeck, 1997). The analysis technique must measure and test the effect that the moderator has on the relationship between the independent and the dependent variable.

In the theoretical model (Figure 10 on page 46) industry concentration (a categorical variable) moderates the relationship between the environmental posturing variable and the environmental performance variable. It also moderates the relationship between the environmental performance variable and the financial performance variable. Because the industry concentration is a categorical variable and environmental posturing, environmental performance, and financial performance are all continuous variables, to measure the moderator effect I correlated the independent and dependent variables with each value of the industry concentration and tested the difference (Baron & Kenny, 1986) using multiple regression (Holmbeck, 1997).

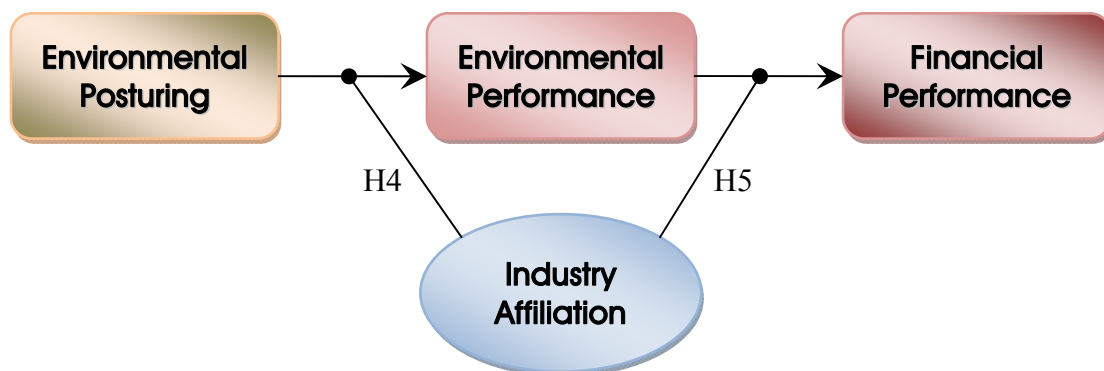


Figure 14: Moderation Relationships to Be Tested

CHAPTER 4

DATA AND ANALYSIS

4.1 Introduction

This chapter discusses the requisite steps for testing the hypotheses set forth in Chapter 2. Specifically, I describe the sample used in the current research, the content analysis procedures, the operationalization of the constructs, and the results of the statistical tests using SPSS.

4.2 Sample

The sample for this research includes publicly-traded organizations that appeared in the KLD STATS datasets for 2008 and had posted ten or more computing job ads in 2007 and 2008. As a part of the job ad collection process, company names are extracted from the job ads and stored as a separate field in the database. Interestingly, 50,792 unique variations of company names were found in 924,844 of the job ads (about 54% of the job ads collected). Because many of these unique names were composed of different spellings or variations of the same company name, I went through a systematic process of matching these company names to the correct entities listed in the 2008 KLD dataset (See Table 3: Sample Company Names from Job Ads).

Table 3: Sample Company Names from Job Ads

Company Name extracted from Jobs Database	Company Name from KLD STATS
Adobe	Adobe Systems Incorporated
Adobe ()	Adobe Systems Incorporated
Adobe Systems	Adobe Systems Incorporated
Adobe Systems ()	Adobe Systems Incorporated
Adobe Systems Incorporated	Adobe Systems Incorporated
Adobe United States	Adobe Systems Incorporated
Adobe United States-California, San Jose	Adobe Systems Incorporated
Adobe United States-Washington, Seattle	Adobe Systems Incorporated

This resulted in matches of 1,883 company names from the job ads to the KLD dataset. Of this set of companies, 1,012 had placed 10 or more job ads.

Environmental Posturing was operationalized using content analysis of the 2007 Annual Report Texts (ARTs). Of the 1,012 companies, 947 had Annual Reports which could be downloaded through Mergent Online. Of these companies, 853 had the necessary financial performance measures available through Research Insight. Thus, the study was based upon the 853 organizations which met each of the criteria noted above (in the KLD STATS data set and which had placed 10 or more job ads which had been captured) and did not have any other missing data required for the subsequent analyses. The industry affiliations represented by these organizations are based upon their primary 2-digit NAICS codes as shown in Table 12 on page 92.

4.3 Variable Measurements

This section describes the data collection process and the calculations needed to operationalize the variables in ways that facilitate the testing of the hypotheses set forth in the

current research. In some instances, I discovered occurrences when alternative ways of operationalizing certain variables in the model were appropriate given the nature of the test and the nature of the organizations in the sample. These instances and their rationale are described in detail below.

4.3.1 Content Analysis

As was previously stated in Chapter 3, content analysis was utilized to measure the Environmental Posturing and the Hiring Practices constructs. The data being analyzed includes the Annual Report Texts (ARTs) from the year 2007 and the computing job ads collected between April 2007 (the first date from which data is available) through 2008. A computer program developed by the author and written in PHP was used to perform the data collection and content analysis. A relational database management system (MySQL) was used as the data repository for all of the source and extracted information. This section describes the sequence of content analysis procedures that were followed, including validation testing.

4.3.1.1 Keyword Selection

An initial set of 127 eco-environmentally-oriented terms was created by two doctoral students and a faculty member based upon their extant knowledge in the domain. This list was augmented by academic and practitioner literature (Hart, 1995; Reid & Toffel, 2009; Symantec Corporation, 2009; Banerjee, 2002; Aragon-Correa, Hurtado-Torres, Sharma, & Garcia-Morales, 2008), textbooks (Callan & Thomas, 2010; Willard, 2002; Lawrence & Weber, 2008), and the Internet which added another 154 terms.

4.3.1.1.1 Data Dictionary

A data dictionary (complete list of words occurring in the target text) was created by the custom software from the Annual Report Texts (ARTs) along with their frequencies to further complete the environmental keyword list (Michalisin, 1999). The following steps were taken to extract the environmentally-oriented terms from the ARTs to build the data dictionary.

1. ARTs downloaded in PDF format and converted to text.
2. ARTs stored in MySQL database along with the company which submitted the annual report, the date it was submitted, the number of words found, the number of characters found, and the number of sentences found.
3. ARTs converted to lower case.
4. All sequences of alphabetic characters beginning and ending along a word boundary (whitespace, certain punctuation, beginning of line, end of line) were extracted as ‘words’ along with their frequency and distribution (number of files in which they appeared). Hyphenated words were kept together. This resulted in 382,672 unique ‘words’ which were extracted.

Table 4: Sample of Data Dictionary

Word_id	Term	Length	Occurrences	Files
6773	abandon	7	831	458
8951	abandoned	9	2797	962
121620	abandonedfacility	17	11	5
121598	abandoned-facility	18	24	5
169185	abandonfirstenergy	18	2	2
17964	abandoning	10	126	83
8952	abandonment	11	2235	719
164464	abandonmentandrehabilitationcosts	33	6	3

5. 20,137 long ‘words’ (50 or more characters) and short ‘words’ (2 or fewer characters) were eliminated (because of the PDF conversion process, some garbage text was produced which resulted in the long ‘words’).
6. Based upon the previous environmental term keyword list, certain environmentally-oriented common word components were extracted (bio, carbon, clean, climat, conserve, eco, efficien, electr, energy, env, forest, fuel, geo, green, hybrid, hydro, natur, pollut, power, recycle, reduc, reus, social, solar, sustain, therm, toxic, wast).
7. The data dictionary was then scanned for occurrences of these word components resulting in 11,587 words to be manually examined.
8. Unfamiliar terms were looked up in Google & the Wikipedia to determine if they were environmentally-oriented and in what way.

This process resulted in the addition of 220 words and phrases being added to the environmental terms list, resulting in a total of 501 pre-validated terms. A complete list of terms, their validation status, and the frequencies of validated terms can be found in Appendix C. Inclusion of each of these words and phrases in the subsequent analyses was determined through a rigorous, systematic validation process commonly known as Keyword In Context (KWIC) analysis (Krippendorff, 2004; Michalisin, 1999).

4.3.1.2 Content Analysis Preparation

The environmental terms were then converted to their root word forms (where applicable). Certain terms were not convertible to their root word formats (e.g., acronyms) or lose their specific environmentally-oriented meaning when converted to their root word form (e.g., converting ‘environmentally’ to ‘environment’). Occurrences of all variations of the terms

(see section 3.2.1.2.1) from within the root word forms of the target texts or the original texts were recorded and associated to the ARTs from which they were extracted.

4.3.1.3 Keywords in Context (KWIC) Analysis

After the initial keyword selection and term extraction from the target texts, the utilization of these terms was validated utilizing the Keywords in Context (KWIC) process. In this process, the terms and the surrounding textual unit were extracted from the text in which they occurred. For this research, the sentence was the unit of analysis for validating whether key word or key word combinations were environmentally oriented in a manner consistent with the logic embodied in the NRBV. These extracted contextual usages of the terms are then validated using subject matter experts with specific rules which are previously and explicitly defined. The rules should be defined with enough specificity that the results of the analysis could be replicable by reviewers with comparable backgrounds (Krippendorff, 2004).

4.3.1.3.1 Annual Reports

For validating the terms in the Annual Report Texts (ART), the primary concern was determining from the context whether the term was making a statement about an environmental issue relative to the organization. Because some terms may have been stated in a positive or negative context, the reviewers were also asked to specify if the terms were used in a negative way. Additionally, if other environmentally-oriented terms were found in proximity to the terms being validated and were found to be highly valid, they were added to subsequent KWIC analyses, which helped to ensure the completeness of key words and key word combinations. Consequently, the rules for analyzing the KWIC text in the ARTs were:

1. If the context of the term does not seem to indicate that this term is used to describe an ecologically-oriented environmental process, strategy, or activity of the organization, select 'No' from the 'Valid' column.
2. Otherwise, if the term appears to be used in a negative environmental context (e.g., the organization is being penalized for a bad environmental activity or they are being forced to comply with a new environmental regulation involuntarily), select 'Negative Environmental Statement' from the Negative column.
3. If you see other environmentally-oriented terms or phrases which are not already included in the keywords list, copy and paste the new term into the New Term column for validation testing.

For key word and key word combinations comprising the KWIC list, ten sentences containing the key word or key word combinations were randomly selected by the software. When fewer than ten occurrences of a key word or key word combination existed in the ARTs, then all of the sentences containing the key word or key word combinations were selected. The sentences were put into a CSV (Comma Separated Values) file along with the original text of the environmental term, the number of occurrences of the term, and columns for the reviewer to select whether the term was valid, negative, and whether to include newly identified key words and key word combinations. The CSV file was then imported into Excel where dropdown menus for the valid and negative columns were created for each record. 103 keywords were not found in any of the ARTs which resulted in their automatic elimination from further analysis.

Table 5: Sample of KWIC Analysis Validation Form

Number Found	New Terms	Negative	Environmental Term	Valid	Sentence
25	low carbon		environmental leadership	Yes	As the nation's largest nuclear generator, Exelon is well positioned to provide environmental leadership in a low-carbon energy future.
25			environmental leadership	Yes	Our Health, Safety and Environment group has several programs in place to maintain environmental leadership and to prevent the occurrence of environmental contamination.
25			environmental leadership	Yes	Our environmental leadership strategy is designed to meet customer and policy maker expectations while creating shareholder value.
25			environmental leadership	Yes	Through our environmental leadership strategy, we are well-positioned to meet the challenges of potential future climate change regulation, comply with the renewable energy mandates and take advantage of the clean energy incentives created by policy makers in the states in which we operate.
25			environmental leadership	Yes	In 2007, a partnership involving Chrysler LLC and UpstreamSM received the Environmental Leadership Award (ELA), Chrysler's highest level of recognition for environmental achievement and excellence among all its employees and vendors.

For the first validation round, 3574 sample sentence records were extracted and initial validation was performed by a Ph. D. student. If more than two sentences with the same term to be validated (where ten sentences were found) were marked as invalid given the above rules, the term was eliminated. Likewise, if any invalid sentence was found when there were less than ten sentences for that term, then the term was eliminated. Additionally, if there were a mixture of positive and negative uses of the term with less than 80% consistency (e.g., the term was used positively 7 times and negatively 3 times), the term was also eliminated. This resulted in a

validated term list where the terms were used in least an 80% consistent environmental context. The initial KWIC analysis of the ART terms found 32 new terms and eliminated 124 terms.

After the addition of the new terms and removal of the invalid terms (leaving 306 keywords), a new random sample of five sentences per term was created (resulting in 1094 validation sentences). The new KWIC sample was independently evaluated by a Ph. D. student and a faculty member with the same rules as the previous sample. A third Ph. D. student was used as a tie-breaker when disagreement on the evaluation of any sentence occurred. As a result of this round of analysis, seven more terms were eliminated and no new terms were added. This left 299 validated terms to be used in the subsequent analysis of the ARTs.

4.3.1.3.2 Job Ads

A similar process of validating the environmental key word and key word combinations was performed using the textual data in the job ads. However, it is not uncommon for job ads to make statements about an organization (e.g., its philosophy or benefits) before discussing the position they seek to fill. As such, I also needed to determine whether the environmental term related to the firm or the IT position in the ad, as noted in the following rules below:

1. If the context of the term does not seem to indicate that this term is used to describe an ecologically-oriented environmental process, strategy, or activity to be performed, managed, or otherwise involved with the job being advertised, select 'No' from the Valid column.
2. Otherwise, if the term appears to be used in a negative environmental context, select 'Negative Environmental Statement' from the Negative column.

3. If you see other environmentally-oriented terms or phrases which are not already included in the keywords list, copy and paste the new term into the New Term column for inclusion into the KWIC list for validation testing.

An additional feature was incorporated into the Excel spreadsheet for validating key words and key word combinations in job ads: A field which provided a link to the full text of the job ad was added. This was provided because many of the terms in the job ads could be displayed with nominal context within the surrounding sentence (e.g., a bulleted list of responsibilities for the applicant) and it enhanced the validity testing of the key word or key word combinations in the job ad.

After the initial first-round analysis of ten random sentences containing the keywords within the job ads, 404 keywords were eliminated because they did not occur within the job ads and 59 were eliminated because they did not meet the specified criteria. In most cases when the keywords did not meet the specified criteria, the environmental term was being used within the job ad to describe the company or its benefits and was not specifically related to the function of the job. This left 70 keywords for the second round of analysis. None of the keywords were utilized within a negative environmental context.

The second round of validation also used five randomly selected sentences which were independently evaluated by a Ph. D. student and a faculty member with a second Ph. D. student acting as a tie-breaker. This round of validation resulted in the additional removal of two keywords and no additional new keywords. Consequently, 68 validated keywords were utilized for the subsequent analysis of the job ads.

4.3.1.4 Calculating Values for Content Analyzed Constructs

D'Aveni & MacMillan (1990) stated that when performing Content Analysis, the weighting of the scores derived should ensure that the scores are relative to the other components of the text being analyzed. One method of determining the weighted value is to compare the frequency that a topic is mentioned relative to other attributes of the text. All of the methods used for calculating the Content Analysis-derived values incorporated this basic precept.

4.3.1.4.1 Annual Reports

Because the Annual Report Texts contained positive as well as negative statements regarding environmental issues, one method of calculating the Environmental Posturing score was to subtract the occurrences of negative statements from the occurrences of positive statements. This was consistent with the method of calculating the Environmental Performance score which subtracted the KLD Environmental Concerns from the Environmental Strengths. This method of calculating the Environmental Posturing score resulted in some companies having negative values (with a range of values between -266 and 746). However, because the job ads only contained environmental statements of a positive nature, an alternative method of calculating the Environmental Posturing score was to calculate the positive environmental statements as a ratio to the size of the ART (D'Aveni & MacMillan, 1990).

4.3.1.4.2 Job Ads

For the job ads, each ad was binary coded by the software as either having an environmental component or not. For each organization included in the study, the Hiring Practices variable was calculated as the percentage of all of the job ads in the dataset that had an environmental component (e.g., if Company A had placed 25 job ads and 5 of them had an environmental component related to the job, then its Hiring Practices value would be 0.20). As

was previously stated, none of the job ads had any negative environmental statements so that did not have to be considered in calculating the value for the Hiring Practices.

4.3.2 Environmental Performance

Because the job ads only contained positive statements regarding environmental activities, two measures of Environmental Performance (Environmental Strengths and Overall Environmental scores) were evaluated. Equally important, recent literature has indicated that combining the environmental strengths and concerns (weaknesses) data from within the KLD STATS dataset may not be statistically valid because the two groups of data (environmental strengths and concerns) lack convergent validity (Mattingly & Berman, 2006; Chatterji, Levine, & Toffel, 2007; Chatterji, Levine, & Toffel, 2009) and recommend using only the KLD environmental strengths metrics in computing Environmental Performance. For these reasons, I added the KLD STATS attributes for Environmental Strengths in deriving each firm's Environmental Performance in the current research. The descriptive statistics for Environmental Posturing, Hiring Practices, and Environmental Performance and summarized in Table 6, below.

Table 6: Descriptive Statistics for Environmental Posturing, Hiring Practices, and Environmental Performance

	Range	Minimum	Maximum	Mean		Std. Deviation
				Statistic	Std. Error	
Environmental Posturing Scores for 2007 with Negative Keywords	1012	-266	746	6.78	1.448	42.295
Environmental Posturing Scores for 2007 As a Ratio to Size of ARTs	.17943	.000	.17943	.00425	.00045	.01316
Environmental Hiring Practices	1.000	.000	1.000	.03662	.00429	.12523
Overall Environmental Performance Score for 2008	8	1	9	5.04	.026	.749
Environmental Strengths Score for 2008	4	0	4	.30	.025	.717
Valid N (listwise)	853					

4.3.3 Financial Performance

Financial Performance data for 2009 based upon market performance criteria were likely to be abnormal because of the erratic economy. Consequently, market-based performance measures are unreliable for that period of time. Additionally, because the large sample included in this study covered a wide variety organizational types, asset-based measures were likewise problematic. For example, service organizations have a significantly different asset structure than non-service organizations as demonstrated in Table 7. For this analysis, classification of service organizations was based upon Cha, et al.'s (2009) classification which considered the first eight NAICS sectors as non-service organizations and the remaining sectors as service organizations.

Table 7: T-Tests of Differences in Mean for Service/Non-Service Organizations' Assets

Group Statistics										
Service Industry		N	Mean	Std. Deviation	Std. Error Mean					
Total Assets 2009	0	400	153100.17	791533.342	39576.667					
	1	456	50740.26	169322.533	7929.254					
Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Total Asset 2009	Equal variances assumed	25.44	.000	-2.69	853	.007	-102360	38019	-176981	-27739
	Equal variances not assumed			-2.54	431	.012	-102360	40363	-181693	-23027

T-Tests on the differences in means (based on total assets) between service and non-service groups is statistically different at $p < .05$ (Cho & Patten, 2007), wherein the mean assets of one group is three times larger than the mean assets of the other group. Consequently, asset-

based financial performance measurements across this sample will likely result in unreliable results because different types of companies have significantly different asset structures. As such, Tobin's q (which is an asset-based computation) is a poor proxy for measuring financial performance across the diverse sample used in this study.

Instead, I used principle component analysis (PCA) to triangulate across three firm performance measures (Brown & Perry, 1995) commonly cited in the environmental management literature in creating one composite performance score for each sample firm. The three firm performance-based measures were (1) Earnings per Share (EPS) from Operations, a profit-based performance measure that controls for the size of the organization based upon the number of outstanding shares and excludes extraordinary expenses that can distort earnings (Blackburn, Doran, & Shrader, 1994; Greening, 1995; Parket & Eilbirt, 1975; Pava & Krausz, 1995; Simerly, 1995); (2) Return on Sales (ROS), a frequently used efficiency-based measure (Griffin & Mahon, 1997; Heinze, 1976; Parket & Eilbirt, 1975; Spencer & Taylor, 1987; Waddock & Graves, 1997); and (3) Gross Profit which is an effectiveness-based measure of firm performance (Chen & Metcalf, 1980; Levy & Shatto, 1980; Parket & Eilbirt, 1975).

A fundamental goal of PCA for this type of analysis is to determine if these financial attributes are driven by a single underlying factor (Field, 2005). To determine the number of factors using PCA, valid factors are those whose Eigenvalues are greater than 1.0 (Kaiser, 1960). Table 8 shows the degree of statistical significance between the variables used in the PCA (bi-variate correlations). Table 9 shows that only one principle component had an Eigenvalue greater than 1.0 and that all three variables load onto a single principle component that explains approximately 50 percent of the cumulative variance in the PCA solution.

Table 8: Correlation Matrix for Financial Performance PCA

	Mean	Std. Deviation	ROS 2009	EPS From Ops 2009	Gross Profit 2009
ROS 2009	-11.31	59.27	1		
EPS From Ops 2009	.81	2.81	.394**	1	
Gross Profit 2009	2753.02	8367.39	.089**	.220**	1

** Significant at p<.01

Table 9: Variance Explained for Financial Performance PCA

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.492	49.750	49.750	1.492	49.750	49.750
2	.925	30.849	80.599			
3	.582	19.401	100.000			

To test whether or not PCA is an appropriate form of analysis for the data, Kaiser (1974) recommends a KMO score greater than 0.5. This criterion is met with a score of 0.527 (see Table 10). Moreover, Bartlett’s Test of Sphericity is highly significant at p<.001, providing additional evidence that there is a significant relationship between these variables (Field, 2005). Collectively, the analysis demonstrates that PCA was an appropriate and effective statistical technique for reducing three performance variables into one composite score for further statistical analysis.

Table 10: KMO and Bartlett's Test for Financial Performance PCA

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.527
Bartlett's Test of Sphericity	Approx. Chi-Square	186.185
	df	3
	Sig.	.000

Table 11: Component Score Coefficient Matrix for Financial Performance PCA

	Component 1
ROS 2009	.502
EPS From Ops 2009	.552
Gross Profit 2009	.337

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

4.3.4 Industries

Based upon the 2-digit NAICS codes for primary industry affiliation of the organizations in the sample being studied, Table 12 shows the representative industries involved in this study.

Table 12: Industry Frequencies

NAICS	Name	Frequency	Percent
21	Mining	11	1.41
22	Utilities	33	3.87
23	Construction	6	0.70
31, 32, 33	Manufacturing	312	36.58
42	Wholesale Trade	21	2.46
44, 45	Retail Trade	55	6.45
48, 49	Transportation and Warehousing	16	1.88
51	Information	132	15.47
52	Finance and Insurance	113	13.25
53	Real Estate and Rental and Leasing	15	1.76
54	Professional, Scientific, and Technical Services	62	7.27
56	Administrative and Support and Waste Management and Remediation Services	25	2.93
61	Educational Services	9	1.06
62	Health Care and Social Assistance	20	2.34
71	Arts, Entertainment, and Recreation	7	0.82
72	Accommodation and Food Services	12	1.41
81	Other Services (except Public Administration)	4	0.47
	Total	853	100.00

4.3.5 Controls

The control variables utilized for this study include Growth Rate, Size, and Capital Intensity. Growth Rate was measured as the annual change in sales expressed as a percentage. To calculate this value, total sales from 2009 were subtracted from the organization's total sales from 2008 and then divided by its 2008 sales. Hence, for organizations with decreases in sales between 2008 and 2009, this resulted in a negative growth rate. Size was the number of employees of the organization as reported in its 2009 annual report. Capital Intensity was the organization's total assets divided by its total sales as stated in its latest 2009 quarterly reports.

All of the data for calculating the values of the controls, the financial performance measures, and the industry affiliations were collected through Research Insight.

4.4 Results

This section discusses the results of the analyses utilized in the study with both the proposed methods for operationalizing the constructs as well as the revised methods, based on the rationale previously described.

Tests of the assumptions for utilizing regression analyses were performed on each of the variables as well as the relationships among the variables. Although there were non-normal distributions of the data for some of the variables (primarily resulting from large numbers of valid measurements of zero (e.g., Environmental Strengths, Hiring Practices)) and attempts to normalize the data were unsuccessful, violations of the normality assumption “will have a negligible effect at large sample sizes” (Hair, Black, Babin, Anderson, & Tatham, 2006, p. 80). According to Hair, et al. (2006), a large sample would be one that included 200 or more observations. As such, with 853 observations, less than normally distributed data among some of the variables is thus not problematic in utilizing regression analysis to perform tests of the models and hypotheses. In fact, current research informs us that analytical techniques of the type used in the current research specifically state that normality assumptions need not be established for the tests to return valid results (Preacher & Hayes, 2008) and thus normalization of the data is not recommended when large samples are employed, as is the case in the current study (Goh & Yap, 2009). Statistical and graphical analyses performed in this research, as detailed later in this section, show that the other assumptions underlying the requisite statistical models needed to perform the empirical tests have not been violated.

The following sections are organized as follows. First, I show the correlations between the different variables. Next, I describe the statistical techniques used to test the relationships between Environmental Posturing, Environmental Performance, and Environmental Hiring Practices (Hypotheses 1 and 2) which are shown in Figure 7. Then, I present the empirical test results of the relationship between Environmental Performance and Financial Performance (Hypothesis 3), as well as a test of the model shown in Figure 8. The last section describes the empirical tests of the potential moderation of Industry Affiliation on the relationship between Environmental Posturing and Environmental Performance and the relationship between Environmental Performance and Financial Performance which is illustrated in Figure 9.

4.4.1 Correlations

Table 13 shows the correlations between all of the variables (with the proposed methods of calculating the values along with revisions to the calculation of the variables). The correlations lend support for the hypotheses (though not definitive support), show interesting significant results among variables, show interesting findings that certain relationships are not significant, and provide evidence of a lack of multicollinearity.

In the correlation table, interactions between variables which are utilized for the subsequent analyses have been underlined.

Table 13: Correlation Matrix

Variable	Environmental Posturing with Negative Keywords	Environmental Posturing as a Ratio	Environmental Hiring Practices	Overall Environmental Performance	Environmental Strengths	Tobin's q	Triangulated Financial Performance	Company Size	Growth Rate
2007 Environmental Posturing with Negative Keywords	1								
2007 Environmental Posturing as a Ratio	0.713**	1							
Environmental Hiring Practices	0.245**	<u>0.305**</u>	1						
Overall Environmental Performance for 2008	0.138**	0.115**	0.065	1					
Environmental Strengths for 2008	0.214**	<u>0.376**</u>	<u>0.225**</u>	0.522**	1				
2009 Tobin's q	0.053	0.033	-0.007	0.079*	-0.002	1			
2009 Triangulated Financial Performance	0.068*	0.115**	0.041	-0.002	<u>0.203**</u>	0.174**	1		
Company Size	0.019	0.051	0.000	0.021	0.174**	-0.010	<u>0.316**</u>	1	
2009 Capital Intensity	-0.016	-0.051	-0.061	0.007	-0.067	-0.145**	<u>-0.185**</u>	-0.015	1
2009 Growth Rate	0.084*	-0.029	-0.025	0.080*	-0.118**	0.191**	<u>0.214**</u>	0.014	-0.191**

**Significant at p<0.01

*Significant at p<0.05

4.4.2 Mediating Effect of Hiring Practices

The longstanding test for mediating effects was established by Baron & Kenny (1986) which required a three-step process for determining mediation. Although it is still widely utilized in research today, other methods for testing for mediation have subsequently been developed. Most notable of these later methods are those established by Preacher & Hayes (2008). One of the benefits of the methods proposed by Preacher & Hayes is that certain preconditions for mediation testing are no longer necessary. With the new methods, normality of the data is no longer a prerequisite and statistically-significant positive correlations among each of the variables in the model is also not a necessity. However, for sake of comprehensiveness, both the Baron & Kenny and the Preacher & Hayes methods were used in this study to analyze the hypothesized mediation relationship in the model.

4.4.2.1 Baron & Kenny

According to Baron & Kenny (1986), there are four relational paths which must be tested: the direct path between the independent variable (IV) and the dependent variable (DV) (path c), the path between the mediating variable (MV) and the DV (path b), the path between the IV and the MV (path a), and the indirect path between the IV and the DV through the MV (path c') as illustrated in Figure 15. These paths are tested utilizing a series of three separate linear regression analyses. Mediation exists if the c path diminishes or is rendered insignificant in the presence of the mediator.

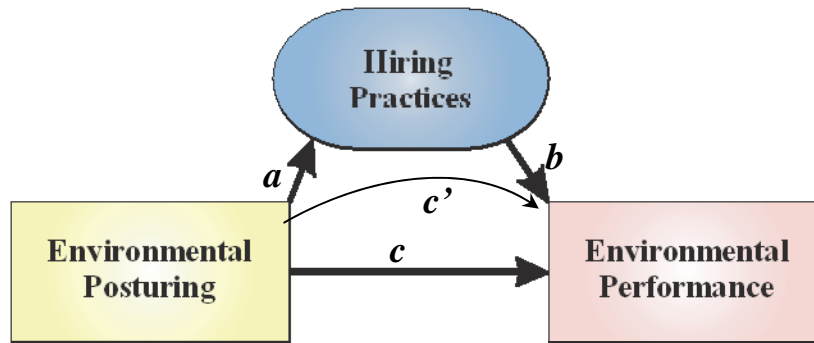


Figure 15: Model of Mediation Relationships

A precondition of testing for mediation is that significant and positive correlations must exist between the IV and the MV, the MV and the DV, and the IV and the DV (Baron & Kenny, 1986). Preacher, Rucker, & Hayes (2007) would later contend that these relationships do not all need to exist for a mediation relationship to be present. However, when utilizing the Baron & Kenny method, these requirements must be met.

As can be seen from Table 14 below, there is no significant relationship between Environmental Hiring Practices (the Mediator) and Overall Environmental Performance (the potential Dependent Variable). However, as explained in section 4.3.1.4, the Environmental Hiring Practices did not include negative (or concerning) statements regarding environmental issues while the Overall Environmental Performance variable is the result positive environmental attributes minus negative environmental attributes. Arguably, a more valid test of the MV and the DV is to compute Environmental Performance using only the strength measures included in the KLD STATS data. This logic is consistent with the recent research (Mattingly & Berman, 2006; Chatterji, Levine, & Toffel, 2007; Chatterji, Levine, & Toffel, 2009) which has shown that a composite of just the KLD strength measures is a better proxy of environmental performance than the net (strengths minus concerns) measure used in previous research. My findings support this logic. As shown in Table 14, the correlation between Environmental Hiring Practices and

Environmental Strengths is positive and highly significant ($p < 0.01$), while the correlation between the Overall Environmental Score and Environmental Hiring Practices is insignificant.

Similarly, if the composite KLD strength measure is a superior proxy of environmental performance, then one could extend the same logic for using an Environmental Posturing Ratio that only includes positive environmental statements. This is consistent with previous validation tests of company ARTs, which found that greater emphasis in the ART on positive activities such as innovation and quality had significant, positive associations with independent measures of such attributes (Michalisin, Karau, & Tangpong, 2004; Michalisin, 1999). In the current research, I anticipate that a significant positive relationship exists between the top management teams' positive environmental posturing and its organization's environmental performance strengths. Indeed, the correlation between the Environmental Posturing Ratio and Environmental Strengths ($r = 0.376$, $p < 0.01$) is stronger than it is to the Overall Environmental Performance ($r = 0.115$, $p < 0.01$) as shown in Table 14. This also lends support for Hypothesis 1.

Table 14: Correlation Table of Mediation Relationships

Variable	Environmental Posturing with Negative Keywords	Environmental Posturing as a Ratio	Environmental Hiring Practices	Overall Environmental Performance
2007 Environmental Posturing with Negative Keywords	1			
2007 Environmental Posturing as a Ratio	0.713**	1		
Environmental Hiring Practices	0.245**	<u>0.305**</u>	1	
Overall Environmental Performance for 2008	0.138**	0.115**	0.065	1
Environmental Strengths for 2008	0.214**	<u>0.376**</u>	<u>0.225**</u>	0.522**

** Significant at $p < 0.01$
* Significant at $p < 0.05$

The significant positive correlations, using the prescribed measurements discussed above for assessing whether the preconditions for testing mediation have been met are highlighted and underlined in Table 14. As shown, significant correlations exist between the IV and the MV ($r=0.305$, $p<0.01$), the MV and the DV ($r=.225$, $p<0.01$), and the IV and the DV ($r=0.376$, $p<0.01$). The next three steps in testing for mediation utilizing Baron & Kenny's (1986) method are to perform three linear regression tests. If any of the tests fail to produce a statistically-significant valid equation, then mediation does not exist.

The first step is to estimate the regression of the mediator on the IV (path *a* in Figure 15). As can be seen in Table 15, the model has a significant R^2 of .093 ($p<0.01$) and the positive, highly significant standardized Beta coefficient of .305 ($p<.01$). Statistical and graphical analyses indicate that the assumptions underlying the regression model have not been violated. Thus, the first part of the mediation test is supported.

Table 15: Regression Statistics for Baron & Kenny Step 1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.305(a)	.093	.092	.119326	.093	87.369	1	851	.000

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.244	1	1.244	87.369	.000
	Residual	12.117	851	.014		
	Total	13.361	852			

Coefficients(b)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.024	.004		5.686	.000	1.000	1.000
	Environmental Posturing	2.904	.311	.305	9.347	.000		

(a) Predictors: (Constant), Environmental Posturing

(b) Dependent Variable: Hiring Practices

The second step in the Baron & Kenny technique is to perform the same test on the relationship between the DV and the IV (path *c* in Figure 15). As can be seen in Table 16, the model is significant ($p < 0.01$) with an R^2 of .141 and highly significant positive standardized Beta coefficient of .376 ($p < 0.01$). Statistical and graphical analyses indicate that the assumptions underlying the regression model have not been violated. Thus, the second step is supported and these results lend additional support for Hypothesis 1.

Table 16: Regression Statistics for Baron & Kenny Step 2

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.376(a)	.141	.140	.665	.141	139.922	1	851	.000

ANOVA(b)						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	61.899	1	61.899	139.922	.000(a)
	Residual	376.467	851	.442		
	Total	438.366	852			

Coefficients(b)								
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.212	.024		8.845	.000		
	Environmental Posturing	20.488	1.732	.376	11.829	.000	1.000	1.000

(a) Predictors: (Constant), Environmental Posturing
 (b) Dependent Variable: Environmental Performance

The third, and final, test for mediation requires regressing the IV and the MV on the DV (path *c'* in Figure 15). As can be seen in Table 17, the model is statistically significant at $p < 0.01$, with an R^2 of 0.155, and a standardized Beta coefficient of .339 for Environmental Posturing which is less than the standardized coefficient of .376 from step 2. Consequently, this model has more explanatory power than the direct relationship between the IV and the DV and the coefficients for the IV are lower than in the direct model. According to Baron & Kenny, this

reduced coefficient in the indirect model indicates a mediating effect of the organization's Hiring Practices on the relationship between Environmental Posturing and Environmental Performance. These results strongly support Hypothesis 2. Statistical and graphical analyses indicate that the assumptions underlying the regression model have not been violated.

Table 17: Regression Statistics for Baron & Kenny Step 3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.393(a)	.155	.153	.660	.155	77.790	2	850	.000

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	67.823	2	33.911	77.790	.000(a)
	Residual	370.543	850	.436		
	Total	438.366	852			

Coefficients(b)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.194	.024		8.041	.000		
	Environmental Posturing	18.457	1.805	.339	10.223	.000	.907	1.103
	Hiring Practices	.699	.190	.122	3.686	.000	.907	1.103

(a) Predictors: (Constant), Environmental Posturing, Hiring Practices

(b) Dependent Variable: Environmental Strengths

4.4.2.2 Preacher & Hayes

The other prevalent and more recent methodology of testing for mediation was developed by Preacher & Hayes (2008). Advantages of this methodology over the Baron & Kenny methodology are that the prerequisites of a correlation between the IV and the DV and a normal sampling distribution are not required (Preacher & Hayes, 2008). Multiple mediators can also easily be assessed utilizing this approach (although only one is necessary for this research project). Additionally, scripts are available in SPSS to test for this relationship in a single step

(Hayes, 2010) which not only simplifies the process, but enables a clearer interpretation of the results.

Utilizing Environmental Posturing as the IV, Environmental Strengths as the DV, and Hiring Practices as the Mediator, the following results were generated:

```

Run MATRIX procedure:
*****
Preacher and Hayes (2008) SPSS Macro for Multiple Mediation
Written by Andrew F. Hayes, The Ohio State University
http://www.comm.ohio-state.edu/ahayes/
*****
Dependent, Independent, and Proposed Mediator Variables:
DV = Env_Stre
IV = ARTScore
MEDS = env_jobs
Sample size
      853
IV to Mediators (a paths)
      Coeff      se      t      p
env_jobs  2.9044   .3107   9.3471  .0000
Direct Effects of Mediators on DV (b paths)
      Coeff      se      t      p
env_jobs  .6992   .1897   3.6863  .0002
Total Effect of IV on DV (c' path)
      Coeff      se      t      p
ARTScore 20.4876   1.7320  11.8288  .0000
Direct Effect of IV on DV (c path)
      Coeff      se      t      p
ARTScore 18.4568   1.8054  10.2229  .0000
Model Summary for DV Model
      R-sq  Adj R-sq      F      df1      df2      p
      .1547  .1527  77.7902  2.0000  850.0000  .0000
*****
NORMAL THEORY TESTS FOR INDIRECT EFFECTS
Indirect Effects of IV on DV through Proposed Mediators (ab paths)
      Effect      se      Z      p
env_jobs  2.0308   .5915   3.4330  .0006
*****
BOOTSTRAP RESULTS FOR INDIRECT EFFECTS
Indirect Effects of IV on DV through Proposed Mediators (ab paths)
      Data      Boot      Bias      SE
env_jobs  2.0308   2.0630   .0322   .9331
Bias Corrected and Accelerated Confidence Intervals
      Lower      Upper
env_jobs  .7109   4.4812
Bias Corrected Confidence Intervals
      Lower      Upper
env_jobs  .7417   4.6271
Percentile Confidence Intervals
      Lower      Upper
env_jobs  .6256   4.2493
*****
Level of Confidence for Confidence Intervals:
      95
Number of Bootstrap Resamples:
      5000
----- END MATRIX -----

```

Figure 16: Results of Preacher & Hayes Mediation Analysis

These results are consistent with the results produced using Baron and Kenny's methodology, as shown in Tables 15, 16, and 17. Indeed, the Preacher and Hayes method produced the *same* unstandardized regression coefficients as those produced using Baron and Kenny's procedures, with a direct coefficient of 18.46 ($p < .001$) and the indirect coefficient of 20.4876 ($p < .001$) where Environmental Posturing is the IV and Environmental Performance is the DV. Triangulating across multiple methods and producing the same results shows consistency that the relationship between environmental posturing and the organization's environmental performance is mediated by its environmental hiring practices, and thus providing strong support for Hypothesis 2.

One other difference between the Preacher and Hayes process and the Baron and Kenny process is that Preacher & Hayes uses a bootstrap method to estimate the indirect effect of the mediation relationship. Bootstrapping is accomplished by taking a number of subsamples of the data and calculating the difference between the indirect effect and the direct effect (in the analysis of the data for this research, 5000 bootstrap samples were selected to conduct the mediation test). Unlike other methods of estimating the indirect effects, bootstrapping has no requirements regarding the shape of the sampling distribution (Preacher & Hayes, 2008). The 95% confidence intervals of the indirect effects did not pass through zero (see Figure 17 below), which lends support for Hypothesis 2 that Hiring Practices at least partially mediates the relationship between Environmental Posturing and Environmental Performance (Preacher & Hayes, 2008).

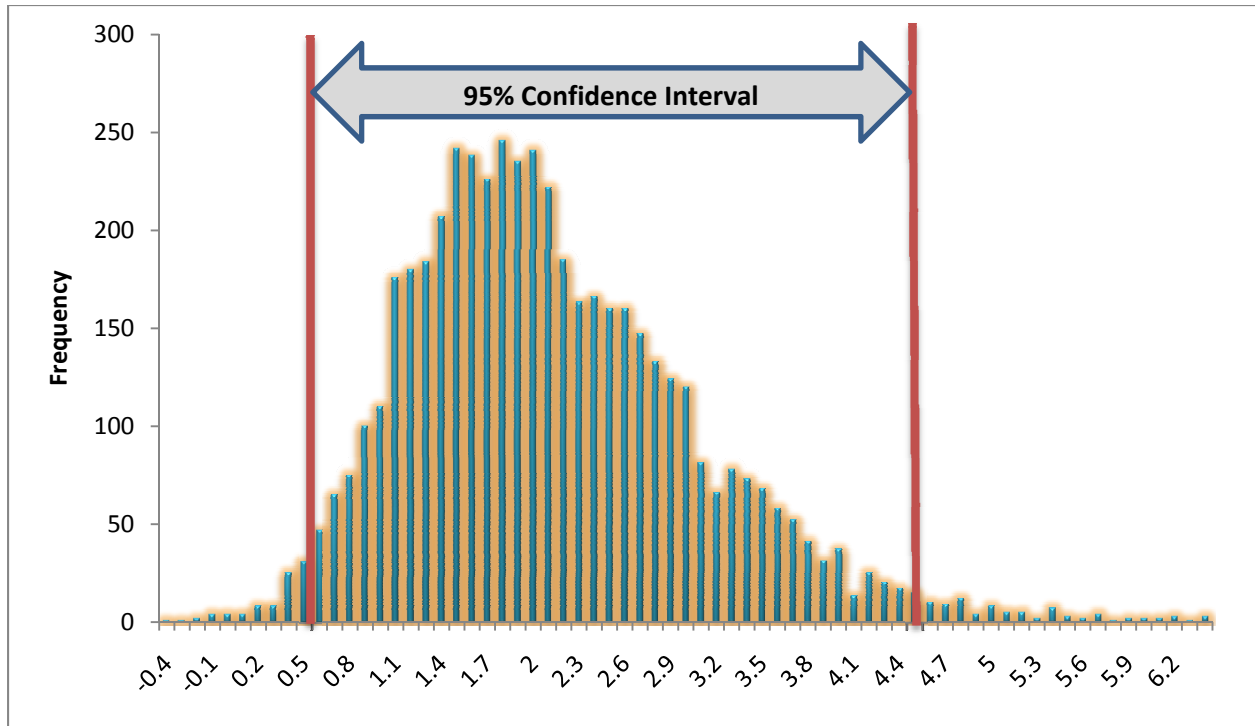


Figure 17: Bootstrapped Sampling Distribution of Indirect Effect ($c' - c$)

4.4.3 Environmental Performance as a Predictor of Financial Performance

To test the hypothesis that there is a positive relationship between firms' Environmental Performance and its Financial Performance, I regressed Environmental Performance (using Environmental Strengths) on Firm Performance (using the Principle Composite Score) for the sample organizations controlling for industry size (number of employees), growth rate, and capital intensity. To further validate the results of the difference of means test that non-service firms had a significantly different asset base than service firms ($p < .01$), a binary coded variable for organization type (service-based/non-service-based) was derived and included as a control variable in the regression models shown in this section. If the Service Industry variable is insignificant or drops out of the equation, this confirms that my principle composite financial performance metric is not affected by the different types of organizations based upon their varying asset structures. Put differently, such a result would indicate that my principle composite

score is a viable financial performance metric for samples that vary in asset structure, such the ones used in the current research.

Table 18: Analysis Results of Financial Performance by Environmental Performance Model Summary(c)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.403(a)	.162	.159	.918	.162	54.785	3	849	.000
2	.435(b)	.190	.186	.903	.027	28.617	1	848	.000

ANOVA(c)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	138.493	3	46.164	54.785	.000(a)
	Residual	715.410	849	.843		
	Total	853.903	852			
2	Regression	161.847	4	40.462	49.579	.000(b)
	Residual	692.056	848	.816		
	Total	853.903	852			

Coefficients(c)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.010	.037		.274	.784		
	Growth Rate	1.121	.198	.182	5.672	.000	.963	1.038
	Employees	3.4E-006	.000	.308	9.816	.000	1.000	1.000
	Capital Intensity	-.008	.002	-.145	-4.539	.000	.963	1.038
1	(Constant)	-.056	.038		-1.457	.145		
	Growth Rate	1.265	.196	.205	6.444	.000	.945	1.058
	Employees	3.1E-006	.000	.279	8.877	.000	.969	1.032
	Capital Intensity	-.007	.002	-.130	-4.107	.000	.955	1.047
	Environmental Strengths	.237	.044	.170	5.349	.000	.948	1.055

Excluded Variables(c)

Model		Beta In	T	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
1	Service Industry	-.076(a)	-2.308	.021	-.079	.904	1.106	.882
	Environmental Strengths	.170(a)	5.349	.000	.181	.948	1.055	.945
2	Service Industry	-.031	-.903	.367	-.031	.836	1.196	.836

a. Predictors: (Constant), Capital Intensity, Employees, Growth Rate

b. Predictors: (Constant), Capital Intensity, Employees, Growth Rate, Environmental Strengths

c. Dependent Variable: Triangulated Financial Performance (ROS, EPS, & Gross Profit)

As can be seen in Table 18, Model 1 (only the control variables), with an R² of .162, is statistically significant at p<0.01. Model 2, which adds Environmental Performance to the

control variables in Model 1, is also statistically significant at $p < .001$ with an R^2 of .19 and the Beta for Environmental Performance is positive and statistically significant at $p < .001$. The incremental change in R^2 (.027) from adding Environmental Performance to the control model is also statistically significant at $p < .001$. The standardized Beta coefficient of .170 for Environmental Performance is even greater than Capital Intensity, a highly potent control variable in studies involving financial performance. The data also passes multicollinearity tests with all VIF scores < 10.0 (the largest being 1.058). Linearity was checked by examining the plots of the residuals against each independent variable. Homoskedasticity was evaluated using scatterplots that indicated a random dispersion of points. Consequently, Hypothesis 3 is strongly supported.

Following are descriptive and graphical results of the analysis of Financial Performance of the organization:

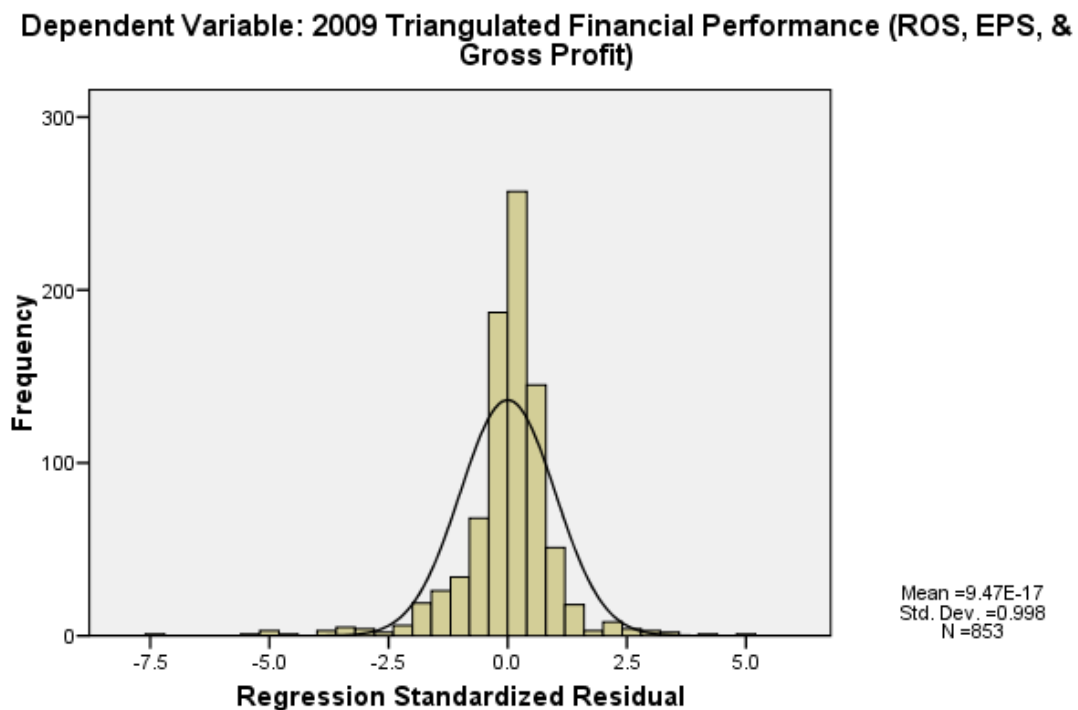


Figure 18: Histogram of Financial Performance by Standardized Residuals

Dependent Variable: 2009 Triangulated Financial Performance (ROS, EPS, & Gross Profit)

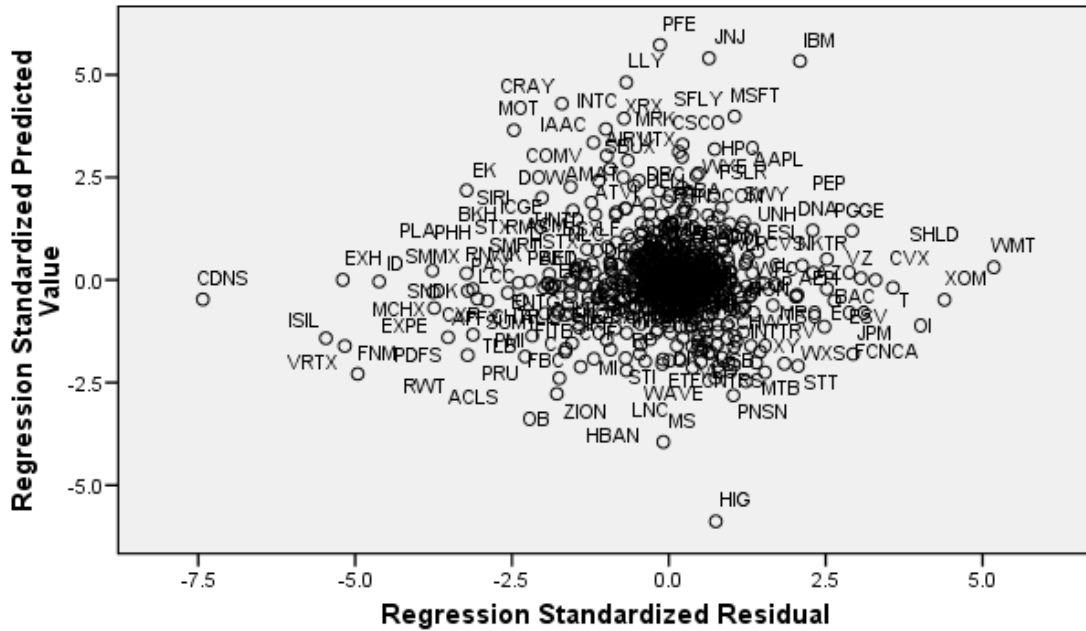


Figure 19: Partial Plot of Residuals and Predicted Values

Dependent Variable: 2009 Triangulated Financial Performance (ROS, EPS, & Gross Profit)

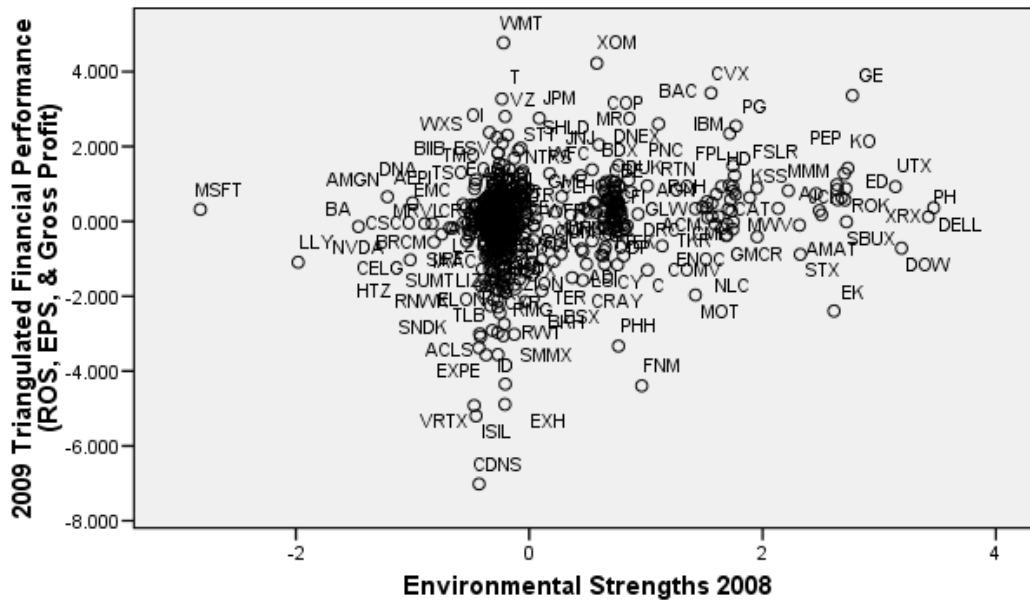


Figure 20: Partial Plot of Environmental Strengths and Financial Performance

4.4.4 Industry Moderation

Moderation exists when changes in the direction and/or the strength of the relationship between the IV and the DV are significant when the values of the moderator are changed (Baron & Kenny, 1986). Moderation tests are generally straight-forward. However, when the moderating variable is categorical in nature, the analysis processes become significantly more complex.

For this study, I utilized Aiken & West's (1991) Moderated Multiple Regression (MMR) process to test for the moderating influence of industry affiliation on the relationship between Environmental Posturing and Environmental Performance, and the relationship between Environmental Performance and Financial Performance as shown in Figure 9. Preacher & Hayes (2008) moderated mediation tests could not be utilized because they do not work with multi-level categorical moderators.

Using MMR to test for the presence of a moderating effect entails using multiple regression where the outcome is dependent upon whether the interactions between the independent variable(s) and the moderating variable(s) are significant predictors across multiple levels of the moderator or that the relationship is conditional on different values of the moderator (Holmbeck, 2002). The following steps are necessary when utilizing a categorical variable as a moderator when there are more than two potential values for the categories in MMR analysis.

1. Center the independent variables

To avoid multicollinearity and to improve the interpretation of the results, the independent variables need to be centered. For the moderation analyses, the centering of the variables was accomplished by calculating the means of the independent variables used in the equations which were then subtracted from the original values and stored as new variables for

each case. This resulted in variables whose means were zero. Centering reduces the multicollinearity by eliminating the non-essential relations between the means of the variables (West, Aiken, & Krull, 1996).

2. Establish a control group

For each categorical variable to be used in the analysis, cases with a specific value or level within that variable must be selected as a control group. The group selected as the control is one that either has theoretical meaning, is expected to score lowest or highest on the dependent variable, or has some other significance. Additionally, the control group should neither be a “wastebasket” category like “other” nor should it have a small sample size relative to the other groups. In the subsequent analysis, the coefficients assigned to the interactions were determined relative to the coefficient of the control group (West, Aiken, & Krull, 1996). For this research project, the Manufacturing industry was set as the control group because it has the largest sample size relative to the other industries.

3. Dummy code the categorical moderator

Dummy variables are created for one less than the number of categories (with N categories, N-1 variables are created). These represent the first-order effect of the categorical variable (West, Aiken, & Krull, 1996). No dummy-coded variable is created for the control group. Although multiple methods of selecting the values for the dummy-coded values exist, for this analysis zero was used to represent not belonging to that category for each case, and one was used as the value of the dummy-coded variable to represent membership in that category for each case. The 0/1 coding scheme simplifies the interpretation of the results of the regression equations (West, Aiken, & Krull, 1996).

4. Create interaction variables

The values of the interaction variables are calculated by multiplying the value of the centered independent variable by the values of each of the dummy-coded variables (creating N-1 interaction variables) (West, Aiken, & Krull, 1996). No interaction variable is created for the control group.

5. Run multiple regression

With the data prepared, the next step in the MMR process is to setup the linear regression model. The dependent variable is input along with any other independent variables. The dummy-coded moderator variables are input as independent variables using the “Enter” method in the first step of the regression equation. All of the interaction variables are entered in the second step of the regression equation. If any three-way interaction variables were created (for multiple moderators or multiple independent variables), they would be entered into the third step of the regression analysis (Rose, Holmbeck, Coakley, & Franks, 2004).

6. Compare the models

To determine whether a moderation effect exists, there should be statistically-significant differences between the models, multicollinearity should not exist among variables in the regression model, there should be a statistically significant change in the R^2 between the models indicating substantive additional explanatory power with the addition of the interaction variables, and there should be significant predictors across multiple levels of the interactions. If these criteria are met, the statistically significant regression coefficients of the interaction variables indicate a significant difference in the slopes from the baseline coefficient of the control group for each of the other groups within the moderator (Overton, 2001).

4.4.4.1 Industry Moderation of Environmental Posturing to Environmental Performance

Utilizing Aiken & West’s Moderated Multiple Regression methodology to test whether or not Industry Affiliation has a moderating effect on the relationship between Environmental Posturing and Environmental Performance, the Environmental Posturing variable was centered by subtracting the arithmetic mean of all of the cases (.0042105) from each of the cases.

Dummy-coded variables were created for each of the industries except for Manufacturing, which was selected as the control group. For each of the Industry dummy variables, if the case belonged to that industry, it was coded as a one otherwise it was coded as a zero. Interaction variables were likewise created for each of the Industries (except for Manufacturing). The value of the interaction variables was calculated by multiplying the centered Environmental Posturing score by the corresponding dummy-coded variables (analysis results in Table 19).

Table 19 : MMR Results for Industry Moderation of Environmental Performance on Environmental Posturing

Model Summary(c)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.471(a)	.222	.206	.639	.222	14.020	17	835	.000
2	.490(b)	.240	.210	.638	.018	1.238	16	819	.232

ANOVA(c)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	97.342	17	5.726	14.020	.000(a)
	Residual	341.024	835	.408		
	Total	438.366	852			
2	Regression	105.397	33	3.194	7.856	.000(b)
	Residual	332.969	819	.407		
	Total	438.366	852			

a Predictors: (Constant), Centered Environmental Posturing, Dummy-Coded Industry Affiliations

b Predictors: (Constant), Centered Environmental Posturing, Dummy-Coded Industry Affiliations , Interaction variables

c Dependent Variable: Environmental Performance

Based upon the results in Table 19, Model 1 (which included the independent variable along with the dummy-coded industry variables) was significant. Additionally, the ANOVA

results indicate that there is a significant difference between the groups for both models. The VIF scores ranged in value from 1.012 through 1.232 indicating that multicollinearity was not present (VIF<10.0). Most importantly, for the current study, Model 2 was insignificant and thus Hypothesis 4 was not supported.

4.4.4.2 Industry Moderation of Environmental Performance to Financial Performance

Using MMR to test whether or not Industry Affiliation has a moderating effect on the relationship between Environmental Performance and Financial Performance, the Environmental Performance variable was centered by subtracting the arithmetic mean of all of the cases (.30) from each of the cases. Interaction variables were created for each of the Industries (except for Manufacturing). The value of the interaction variables was calculated by multiplying the centered Environmental Performance score by the corresponding dummy-coded variables. The results of the subsequent analysis are presented in Table 20.

Table 20: MMR Results for Industry Moderation of Financial Performance on Environmental Performance

Model Summary(c)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.272(a)	.074	.055	.973	.074	3.926	17	835	.000
2	.310(b)	.096	.065	.968	.022	1.818	11	824	.047

ANOVA(c)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	63.196	17	3.717	3.926	.000(a)
	Residual	790.707	835	.947		
	Total	853.903	852			
2	Regression	81.934	28	2.926	3.123	.000(b)
	Residual	771.969	824	.937		
	Total	853.903	852			

a Predictors: (Constant), Centered Environmental Performance, Dummy-Coded Industry Affiliations

b Predictors: (Constant), Centered Environmental Performance, Dummy-Coded Industry Affiliations , Interaction variables

c Dependent Variable: Triangulated Financial Performance

Based upon the results presented in Table 20, Model 1, which included the independent variable (Environmental Performance) along with the dummy-coded industry variables, was significant. Additionally, the results indicate that there is a significant difference between the groups for both models. The VIF scores ranged in value from 1.012 through 2.428 indicating that multicollinearity was not present ($VIF < 10.0$). Model 2 was also significant at $p < .05$ indicating the potential presence of a moderating relationship. Linearity was checked by examining the plots of the residuals against each independent variable. Homoskedasticity was evaluated using scatterplots that indicated a random dispersion of points.

Dependent Variable: 2009 Triangulated Financial Performance (ROS, EPS, & Gross Profit)

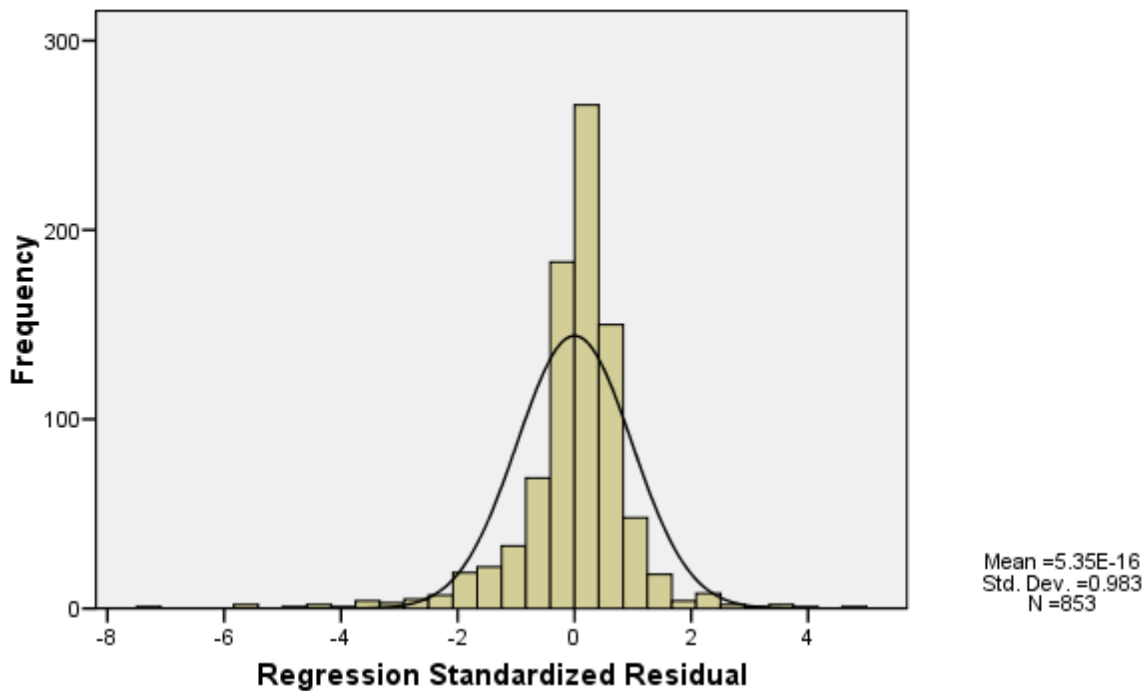


Figure 21: Histogram of Residuals for Industry Moderation of Financial Performance & Environmental Performance

Table 21: MMR Coefficient Table for Industry Moderation of Financial Performance on Environmental Performance

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics		
		B	Std. Error	Beta			Tolerance	VIF	
1	(Constant)	-0.033	0.057		-0.580	0.562			
	Environmental Strengths-C	0.281	0.050	0.201	5.609	0.000	0.859	1.163	
	Mining	0.370	0.299	0.042	1.238	0.216	0.974	1.027	
	Utilities	0.154	0.179	0.030	0.863	0.389	0.936	1.069	
	Waste Mgmt	-0.078	0.204	-0.013	-0.384	0.701	0.939	1.065	
	Transportation	-0.363	0.250	-0.049	-1.449	0.148	0.963	1.038	
	Construction	0.026	0.402	0.002	0.065	0.948	0.983	1.018	
	Wholesale Trade	0.355	0.221	0.055	1.608	0.108	0.951	1.052	
	Retail Trade	0.424	0.144	0.104	2.944	0.003	0.887	1.127	
	Information	-0.060	0.105	-0.022	-0.574	0.566	0.773	1.294	
	Finance & Insurance	-0.131	0.110	-0.044	-1.187	0.236	0.796	1.256	
	Real Estate	-0.386	0.259	-0.051	-1.492	0.136	0.961	1.040	
	Services	0.134	0.137	0.035	0.980	0.327	0.878	1.139	
	Education	0.602	0.330	0.061	1.823	0.069	0.975	1.026	
	Health Care	0.319	0.226	0.048	1.407	0.160	0.946	1.057	
	Arts & Entertainment	0.010	0.373	0.001	0.027	0.978	0.980	1.020	
	Accommodation & Food	0.216	0.287	0.025	0.755	0.451	0.975	1.026	
	Other Services	0.261	0.491	0.018	0.532	0.595	0.988	1.012	
	2	(Constant)	-0.040	0.057		-0.701	0.483		
		Environmental Strengths-C	0.306	0.056	0.219	5.413	0.000	0.670	1.493
Mining		0.363	0.303	0.041	1.197	0.232	0.938	1.067	
Utilities		0.313	0.217	0.060	1.443	0.149	0.627	1.595	
Waste Mgmt		-0.171	0.256	-0.029	-0.667	0.505	0.590	1.694	
Transportation		-0.382	0.258	-0.052	-1.481	0.139	0.895	1.117	
Construction		0.040	0.400	0.003	0.101	0.920	0.981	1.019	
Wholesale Trade		0.270	0.238	0.042	1.131	0.259	0.804	1.243	
Retail Trade		0.437	0.150	0.107	2.922	0.004	0.814	1.228	
Information		-0.007	0.148	-0.003	-0.050	0.960	0.382	2.615	
Finance & Insurance		-0.464	0.147	-0.157	-3.154	0.002	0.442	2.261	
Real Estate		-0.222	0.347	-0.029	-0.640	0.522	0.528	1.893	
Services		0.198	0.138	0.051	1.431	0.153	0.850	1.177	
Education		0.617	0.329	0.063	1.874	0.061	0.972	1.028	
Health Care		0.333	0.226	0.050	1.475	0.141	0.942	1.062	
Arts & Entertainment		0.025	0.371	0.002	0.066	0.947	0.978	1.022	
Accommodation & Food		0.232	0.285	0.027	0.812	0.417	0.972	1.029	
Other Services		0.276	0.488	0.019	0.564	0.573	0.987	1.013	
Mining-X		-0.145	0.511	-0.010	-0.283	0.777	0.948	1.055	
Utilities-X		-0.302	0.234	-0.054	-1.293	0.196	0.618	1.618	
Waste Management-X		-0.476	0.716	-0.028	-0.665	0.506	0.607	1.649	
Transportation-X		-0.263	0.623	-0.015	-0.423	0.672	0.917	1.090	
Wholesale Trade-X		-0.610	0.606	-0.037	-1.006	0.315	0.828	1.207	
Retail Trade-X		0.013	0.299	0.002	0.044	0.965	0.866	1.154	
Information-X		0.145	0.403	0.019	0.359	0.719	0.412	2.428	
Finance & Insurance-X		-1.402	0.410	-0.164	-3.419	0.001	0.478	2.092	
Real Estate-X		0.646	1.003	0.029	0.644	0.520	0.536	1.866	
Services-X		0.386	0.212	0.064	1.819	0.069	0.885	1.129	
Accommodation & Food-X		-0.279	0.334	-0.028	-0.836	0.404	0.970	1.031	

a Dependent Variable: Triangulated Financial Performance (ROS, EPS, & Gross Profit)

In Model 2, the interaction variables of organizations in the industries Construction, Education, Health Care, Arts & Entertainment, and Other Services (those with the “-X” suffix) were automatically excluded because they were without variation. The interaction variable for Finance & Insurance was the only one which exhibited a significant Beta. The standardized Beta of -0.164 indicates a differential from the control group (Manufacturing) which had a standardized Beta of 0.219. Therefore, the overall standardized Beta for Finance and Insurance was 0.055. However, one of the other conditions for moderation by a multi-level categorical variable is that the relationship is conditional on multiple values of the moderator (Holmbeck, 2002). Consequently, with this analysis and only one industry showing a significant difference from the control group, Hypothesis 5 is not supported.

4.4.4.3 Alternative Classifications of Industry

Although no moderating effects were found for industry affiliation using the NAICS codes, there may be other classifications of industry affiliation which may yield theoretically sound and statistically significant interaction effects. Operating under the premise that organizations which are less environmentally friendly may participate in greenwashing more than other organizations (Parguel, Benoit-Moreau, & Larceneux, 2009; Cho & Patten, 2007), it would be expected that this may significantly change the relationship between their Environmental Posturing and their Environmental Performance. Classifying organizations based upon industry affiliations which are known to have greater environmental issues should establish whether or not this effect exists. Utilizing industry classifications that were theoretically and statistically classified as being environmentally sensitive (Reid & Toffel, 2009; Cho & Patten, 2007) which were mapped to the corresponding NAICS industry specifications, the following

industries were categorized as being environmentally intensive: Mining, Utilities, Agriculture, Waste Management, and Transportation.

As in the other moderation analyses, MMR was used as the analysis technique. Based upon the results presented in Table 22, Model 1 (which included Environmental Posturing and the dummy-coded Industry Environmental Intensity variable as the IV's and Environmental Performance as the dependent variable) was significant. Additionally, the ANOVA results indicate that there is a significant difference between the groups for both models. The VIF scores ranged in value from 1.035 through 1.413 indicating that multicollinearity was not present (VIF<10.0). However, Model 2 was insignificant. Consequently, with this analysis and utilizing Industry Environmental Intensity as the moderator, Hypothesis 4 was still not supported for the Environmental Intensity grouping.

Table 22: MMR Results for Environmentally Intensive Industries Moderation of Environmental Performance on Environmental Posturing

Model Summary(c)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.376(a)	.141	.139	.665	.141	70.032	2	850	.000
2	.380(b)	.144	.141	.665	.003	2.629	1	849	.105

ANOVA(c)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	62.015	2	31.008	70.032	.000(a)
	Residual	376.350	850	.443		
	Total	438.366	852			
2	Regression	63.117	3	21.059	47.654	.000(b)
	Residual	375.189	849	.442		
	Total	438.366	852			

a Predictors: (Constant), Industry Environmental Intensity, Centered Environmental Posturing

b Predictors: (Constant), Industry Environmental Intensity, Centered Environmental Posturing, Industry Environmental Intensity Interaction

c Dependent Variable: Environmental Performance

MMR was also used to assess whether Industry Environmental Intensity moderated the relationship between Environmental Performance and Financial Performance. Based upon the

results presented in Table 23, Model 1 was significant. Additionally, the ANOVA results indicate that there is a significant difference between the groups for both models. The VIF scores ranged in value from 1.026 through 1.120 indicating that multicollinearity was not present (VIF<10.0). However, Model 2 (which added the Industry Environmental Intensity Interaction term to Model 1) was not significant, thus failing to support Hypothesis 5 for the Environmental Intensity grouping.

Table 23: MMR Results for Environmentally Intensive Industries Moderation of Financial Performance on Environmental Performance

Model Summary(c)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.203(a)	.041	.039	.981	.041	18.247	2	850	.000
2	.204(b)	.042	.038	.982	.000	.437	1	849	.509

ANOVA(c)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.153	2	17.576	18.247	.000(a)
	Residual	818.750	850	.963		
	Total	853.903	852			
2	Regression	35.574	3	11.858	12.302	.000(b)
	Residual	818.329	849	.964		
	Total	853.903	852			

a Predictors: (Constant), Industry Environmental Intensity, Centered Environmental Performance

b Predictors: (Constant), Industry Environmental Intensity, Centered Environmental Performance, Industry Environmental Intensity Interaction

c Dependent Variable: Financial Performance

CHAPTER 5

DISCUSSION AND CONCLUSIONS

5.1 Introduction

The purpose of this study was to test the main prescription of the Natural Resource-Based View of the Firm: That implementing an environmentally-oriented strategy will result in improved environmental performance and resultant financial performance. Based on the logic embodied in the NRBV, organizations that are proactive in formulating and implementing environmental strategy can achieve a sustainable competitive advantage and improved financial performance.

This study examined four research questions, namely (1) is there a relationship between the assertions of the top management team regarding their environmental focus and their organization's environmental performance, (2) does better environmental performance improve financial performance, (3) how do the hiring practices of the organization affect the environmental performance of the firm, and (4) how does industry affiliation affect its environmental and financial performance? This study empirically examined the relationship between an organization's environmental strategy (as manifested in its environmental posturing in its annual reports), its implementation of that strategy (as manifested in its hiring practices), its environmental performance, and its financial performance.

This chapter presents the results of the study, some of its limitations, and potential areas of future research. It also addresses implications and ramifications for empiricists, theorists, and practitioners.

5.2 Specific Findings

The overall results of this study support the NRBV in that top management’s environmental proactiveness and their investment in the requisite human capital (specifically in IT computing) to support environmental initiatives can lead to improved financial performance. This was an involved and rigorously developed study that even made slight changes in variable measurements based on additional theoretical development and preliminary analyses of the data. Given that testing of the NRBV is still in the developmental stages, this study makes an important contribution to this literature via additional empirical support of the NRBV. Moreover, to my knowledge, there are no published studies that show how human capital investments in IT computing personnel impact the firm’s environmental performance and resultant firm performance.

5.2.1 Discussion of Hypotheses’ Results

Table 24 and Figure 22 summarize the results of testing of the hypotheses that will be discussed in more detail in the following sections.

Table 24: Summary of Hypotheses’ Results

H1	There is a positive relationship between an organization’s environmental posturing and its environmental performance.	Supported
H2	The relationship between environmental posturing and the organization’s environmental performance is mediated by its environmental hiring practices.	Supported
H3	There is a positive relationship between an organization’s environmental performance and its financial performance.	Supported
H4	The relationship between an organization’s environmental posturing and its environmental performance is moderated by its industry.	Not Supported
H5	The relationship between an organization’s environmental performance and its financial performance is moderated by its industry.	Not Supported

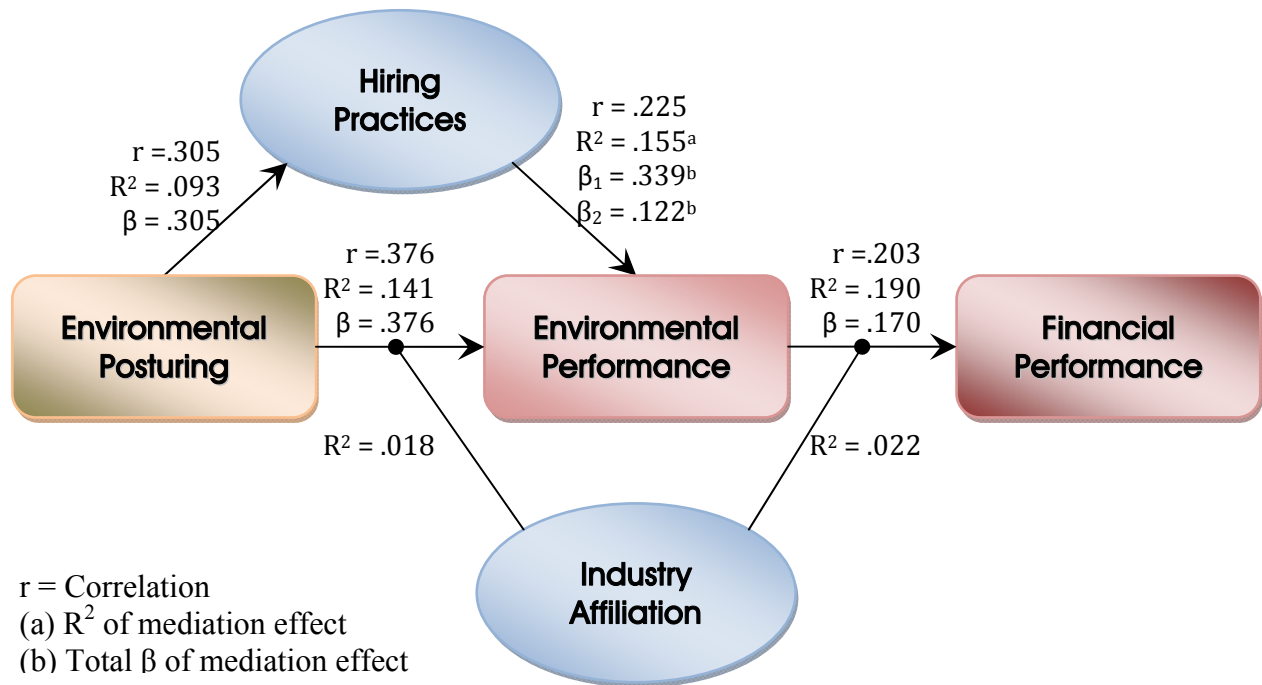


Figure 22: Summary of Results of Theoretical Model

5.2.1.1 Discussion of Findings for Hypothesis 1

Hypothesis 1 theorized a positive relationship between top management's Environmental Posturing in its Annual Report Text and its subsequent Environmental Performance. Because of the implied cause and effect nature of this relationship, the 2007 Annual Reports were used to measure the organization's Environmental Posturing and the 2008 KLD STATS dataset was used to measure Environmental Performance (one year later).

The initial measurements for Environmental Posturing included deriving a weighted measurement of the ART scores based upon the frequency and direction of the environmental statements that were made within the ART. Both positive and negative environmental statements were coded and validated and the number of negative statements was subtracted from the number of positive statements. Although this did correlate significantly with the Environmental

Performance scores which were calculated by subtracting the environmental concerns from the environmental strengths (Pearson's correlation of .138 with a $p < 0.01$), this method was not consistent with the calculation of other variables within the model. In particular, the calculation of the Environmental Hiring Practices variable could only include positive environmental statements because these were the only types of environmental statements that were being made within the texts of the job ads.

Consequently, based upon constraints imposed by the data and theoretical concerns over calculating the Environmental Performance by subtracting environmental concerns from environmental strengths (Mattingly & Berman, 2006; Chatterji, Levine, & Toffel, 2009; Chatterji, Levine, & Toffel, 2007), the original method of calculating the Environmental Posturing score was replaced by one in which only the frequency of the positive environmental statements relative to the size of the ARTs was used. Likewise, the Environmental Performance calculation was replaced by one in which only the environmental strengths were used (resulting in a range of scores from zero to four).

The subsequent analyses using these alternative methods of calculating the values of the variables resulted in an even stronger significant correlation between the Environmental Posturing and Environmental Performance scores (Pearson's correlation of .376 with a significance < 0.01). Regressing Environmental Performance on Environmental Posturing also produced a significant model with an R^2 of .093 and a Beta for Environmental Posturing of 2.904 (standardized Beta of .305) with a significance < 0.01 .

Because it has also been shown that what an organization presents in its annual report texts is a reflection of its strategy (Michalisin, 1999), this analysis also confirms one of the

premises of the NRBV that there is a significant, positive relationship between an organization's environmental strategy and its environmental performance.

5.2.1.2 Discussion of Findings for Hypothesis 2

Hypothesis 2 theorized that an organization's Environmental Hiring Practices mediates the relationship between its Environmental Posturing and its Environmental Performance. The premise of this relationship is that unless an organization takes action to implement its strategy, its performance will not improve. Additionally, Strategic Human Resource Management literature states that in order for an organization to achieve its goals, its hiring practices must be congruent to its strategy (Wright & McMahan, 1992).

The analysis for Hypothesis 1 already showed that there was a significant relationship between Environmental Posturing and Environmental Performance. To show support for mediation of that relationship, the analyses must show that the relationship going through the mediator is stronger than the direct relationship. This study utilized two widely accepted tests to demonstrate whether or not this mediation relationship exists (Baron & Kenny (1986) and Preacher & Hayes (2008)). Both tests showed strong support for this mediation relationship thus supporting Hypothesis 2.

One of the other interesting facets of this analysis is that the hiring practices that were studied focused only on computing personnel. This also confirms practitioner and academic literature (Symantec Corporation, 2009; Banerjee, 2002) which indicates that Information Technology is a fundamental component of environmental strategy implementation.

5.2.1.3 Discussion of Findings for Hypothesis 3

Hypothesis 3 theorized that there would be a positive relationship between the Environmental Performance of an organization and its subsequent Financial Performance. This,

perhaps, is the hypothesis which most interests practitioners who may wonder whether if they were to take the initiative to try to improve their environmental performance, would reduce their profits, would it be neutral, or, perhaps, could it improve their profitability?

The proposed performance metric, Tobin's q , was problematic in two important ways. First, relying on market-based measures during a tumultuous economic climate (2009) made it an unreliable measure with many possible alternative explanations for statistical results. Second, Tobin's q , as well as being market-based, is largely based upon the asset structure of the organization. Because the sample included a diverse set of organizations (some with large amounts of assets and many types of organizations without substantive assets), an asset-based performance measure would not be accurately representative of the entire sample. Therefore, a financial performance metric was developed which triangulated across measures from other prior research which were non-asset and non-market-based. This measure combined the financial performance measures from 2009 of Earnings per Share from Operations (EPS), Return on Sales, and Gross Profit.

After analyzing the relationship between environmental performance and financial performance while controlling for capital intensity, organization size, and growth rate, a significant and positive relationship was found. Therefore, Hypothesis 3 was supported confirming that the better organizations performed environmentally, the better they performed financially.

5.2.1.4 Discussion of Findings for Hypotheses 4 and 5

Hypotheses 4 and 5 stated that the relationships in the model between Environmental Posturing, Environmental Performance, and Financial Performance would change in magnitude or direction depending upon which industry an organization was primarily affiliated with. The

premises of these hypotheses were that organizations affiliated with certain industries would be more apt to engage in greenwashing (touting environmental initiatives which would not be implemented) and that certain industries may incur greater financial gains or losses from changes in their environmental performance. In particular, dirty industries (those with large environmental impacts like mining, energy, and transportation) were expected to exaggerate their environmental strategies more than organizations in other industries, but would likely see a greater financial payoff if they were able to demonstrate successful environmental performance.

However, Hypothesis 4, which stated that Industry Affiliation would moderate the relationship between Environmental Posturing and Environmental Performance, was not supported. Even when all of the environmentally intensive industries were grouped together and treated as a single moderating value, there was still no significant support for the moderating effect. The implication of not finding support for this hypothesis is that the relationship between environmental posturing and environmental performance is not significantly impacted by the industry that the organization is primarily affiliated with. This means that the results of the analyses of Hypotheses 1 and 2 are not significantly impacted by industry affiliation and thusly are more generalizable and that greenwashing is not affected by industry.

Hypothesis 5, which stated that Industry Affiliation would moderate the relationship between Environmental Performance and Financial Performance, was also not supported. The regression model which was used to test this hypothesis was only significant at $p=0.047$ (just under the 0.05 threshold) and only one industry interaction showed significant differences from the control model. Thus, the results indicate that only the Finance & Insurance industry was significantly different from the control group (Manufacturing industry) and consequently moderation is not supported (Holmbeck, 2002). However, there was over a 50% difference in the

slope of the relationship between environmental performance and financial performance for Finance & Insurance. Consequently, for every incremental improvement in environmental performance, an organization which was in the Finance & Insurance industry would see only 25% of the financial performance improvement relative to organizations in any other industry.

5.2.2 *Greenwashing Not Present*

Although what an organization presents in its annual report texts has been shown to be an accurate reflection of its strategy (Michalisin, 1999), the amount of public attention that has been paid to environmental issues over the past several years would seem to suggest an increase in the amount of disinformation about environmental issues promulgated by organizations (Lauer, 2003). However, with the strong and positive relationship between environmental posturing and environmental performance, it certainly appears through this analysis that environmental statements made in the ARTs are as accurate a reflection of its actual environmental strategy as other strategic statements made in the ARTs. This relationship was not even significantly affected by whether or not the organization was primarily affiliated with an industry which has intense impact on the environment.

5.3 Strengths

In this research, one of the fundamental strengths of the analyses is the sample size. Sample size has been cited as one of the most important characteristics of this type of study (Orlitzky, Schmidt, & Rynes, 2003). Additionally, because of the large sample size, any issues related to normality of the data become insignificant (Hair, Black, Babin, Anderson, & Tatham, 2006). The large sample also includes organizations across a broad spectrum of industries so the results of the analyses are more generalizable.

Another strength of this research is the rigor which was applied to the content analyses of the Annual Reports and the job ads. The utilization of the data dictionary, subject matter experts, previous research literature, practitioner literature, and the KWIC analyses enabled the generation of an exhaustive set of terms (listed in Appendix C) with which to begin the content analysis. Additionally, idiosyncratic terms (those germane to only a single organization) were excluded as prescribed in content analysis literature (Krippendorff, 2004).

What enabled the analysis of such a large sample with the rigor that was utilized was the combination of the human capabilities of the researchers involved together with the efficiency of the computer applications. This will also enable similar studies to be conducted that rely on comparable constructs or analysis techniques.

5.4 Limitations

This section describes some of the limitations of this study. The first limitation was that the population frame and the subsequent sample only included the 3000 largest American companies which are traded in the stock market. Therefore, the results can only be broadly generalized to large, publically-traded American companies. The sample also only included organizations that placed ten or more job ads for computing personnel over the study period. The second limitation was that this study focused on environmental strengths of an organization and did not incorporate the negative environmental statements from the ARTs and the concerns/weaknesses type attributes from the KLD data, which offers future research opportunities in that domain. The third limitation is that the job ad data was only available beginning in mid-2007 and only included computing job ads. This limited the ability to test certain lag scenarios. Additionally, company names could not always be extracted from the job ads. Consequently, these ads could not be included in the study. Another limitation of the study

was the result of the rigor that was applied to the selection of terms in the content analyses. In order to avoid the over-counting of terms found within the annual report texts and the job ads (Type I errors), many terms were excluded from the final analyses which were not consistently used in a positive environmental context which could lead to Type II errors. Finally, as with other organizational studies, it is plausible that other factors beyond those that were controlled for in this study could account for the unexplained variance and thus provide opportunities for future research.

5.5 Implications

This study has implications for empiricists, theorists, and practitioners. The next sections describe the implications of the study for each of these groups.

5.5.1 Implications for Empiricists

In the analysis of the relationships proposed in Hypothesis 1, additional confirmation was found not only for the proposed relationship, but also provided further evidence of the validity of Annual Report Text assertions. Even with a socially-charged topic like the ecological environment, assertions made by top management teams within the Annual Reports were found to be valid predictors of an organization's environmental performance. Because Annual Reports are representative of the amount of attention that is being paid to issues that top management teams consider important (D'Aveni & MacMillan, 1990), they can be valid proxies for measuring a considerable number of other strategic constructs. Additionally, because ARTs are available for all publicly-traded organizations over a long period of time, they are rich sources of longitudinal data across large samples of publically-traded firms which have mandatory reporting requirements with the Securities and Exchange Commission. As such, given the results of the

current research supporting the validity of ART assertions on a socially-charged topic such as the one endeavored in the current research (environmental orientation of the firm), it is encouraging to empiricists that seek to study similar sensitive, high-profile topics using the trace evidence embodied in ARTs that is either unavailable through other data sources or where the other data sources face high levels of social response bias (Banerjee, 2002; Krippendorff, 2004).

This research is also useful for empiricists in documenting the rigorous systematic and requisite repetitive steps needed to ensure that the content results are reliable and valid using both human and computer-based content analysis. Indeed, using a well crafted combinatorial approach such as the one used in this study reaps the effectiveness of human coding capabilities with the efficiency and power of computer-based analytical tools. Moreover, documenting the detailed steps provided in the current research will enable the replication of this study as well as provide a framework for similar studies involving textual data from ARTs, job ads, and other rich qualitative data sources.

Lastly, this study demonstrates a triangulated method for testing for mediation (Hypothesis 2), including that by Baron & Kenny (1986) and the relatively new technique developed by Preacher & Hayes (2008). Triangulating across mediation tests provides a stronger foundation for making empirical inferences than a single approach. The analyses conducted also provided further validation of the techniques developed by Preacher & Hayes.

5.5.2 Implications for Theorists

The results of this study extended the body of literature on the Natural Resource-Based View of the Firm by providing additional empirical support for the NRBV and extending the NRBV by combining it with other theories. This study validated the main prescription of the NRBV that organizations embarking on an environmentally-oriented strategy will achieve

improved environmental performance and the resultant improved financial returns. It also provided construct definitions and methods by which those constructs can be measured and evaluated.

By combining the NRBV literature with the Strategic Fit literature, this research highlights the importance of ensuring that environmental strategies are aligned with the competitive environment as well as the organization's resources and capabilities (Hitt, Bierman, Shimizu, & Kochhar, 2001). When those resources and capabilities are not already in place within an organization, the Knowledge-Based View of the firm, Strategic Human Resource Management, and the Resource-Based View of the Firm complement the Strategic Fit literature in identifying how those requisite human resources and capabilities can be acquired and integrated into the organization to improve its strategic fit and the resultant environmental and financial performance. Certainly, having and promoting a specific strategy is no guarantee of improvement in performance. Only upon possessing or acquiring the necessary resources and capabilities and subsequent implementation of the strategy can organizations hope to reap improvements in the performance measures that are targeted by the specific strategies.

In terms of the RBV, having the requisite resources to implement an environmental strategy is crucial to achieving high levels of environmental performance and resultant financial performance. Moreover, the Knowledge-Based View, which is an extension of the logic embodied in the RBV, informs us that organizations can incrementally add the necessary resources needed through Strategic Hiring Practices using a stepping-stone approach (Abell, 1978; Pettus, Kor, & Mahoney, 2009) to strengthen their strategic assets and distinctive capabilities needed to maintain their business and environmental sustainability. Consequently, an organization does not have to possess all of the requisite resources at the inception of a new

environmental strategy in order to begin its implementation. However, as organizations continue to accrue environmental competencies over time in path dependent ways, their ability to assimilate new environmentally-based knowledge in unique ways will increase as will their ability to detect market opportunities to satiate the needs of eco-friendly customers that can enhance the firm's business sustainability in profitable ways. According to the KBV, acquiring additional IT-based human capital from the marketplace can complement the firm's existing environmental capabilities, which is important to gaining or sustaining a competitive advantage in today's environmentally-conscious world.

As was stated in the implications for empiricists section, this research also aids theorists by providing additional validated variables and processes for measuring those constructs which will be helpful for utilization in future theory development and testing.

5.5.3 Implications for Practitioners

A variety of practitioners can also benefit from this research. Most fundamentally, this research shows that it does pay to be green. With a strong and positive relationship between environmental and financial performance, executives should be able to see that they can achieve improved financial performance by improving their environmental performance. Moreover, they cannot ignore the environment. If they do, it is at their own competitive peril. Although this research shows that Top Management Teams are being valid in the assertions regarding the environmental initiatives, executives reading this study should be additionally incentivized to follow suit. Honesty is the best policy.

Additionally, the mediating effect of Hiring Practices shows that organizations must follow through with their strategies in order to maximize performance and that their Human Resources Strategy must be aligned with the corporate strategy. The resources involved in

implementing an environmental strategy include the environmental distinctive competencies of the organization (individually and collectively). As was illustrated, Knowledge-Based View of the firm and the organization's Strategic Human Resource Management can also result in causal ambiguity, social complexity, path dependency, and unique historical conditions (accrues over time) which could work to sustain that competitive advantage.

Additionally, because no support for the practice of greenwashing was found, organizations and individuals can rely on the annual reports and other data when selecting who they want to invest in or add to their portfolios based upon strategies and activities that they consider important (i.e., creating an environmentally-friendly investment portfolio). It also demonstrates that CEOs are aware of ratings agencies and scrutiny by stakeholders and are therefore making sure that they are being accurate in their ARTs regarding not just innovativeness, but also their environmental sustainability. This research also shows that because industry affiliation did not moderate these relationships, these tenets are equally true across all industries.

For those who are seeking employment within the computing fields, this research shows that there are ample jobs aimed at helping organizations achieve their environmental objectives. Consequently, given the growing concern about the earth's biosphere and depletion of the planet's finite resources, improving one's green computing skills not only improves their employability but also will help the organization in addressing the current environmental crises.

5.6 Future Research

This research has laid the groundwork for several future research streams. One avenue of future research would be to perform a longitudinal study which could determine the amount of lag which exists within the relationships between the different variables. One of the limitations to

performing that type of analysis for this study was the availability of the hiring practices data. So long as that data continues to be collected, future analyses would be able to run multiple scenarios with varying degrees of lag to see what the longitudinal variations are. Additionally, a longitudinal analysis would be able to see if increases or decreases in the values of the constructs have the same relationships that the snapshots have exhibited.

Another potential analysis of the existing data could be to classify the ART environmental statements into Hart's (1995), or other researchers', typology of environmental strategies (e.g., Pollution Control, Pollution Prevention, Product Stewardship, and Sustainable Development). Then, to gain a more complete view of the total environmental pursuits, classify organizations based upon the environmental strategy or strategies that they are pursuing to determine if (as Hart (1995) suggests) the higher-level strategies result in improved environmental or financial performance.

To replicate this study so that it is able to include smaller organizations and those from other nationalities, Corporate Social Responsibility (CSR) reports could be utilized in lieu of the Annual Reports. CSR reports are often available from corporate websites. However, there would be a concern that only organizations that were proud of their CSR would make those accessible. Another form of environmental performance measure would also have to be found which included smaller and/or international organizations.

Of course the content analyses of the job ads and of the ARTs could be utilized to contribute to a variety of other research streams relating to organizational strategy and hiring practices. They could also be utilized to analyze the job market, financial markets, and skills-based research.

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APPENDICES

APPENDIX A: SAMPLE ANNUAL REPORT CONTENT ANALYSIS

In the sample page from the Eaton 2007 annual report shown in Figure 23, validated positive environmental terms are highlighted in green, non-validated positive environmental terms are light green, and non-validated negative environmental terms are light red.

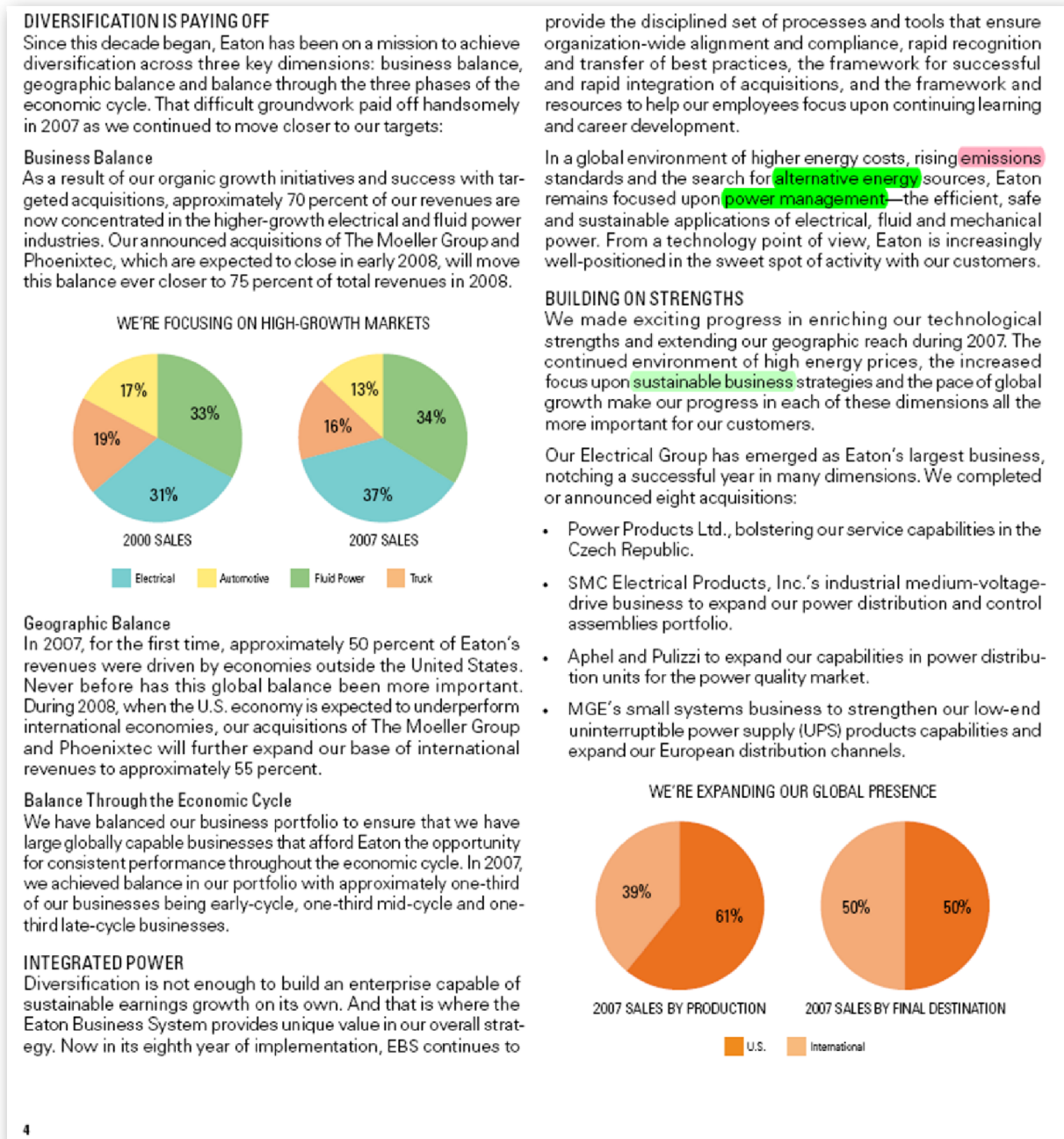


Figure 23: Sample Annual Report Text Page from Eaton Corporation (ETN)

In the Eaton annual report (with 332,722 characters), a total of 68 validated positive environmental references were found for a weighted environmental posturing ratio of 0.0274 which put it in the top 5% of scores for environmental posturing for organizations included in this analysis.

APPENDIX B: SAMPLE JOB AD CONTENT ANALYSIS

Job Ad Data: DOGS-IT.org

http://www.dogs-it.org/show_job.php?job_page_id=59521

DOGS-IT.ORG
Job Ad Data

Jobs: 2,348,724	Skills: 2,034	Today's date Tuesday, June 22nd, 2010 - 8:01 pm
Skill Refs: 38,155,602	Job ID: 595211	

General Info	Skills Found	Certs Found	Clusters	HTML	Text	Web Page
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Job Page ID: 595211

Date Retrieved: 2008-01-12 03:00:45

Skills Found: 12

Certifications Found: 0

Site Job ID: JE0MLFSB4BM

Job Title:

Company Name: Google Inc.

Job Category: Technology; Internet/New Media

Job Location: Mountain View, CA

Salary:

Required Experience: 2-5 Years Experience

Web Page Title: Renewable Energy Engineer - Mountain View job in Mountain View, CA: Technology and Internet/New Media careers - Yahoo HotJobs

Web Page URI: http://hotjobs.yahoo.com/jobseeker/jobsearch/job_detail.html?job_id=JE0MLFSB4BM

Search Page URI: http://hotjobs.yahoo.com/jobseeker/jobsearch/search_results.html?type=main&...

Figure 24: Sample Job Ad Information Page

General Info	Skills Found	Certs Found	Clusters	HTML	Text	Web Page
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All Synonyms Found

Synonym Name	Syn ID	In title?	Occurrences
clean energy	1854	no	2
carbon intensive	1842	no	1
climate change	1794	no	1
development environment	642	no	1
effort	300	no	1
geo thermal	1947	no	1
initiative	17	no	1
manage	1772	no	1
ph.d	1749	no	1
solar	2028	no	1
strategic	61	no	1
wind power	2071	no	1

Original skill set

Skill Name	Skill ID	Synonyms Found
Initiative/Motivation to work	13	1
Business Strategy	36	1

New skill set with O*NET skills

Skill Name	Skill ID	Synonyms Found	Synonyms in Title	Occurrences of Synonyms	Weight

Figure 25: Sample Job Ad Skills Found Page

Renewable Energy Engineer - Mountain View: Google Inc.

Job ID	81800
Company Name	Google Inc.
Job Category	Technology; Internet/New Media
Location	Mountain View, CA
Position Type	Full-Time, Employee
Experience	2-5 Years Experience
Date Posted	December 19, 2007 (Reposted Jan 10)

[View Google Inc. profile and job listings](#)

Renewable Energy Engineer - Mountain View



Renewable Energy Engineer - Mountain View

This position is based in Mountain View, CA.

Business as usual will not deliver low-cost, **clean energy** fast enough to avoid potentially catastrophic **climate change**. We need a **clean energy** revolution that will deliver breakthrough technologies priced lower than **carbon-intensive** alternatives such as coal. Google is launching an R&D group to develop electricity from renewable energy sources that costs less than coal.

This newly created initiative to develop renewable energy cheaper than coal, known as REC, will explore R&D and investments in advanced **solar** thermal power, **wind power** technologies, and enhanced **geothermal** systems and other breakthrough technologies. This effort is about more than our own needs as an energy consumer, but more importantly about the planet's needs for clean and cheap renewable energy.

Google is looking for extraordinarily creative, motivated and talented engineers with significant experience in developing complex engineering designs to join our newly-created renewable energy group. This group is tasked with developing the most cost-effective and scalable forms of renewable energy generation, and these people will play a key role in developing new technologies and systems.

Figure 26: Sample Environmental Job Ad from Google

In this sample job ad from Google, validated positive environmental terms are highlighted in green and non-validated positive environmental terms are light green.

APPENDIX C: ENVIRONMENTAL TERMS

Following are the terms that were utilized in this analysis along with the number of occurrences of those items in the Annual Report Texts (ARTs), the number of occurrences in the job ads, whether or not the terms were validated for subsequent analysis in the ARTs and the job ads, and whether or not the terms were utilized in a negative context in the ARTs and the job ads.

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
bio degradable	68	Y	N	5	Y	N
bio plastics	3	Y	N	1	Y	N
brownfield	74	Y	N	26	Y	N
carbon capture	105	Y	N	2	Y	N
carbon intensive	23	Y	N	1	Y	N
climate change	1,686	Y	N	993	Y	N
climatology	2	Y	N	1,119	Y	N
ecological	85	Y	N	196	Y	N
energy conservation	383	Y	N	763	Y	N
energy from waste	837	Y	N	1	Y	N
energy reduction	36	Y	N	61	Y	N
energy saving	301	Y	N	298	Y	N
environmental design	85	Y	N	1,229	Y	N
environmental engineering	166	Y	N	1,900	Y	N
environmental intelligence	1	Y	N	31	Y	N
environmental management system	114	Y	N	372	Y	N
environmental matters	4,670	Y	N	35	Y	N
environmental performance	297	Y	N	128	Y	N
environmental planning	20	Y	N	172	Y	N
environmental policy	297	Y	N	341	Y	N
environmental science	25	Y	N	1,588	Y	N
environmental strategy	26	Y	N	27	Y	N
environmentally responsible	194	Y	N	351	Y	N
fuel cell	354	Y	N	746	Y	N
gasification	256	Y	N	56	Y	N
global corporate citizenship	7	Y	N	2	Y	N
global warming	295	Y	N	62	Y	N
green computing	1	Y	N	10	Y	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
green data	6	Y	N	169	Y	N
green initiatives	36	Y	N	280	Y	N
green it	4	Y	N	220	Y	N
iso 14000	20	Y	N	77	Y	N
iso 14001	162	Y	N	177	Y	N
leed	174	Y	N	378	Y	N
life cycle analysis	1	Y	N	247	Y	N
low power	1,110	Y	N	1,109	Y	N
natural resource management	9	Y	N	139	Y	N
paperless	177	Y	N	610	Y	N
photovoltaic	513	Y	N	257	Y	N
pollution control	1,624	Y	N	101	Y	N
power management	680	Y	N	2,338	Y	N
remanufacturing	646	Y	N	42	Y	N
smart grid	217	Y	N	585	Y	N
sustainability	1,831	Y	N	2,746	Y	N
sustainability practices	32	Y	N	16	Y	N
sustainable design	25	Y	N	132	Y	N
sustainable product	44	Y	N	29	Y	N
sustainable system	1	Y	N	45	Y	N
waste disposal	1,267	Y	N	137	Y	N
waste elimination	7	Y	N	93	Y	N
waste minimization	31	Y	N	29	Y	N
waste reduction	66	Y	N	110	Y	N
wind turbine	176	Y	N	399	Y	N
carbon dioxide	2,449	Y	Y	16	Y	N
cercla	991	Y	Y	82	Y	N
environmental audit	48	Y	Y	14	Y	N
environmental compliance	1,352	Y	Y	835	Y	N
environmental related	550	Y	Y	46	Y	N
environmental risk	357	Y	Y	171	Y	N
hazardous material	273	Y	Y	297	Y	N
landfill	3,952	Y	Y	179	Y	N
toxic substance	579	Y	Y	72	Y	N
waste handling	109	Y	Y	65	Y	N
alternative energy	789	Y	N	1,513	N	N
alternative fuel	343	Y	N	326	N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
anaerobic digestion	2	Y	N		N	N
anti pollution	9	Y	N		N	N
bio agriculture	9	Y	N		N	N
bio based	27	Y	N		N	N
bio containment	4	Y	N	9	N	N
bio crude	8	Y	N		N	N
bio diesel	308	Y	N	33	N	N
bio diversity	2	Y	N	108	N	N
bio energy	33	Y	N	127	N	N
bio environmental	4	Y	N	24	N	N
bio ethics	3	Y	N	11	N	N
bio fuel	41	Y	N	476	N	N
bio gas	43	Y	N	15	N	N
bio mass	507	Y	N	85	N	N
bio methane	2	Y	N		N	N
bio milling	4	Y	N		N	N
bio monitoring	2	Y	N	3	N	N
bio remediation	7	Y	N	15	N	N
bio smart	7	Y	N		N	N
cap and trade	506	Y	N	7	N	N
carbon constrained	32	Y	N		N	N
carbon footprint	155	Y	N	137	N	N
carbon free	8	Y	N		N	N
carbon fund	3	Y	N	9	N	N
carbon management	16	Y	N	35	N	N
carbon neutral	44	Y	N	2	N	N
carbon sequestration	17	Y	N	2	N	N
carbontrak	6	Y	N		N	N
chicago climate exchange	126	Y	N		N	N
clean burning	109	Y	N	6	N	N
clean coal	199	Y	N	5	N	N
clean diesel	13	Y	N		N	N
clean energy	339	Y	N	168	N	N
clean fuel	158	Y	N	9	N	N
clean power	57	Y	N	28	N	N
clean technology	77	Y	N	133	N	N
climate friendly	10	Y	N	2	N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
climate oriented	1	Y	N		N	N
climate reducing	4	Y	N		N	N
climate registry	32	Y	N	9	N	N
climate related	11	Y	N	5	N	N
climate smart	4	Y	N		N	N
climatmseries	3	Y	N		N	N
co2 sequester	16	Y	N		N	N
composting	14	Y	N	10	N	N
concern for the environment	12	Y	N	2	N	N
conservation oriented	12	Y	N		N	N
conserve forest	1	Y	N		N	N
cradle to grave	10	Y	N	1,779	N	N
cut waste	8	Y	N	1	N	N
de carbonize	7	Y	N		N	N
de carbonizing	7	Y	N		N	N
de pollution	2	Y	N		N	N
de salinization	11	Y	N	1	N	N
design for environment	4	Y	N	7	N	N
design for the environment	5	Y	N	10	N	N
eco conscious	12	Y	N	5	N	N
eco efficiency	9	Y	N		N	N
eco forestry	1	Y	N		N	N
eco friendly	86	Y	N	56	N	N
eco lifestyle	7	Y	N		N	N
eco responsible	4	Y	N		N	N
eco restoration	9	Y	N		N	N
eco start	3	Y	N		N	N
eco system	10	Y	N		N	N
ecological integrity	1	Y	N	1	N	N
ecosys	13	Y	N	1	N	N
electric vehicle	106	Y	N	886	N	N
energy efficiency	2,942	Y	N	1,708	N	N
energy star	152	Y	N	1,164	N	N
energy wise	9	Y	N		N	N
environmental certification	6	Y	N	24	N	N
environmental commitment	66	Y	N	22	N	N
environmental defense fund	12	Y	N	1	N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
environmental improvement	103	Y	N	2	N	N
environmental innovation	1	Y	N		N	N
environmental justice	1	Y	N	2	N	N
environmental leadership	125	Y	N	52	N	N
environmental partnerships	5	Y	N		N	N
environmental preservation	10	Y	N	21	N	N
environmental quality	423	Y	N	176	N	N
environmental services	428	Y	N	402	N	N
environmental standards	279	Y	N	466	N	N
environmental stewardship	330	Y	N	516	N	N
environmental technology	224	Y	N	225	N	N
environmentalism	5	Y	N	2	N	N
environmentalist	4	Y	N	5	N	N
environmentality	14	Y	N		N	N
environmentally	1,347	Y	N	1,504	N	N
environmentally beneficial	30	Y	N		N	N
environmentally concerned	1	Y	N	1	N	N
environmentally friendly	394	Y	N	299	N	N
environmentally preferable	24	Y	N		N	N
environmentally sound	151	Y	N	219	N	N
environnement	31	Y	N	216	N	N
environnementale	2	Y	N		N	N
ethanol	718	Y	N	123	N	N
flex fuel	7	Y	N		N	N
fuel conserving	2	Y	N		N	N
fuel efficiency	464	Y	N	1,089	N	N
gas to fuel	21	Y	N		N	N
geo thermal	5	Y	N	498	N	N
ghg management	6	Y	N	9	N	N
global citizenship	86	Y	N	30	N	N
global environmental management initiative	3	Y	N		N	N
green advantage	1	Y	N		N	N
green banking	2	Y	N		N	N
green build	128	Y	N	144	N	N
green chemistry	27	Y	N	1	N	N
green development	2	Y	N	1	N	N
green economy	4	Y	N	19	N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
green house gas	26	Y	N		N	N
green marketing	3	Y	N	1	N	N
green power	151	Y	N	14	N	N
green roofing	9	Y	N		N	N
green seal	17	Y	N	1	N	N
green supply	3	Y	N	6	N	N
green technology	19	Y	N	301	N	N
green waste	4	Y	N		N	N
greenworks	10	Y	N	3	N	N
hybrid electric	116	Y	N	1,303	N	N
hybrid powered	12	Y	N		N	N
hydro conversion	3	Y	N		N	N
hydro electric	42	Y	N	99	N	N
hydro generation	43	Y	N	14	N	N
hydro power	163	Y	N	94	N	N
hydro processing	3	Y	N	1	N	N
hydro thermal	3	Y	N		N	N
hydro treater	1	Y	N	1	N	N
hydrogen cell	1	Y	N		N	N
hydrogen fuel	10	Y	N	131	N	N
hydrogen powered	6	Y	N	4	N	N
incineration	246	Y	N	16	N	N
industria limpia	4	Y	N		N	N
kyoto protocol	263	Y	N	9	N	N
landfill gas	422	Y	N	60	N	N
less carbon	20	Y	N		N	N
low carbon	181	Y	N	5	N	N
micro turbine	506	Y	N	48	N	N
montreal protocol	31	Y	N		N	N
natural systems	6	Y	N	34	N	N
nature conservancy	57	Y	N	29	N	N
nature regeneration	4	Y	N		N	N
nature serve	1	Y	N	2	N	N
no carbon	11	Y	N	1	N	N
non carbon	13	Y	N		N	N
non ozone	16	Y	N	2	N	N
non polluting	3	Y	N	1	N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
not pollute	3	Y	N		N	N
phytoremediation	2	Y	N		N	N
planet green	22	Y	N	9	N	N
pollute less	1	Y	N		N	N
power efficiency	128	Y	N	156	N	N
power save	64	Y	N	1	N	N
protecting the environment	393	Y	N	9	N	N
purify water	1	Y	N	16	N	N
pyrolysis	1	Y	N		N	N
rain forest	45	Y	N	13	N	N
recyclable	214	Y	N	46	N	N
recycle	4,058	Y	N	811	N	N
reduce natural resource	3	Y	N		N	N
reduce nitrogen oxide	32	Y	N		N	N
reduce waste	126	Y	N	63	N	N
renewable energy	2,141	Y	N	2,450	N	N
renewable resources	301	Y	N	187	N	N
resource conserving	2	Y	N		N	N
selective catalytic reduction	101	Y	N	2	N	N
sewage treatment	27	Y	N	18	N	N
smartwood	38	Y	N		N	N
social accountability	12	Y	N	12	N	N
social entrepreneurship	5	Y	N		N	N
social responsibility	1,006	Y	N	2,313	N	N
solar	5,901	Y	N	5,097	N	N
spent fuel	511	Y	N	3	N	N
sustainability driven	5	Y	N	1	N	N
sustainability indexes	80	Y	N		N	N
sustainability principles	4	Y	N	1	N	N
sustainability reporting	126	Y	N		N	N
sustainable building	11	Y	N	6	N	N
sustainable computing	2	Y	N	4	N	N
sustainable development	155	Y	N	270	N	N
sustainable innovation	27	Y	N	7	N	N
sustainable substitute	1	Y	N		N	N
syn fuel	3,426	Y	N	1	N	N
syn gas	38	Y	N	3	N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
thermal energy	108	Y	N	7	N	N
thermo electric	6	Y	N	32	N	N
tipping fee	30	Y	N		N	N
triple bottom line	13	Y	N	6	N	N
united nations global compact	17	Y	N		N	N
waste based	7	Y	N		N	N
waste free	27	Y	N		N	N
waste to energy	483	Y	N	106	N	N
waste water	2,375	Y	N	2,189	N	N
water conservation	65	Y	N	61	N	N
water conserving	3	Y	N	3	N	N
water efficient	20	Y	N	1	N	N
water sustainability	12	Y	N		N	N
wbcasd	2	Y	N		N	N
wildlife conservation	7	Y	N	18	N	N
wind energy	383	Y	N	1,408	N	N
wind power	321	Y	N	145	N	N
world business council for sustainable development	17	Y	N		N	N
zero carbon	6	Y	N	3	N	N
zero waste	16	Y	N	5	N	N
acid rain	95	Y	Y	8	N	N
bio accumulative	4	Y	Y		N	N
chem waste	66	Y	Y	13	N	N
clean air act	1,107	Y	Y	41	N	N
clean water act	510	Y	Y	52	N	N
ecological restoration	9	Y	Y	10	N	N
ecological risk	8	Y	Y	11	N	N
environmental charge	141	Y	Y		N	N
environmental cleanup	271	Y	Y	211	N	N
environmental concern	297	Y	Y	110	N	N
environmental contamination	686	Y	Y	7	N	N
environmental liabilities	3,388	Y	Y	3	N	N
environmental remediation	3,499	Y	Y	97	N	N
environmental response	903	Y	Y	21	N	N
fossil fuel	756	Y	Y	384	N	N
hazardous substance	3,688	Y	Y	66	N	N
hazardous waste	2,131	Y	Y	573	N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
hydro carbon	1,533	Y	Y	595	N	N
hydro cracker	16	Y	Y	2	N	N
hydro fluorocarbon	4	Y	Y	2	N	N
hydrocarbon producing	27	Y	Y		N	N
nitrous oxide	77	Y	Y	4	N	N
perfluorocarbon	8	Y	Y		N	N
pollute	3	Y	Y		N	N
pollution abatement	45	Y	Y	19	N	N
superfund	1,962	Y	Y	35	N	N
toxic	1,686	Y	Y	723	N	N
waste removal	58	Y	Y	47	N	N
waste treatment	154	Y	Y	52	N	N
bioassays	9	N	N	17	Y	N
environmental		N	N	82,672	Y	N
pollution prevention	309	N	N	202	Y	N
watershed	145	N	N	131	Y	N
emissions	14,032	N	Y	1,204	Y	N
environmental health and safety	94	N	Y	931	Y	N
solid waste management	53	N	Y	33	Y	N
agrophysics		N	N		N	N
air power		N	N		N	N
air quality index		N	N		N	N
all electric		N	N		N	N
all natural		N	N		N	N
allwaste		N	N		N	N
anthropogenic		N	N		N	N
api separator		N	N		N	N
aqi		N	N		N	N
arable land		N	N		N	N
bio analysis		N	N		N	N
bio ceramic		N	N		N	N
bio chemical		N	N		N	N
bio compatible		N	N		N	N
bio control		N	N		N	N
bio defense		N	N		N	N
bio drying		N	N		N	N
bio forensic		N	N		N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
bio guard		N	N		N	N
bio innovation		N	N		N	N
bio manage		N	N		N	N
bio matrix		N	N		N	N
bio oxidation		N	N		N	N
bio physical		N	N		N	N
bio physics		N	N		N	N
bio polymer		N	N		N	N
bio refining		N	N		N	N
bio sphere		N	N		N	N
bio systems		N	N		N	N
biocom		N	N		N	N
biodyne		N	N		N	N
bioionix		N	N		N	N
biological reprocessing		N	N		N	N
bioquel		N	N		N	N
biosand		N	N		N	N
bsi		N	N		N	N
carbon less		N	N		N	N
carbon sinks		N	N		N	N
carbon to liquids		N	N		N	N
ccx		N	N		N	N
cell powered		N	N		N	N
cen		N	N		N	N
ceres		N	N		N	N
clean air		N	N		N	N
clean edge	29	N	N		N	N
clean harbors		N	N		N	N
clean industry		N	N		N	N
clean operating		N	N		N	N
climate scientist		N	N		N	N
climatepath		N	N		N	N
code optimization		N	N		N	N
community commitment		N	N		N	N
conservancy		N	N		N	N
conservation based development		N	N		N	N
conservationist		N	N		N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
corporate citizenship		N	N		N	N
corporate philanthropy		N	N		N	N
cybernetics		N	N		N	N
design for disassembly		N	N		N	N
dfe		N	N		N	N
distinguished citizen award		N	N		N	N
dual fuel		N	N		N	N
eco advantage		N	N		N	N
eco analytix		N	N		N	N
eco branding		N	N		N	N
eco centric		N	N		N	N
eco design		N	N		N	N
eco development		N	N		N	N
eco innovation		N	N		N	N
eco wipe		N	N		N	N
eco zone		N	N		N	N
ecological economics		N	N		N	N
ecological footprinting		N	N		N	N
ecological sustainability		N	N		N	N
ecologinomic		N	N		N	N
ecology economic		N	N		N	N
ecolonomic		N	N		N	N
econergy		N	N		N	N
ecopreneurship		N	N		N	N
ecotech		N	N		N	N
electrically powered		N	N		N	N
electro hydrostatic		N	N		N	N
energy management		N	N		N	N
energy recovery		N	N		N	N
envac		N	N		N	N
enviro fuel		N	N		N	N
enviro shield		N	N		N	N
enviro source		N	N		N	N
enviro systems		N	N		N	N
environetics		N	N		N	N
environmax	17	N	N		N	N
environment changes		N	N		N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
environmental factor		N	N		N	N
environmental health		N	N		N	N
environmental protection		N	N		N	N
environmental scanning		N	N		N	N
environmental toxicology		N	N		N	N
enviropreneurial		N	N		N	N
envirotemp		N	N		N	N
envirotran		N	N		N	N
eso		N	N		N	N
factor 10		N	N		N	N
factor 4		N	N		N	N
forest land		N	N		N	N
fossil hydro		N	N		N	N
gas plasma		N	N		N	N
gasifier vessel		N	N		N	N
gemi		N	N		N	N
geo chemical		N	N		N	N
geo engineering		N	N		N	N
geo physical		N	N		N	N
geo physicist		N	N		N	N
geo physics		N	N		N	N
geo science		N	N		N	N
geo scientist		N	N		N	N
global codes of conduct		N	N		N	N
global responsibility		N	N		N	N
grease stock		N	N		N	N
green		N	N		N	N
green architect		N	N		N	N
green ict		N	N		N	N
green parks		N	N		N	N
green peace		N	N		N	N
green range		N	N		N	N
greenfeld energy		N	N		N	N
greening		N	N		N	N
greenway		N	N		N	N
high efficiency		N	N		N	N
hybrid technology		N	N		N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
hydraulically powered		N	N		N	N
hydro based		N	N		N	N
hydro dynamic		N	N		N	N
hydro excavation		N	N		N	N
hydro mechanical		N	N		N	N
hydrofluorocarbon free		N	N		N	N
hydrogen pipeline		N	N		N	N
hydrogen technology		N	N		N	N
hydrotech		N	N		N	N
increased efficiencies		N	N		N	N
industrial ecology		N	N		N	N
invenergy		N	N		N	N
issp		N	N		N	N
la21		N	N		N	N
land management		N	N		N	N
less toxic		N	N		N	N
life cycle assessment		N	N		N	N
life cycle costing		N	N		N	N
life cycle product		N	N		N	N
low impact development		N	N		N	N
marginal social cost		N	N		N	N
mechanical biological treatment		N	N		N	N
mechanical heat treatment		N	N		N	N
micro power	27	N	N	17	N	N
multi fuel		N	N		N	N
natural capital		N	N		N	N
natural gas		N	N		N	N
nature step		N	N		N	N
nature works		N	N		N	N
non chlorofluorocarbonated		N	N		N	N
non hydrocarbon		N	N		N	N
non toxic		N	N		N	N
ocean energy		N	N		N	N
oil recycling		N	N		N	N
organic		N	N		N	N
oxy fuel		N	N		N	N
p2		N	N		N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
perma culture		N	N		N	N
perma forestry		N	N		N	N
plasma arc		N	N		N	N
plasma gasification		N	N		N	N
pollution trading		N	N		N	N
poly fuel		N	N		N	N
polyculture		N	N		N	N
professional certificate in sustainability		N	N		N	N
re forest		N	N		N	N
re power		N	N		N	N
reusable		N	N		N	N
reuse		N	N		N	N
sierra club		N	N		N	N
smart forest		N	N		N	N
social equity		N	N		N	N
social justice		N	N		N	N
social marketing		N	N		N	N
solar thermal		N	N		N	N
solartechnik		N	N		N	N
source reduction		N	N		N	N
specpower		N	N		N	N
sustainability compliance		N	N		N	N
sustainability entrepreneurship		N	N		N	N
sustainability leadership certificate		N	N		N	N
sustainability operating system		N	N		N	N
sustainable business		N	N		N	N
sustainable entrepreneurship		N	N		N	N
sustaincentric		N	N		N	N
sustainopreneurship		N	N		N	N
sustainpreneurship		N	N		N	N
syltherm		N	N		N	N
symbiocity		N	N		N	N
symbiosis		N	N		N	N
systems biology		N	N		N	N
systems ecology		N	N		N	N
the climate registry		N	N		N	N
thermal treatment		N	N		N	N

Environmental Term	Occurrences in ARTs	Valid in ARTs	Negative in ARTs	Occurrences in Job Ads	Valid in Job Ads	Negative in Job Ads
thermo depolymerization		N	N		N	N
total quality environmental management		N	N		N	N
tqem		N	N		N	N
urban design	10	N	N	50	N	N
waste autoclave		N	N		N	N
waste management		N	N		N	N
water purification	82	N	N	45	N	N
air pollution		N	Y		N	N
bio agent		N	Y		N	N
bio hazard		N	Y		N	N
calpine		N	Y		N	N
de forestation		N	Y		N	N
fluorocarbon		N	Y		N	N
green house		N	Y	441	N	N
greenhouse gas	2,137	N	Y		N	N
high carbon	23	N	Y		N	N
hydrocarbon water		N	Y		N	N
hydrochlorofluorocarbons		N	Y		N	N
multi pollutant		N	Y		N	N
percarbonates		N	Y		N	N
pollutants		N	Y		N	N
pollution related		N	Y		N	N
sulfur		N	Y		N	N
toxic spill		N	Y		N	N
water pollution		N	Y		N	N

APPENDIX D: ORGANIZATIONS

Following are lists of the organizations utilized in this analysis organized by industry.

Mining	
Apco Argentina Inc. [APAGF]	EOG Resources, Inc. [EOG]
Arch Coal, Inc. [ACI]	Halliburton Company [HAL]
Chesapeake Energy Corporation [CHK]	Newmont Mining Corporation [NEM]
Continental Resources, Inc. [CLR]	Occidental Petroleum Corporation [OXY]
Devon Energy Corporation [DVN]	Oceaneering International, Inc. [OII]
Dynegy Inc. [DYN]	Quest Resource Corporation [QRCP]
ENSCO International Incorporated [ESV]	

Utilities	
AES Corp. [AES]	Laclede Group, Inc. (The) [LG]
American Electric Power Co., Inc. [AEP]	National Fuel Gas Co. [NFG]
Aqua America, Inc. [WTR]	Nicor, Inc. [GAS]
Atmos Energy Corp. [ATO]	Nstar [NST]
Calpine Corp. [CPN]	Pepco Holdings, Inc. [POM]
CenterPoint Energy, Inc. [CNP]	PG&E Corp. [PCG]
Consolidated Edison Inc. [ED]	PNM Resources, Inc. [PNM]
Constellation Energy Group, Inc. [CEG]	Portland General Electric Co. [POR]
Covanta Holding Corp. [CVA]	PPL Corp. [PPL]
DTE Energy Co. [DTE]	Progress Energy, Inc. [PGN]
Duke Energy Corp. [DUK]	Public Service Enterprise Group, Inc. [PEG]
Edison Int'l [EIX]	Reliant Energy, Inc. [RRI]
Entergy Corp. [ETR]	Southwest Water Co. [SWWC]
Exelon Corp. [EXC]	TECO Energy, Inc. [TE]
FirstEnergy Corp. [FE]	UIL Holdings Corp. [UIL]
FPL Group, Inc. [FPL]	Vectren Corp. [VVC]
Integrus Energy Group, Inc. [TEG]	Xcel Energy Inc. [XEL]

Construction	
Fluor Corp. [FLR]	KBR, Inc. [KBR]
Granite Construction Inc. [GVA]	M.D.C. Holdings, Inc. [MDC]
Jacobs Engineering Group, Inc. [JEC]	NVR, Inc. [NVR]

Manufacturing	
3M Co. [MMM]	Intel Corp. [INTC]
ACCO Brands Corp. [ABD]	Intersil Corp. [ISIL]
Accuray Inc. [ARRAY]	Intuitive Surgical, Inc. [ISRG]
Acuity Brands, Inc. [AYI]	iRobot Corp. [IRBT]
Adaptec, Inc. [ADPT]	Isilon Systems, Inc. [ISLN]
ADC Telecommunications, Inc. [ADCT]	Isis Pharmaceuticals, Inc. [ISIS]
ADTRAN, Inc. [ADTN]	ITT Corp. [ITT]
AEP Industries Inc. [AEPI]	Ixia [XXIA]
AeroVironment, Inc. [AVAV]	Jabil Circuit, Inc. [JBL]
Affymetrix, Inc. [AFFX]	JDS Uniphase Corp. [JDSU]

Manufacturing

Agilent Technologies, Inc. [A]	Johnson & Johnson [JNJ]
Airvana, Inc. [AIRV]	Johnson Controls, Inc. [JCI]
Albany Int'l Corp. [AIN]	Juniper Networks, Inc. [JNPR]
Albemarle Corp. [ALB]	Kellogg Co. [K]
Alexion Pharmaceuticals, Inc. [ALXN]	Kimberly-Clark Corp. [KMB]
Align Technology, Inc. [ALGN]	Kinetic Concepts, Inc. [KCI]
Alkermes, Inc. [ALKS]	KLA-Tencor Corp. [KLAC]
Allergan, Inc. [AGN]	Kraft Foods, Inc. [KFT]
Alliant Techsystems Inc. [ATK]	Lam Research Corp. [LRCX]
Altera Corp. [ALTR]	Lattice Semiconductor Corp. [LSCC]
Altria Group, Inc. [MO]	La-Z-Boy, Inc. [LZB]
American Science & Engineering, Inc. [ASEI]	Leapfrog Enterprises, Inc. [LF]
AMETEK, Inc. [AME]	Leggett & Platt, Inc. [LEG]
Amgen Inc. [AMGN]	Lennox Int'l Inc. [LII]
Amylin Pharmaceuticals, Inc. [AMLN]	Lexmark Int'l, Inc. [LXK]
Analog Devices, Inc. [ADI]	Lilly (Eli) and Co. [LLY]
Apple, Inc. [AAPL]	Lincoln Electric Holdings, Inc. [LECO]
Applied Materials, Inc. [AMAT]	Liz Claiborne, Inc. [LIZ]
Applied Micro Circuits Corp. [AMCC]	LMI Aerospace, Inc. [LMIA]
Applied Signal Technology, Inc. [APSG]	Lockheed Martin Corp. [LMT]
Archer-Daniels-Midland Co. [ADM]	LSI Corp. [LSI]
Argon ST, Inc. [STST]	Lubrizol Corp. [LZ]
Armstrong World Industries, Inc. [AWI]	Manitowoc Co., Inc. [MTW]
ARRIS Group, Inc. [ARRS]	Marathon Oil Corp. [MRO]
ArthroCare Corp. [ARTC]	Marvell Technology Group Ltd. [MRVL]
Aruba Networks, Inc. [ARUN]	Masco Corp. [MAS]
ArvinMeritor, Inc. [ARM]	Matrixx Initiatives, Inc. [MTXX]
Atheros Communications, Inc. [ATHR]	Mattel, Inc. [MAT]
Atmel Corp. [ATML]	McCormick & Co., Inc. [MKC]
Avery Dennison Corp. [AVY]	MeadWestvaco Corp. [MWV]
Avid Technology, Inc. [AVID]	Medicis Pharmaceutical [MRX]
Avocent Corp. [AVCT]	Medtronic, Inc. [MDT]
Avon Products, Inc. [AVP]	MEMC Electronic Materials, Inc. [WFR]
Axcelis Technologies, Inc. [ACLS]	Merck & Co., Inc. [MRK]
Bare Escentuals, Inc. [BARE]	Microchip Technology Inc. [MCHP]
Baxter Int'l Inc. [BAX]	Micron Technology, Inc. [MU]
Beckman Coulter, Inc. [BEC]	Millipore Corp. [MIL]
Becton, Dickinson and Co. [BDX]	MKS Instruments, Inc. [MKSI]
Belden, Inc. [BDC]	Mohawk Industries, Inc. [MHK]
Biogen Idec Inc. [BIIB]	Monogram Biosciences, Inc. [MGRM]
Black & Decker Corp. [BDK]	Mosaic Co. (The) [MOS]
Blue Coat Systems, Inc. [BCSI]	Motorola, Inc. [MOT]
Boeing Co. [BA]	Myriad Genetics, Inc. [MYGN]
BorgWarner Inc. [BWA]	Nalco Holding Co. [NLC]
Boston Scientific Corp. [BSX]	National Semiconductor Corp. [NSM]
Bowne & Co., Inc. [BNE]	Nautilus, Inc. [NLS]
Briggs & Stratton Corp. [BGG]	NCR Corp. [NCR]
Broadcom Corp. [BRCM]	Nektar Therapeutics [NKTR]
Brocade Communications Systems, Inc. [BRCD]	NetApp, Inc. [NTAP]

Manufacturing

Brown Shoe Co., Inc. [BWS]	Newell Rubbermaid, Inc. [NWL]
Bucyrus Int'l, Inc. [BUCY]	NIKE, Inc. [NKE]
Caliper Life Sciences, Inc. [CALP]	Northrop Grumman Corp. [NOC]
Campbell Soup Co. [CPB]	Novatel Wireless, Inc. [NVTL]
Capstone Turbine Corp. [CPST]	Novellus Systems, Inc. [NVLS]
Cardiac Science Corp. [CSCX]	NVIDIA Corp. [NVDA]
Carter's, Inc. [CRI]	Omnicell, Inc. [OMCL]
Caterpillar Inc. [CAT]	OmniVision Technologies, Inc. [OVTI]
Celgene Corp. [CELG]	Orbital Sciences Corp. [ORB]
Cepheid [CPHD]	Oshkosh Corp. [OSK]
Chemtura Corp. [CEM]	OSI Systems, Inc. [OSIS]
Chevron Corp. [CVX]	Owens-Illinois, Inc. [OI]
Ciena Corp. [CIEN]	PACCAR, Inc. [PCAR]
Cintas Corp. [CTAS]	Palm, Inc. [PALM]
Cisco Systems, Inc. [CSCO]	Palomar Medical Technologies, Inc. [PMTI]
Clorox Co. (The) [CLX]	Par Pharmaceutical Companies, Inc [PRX]
Coach, Inc. [COH]	Parker-Hannifin Corp. [PH]
Coca-Cola Co. [KO]	Pentair, Inc. [PNR]
Coca-Cola Enterprises Inc. [CCE]	Pepsi Bottling Group, Inc. [PBG]
Cognex Corp. [CGNX]	PepsiAmericas, Inc. [PAS]
Coinstar, Inc. [CSTR]	PepsiCo, Inc. [PEP]
Colgate-Palmolive Co. [CL]	PerkinElmer, Inc. [PKI]
Commercial Metals Co. [CMC]	Perrigo Co. [PRGO]
Comtech Telecommunications Corp. [CMTL]	Perry Ellis Int'l, Inc. [PERY]
Comverge, Inc. [COMV]	Pfizer, Inc. [PFE]
ConAgra Foods, Inc. [CAG]	Pitney Bowes Inc. [PBI]
Conexant Systems, Inc. [CNXT]	Plantronics, Inc. [PLT]
ConocoPhillips [COP]	PMC-Sierra, Inc. [PMCS]
Cooper Companies, Inc. (The) [COO]	Polo Ralph Lauren Corp. [RL]
Cooper Industries, Ltd. [CBE]	Polycom, Inc. [PLCM]
Corning Inc. [GLW]	PolyOne Corp. [POL]
Covidien Ltd. [COV]	PPG Industries, Inc. [PPG]
Crane Co. [CR]	Praxair, Inc. [PX]
Cray Inc. [CRAY]	Procter & Gamble Co. [PG]
Cree, Inc. [CREE]	QLogic Corp. [QLGC]
CSS Industries, Inc. [CSS]	QUALCOMM Inc. [QCOM]
Cubic Corp. [CUB]	Quantum Corp. [QTM]
Cubist Pharmaceuticals, Inc. [CBST]	Ralcorp Holdings, Inc. [RAH]
Cummins, Inc. [CMI]	Raytheon Co. [RTN]
Curtiss-Wright Corp. [CW]	ResMed Inc. [RMD]
CV Therapeutics, Inc. [CVTX]	Revlon, Inc. [REV]
Data Domain, Inc. [DDUP]	Riverbed Technology Inc [RVBD]
Del Monte Foods Co. [DLM]	Rockwell Automation, Inc. [ROK]
Delek US Holdings, Inc. [DK]	Rockwell Collins [COL]
Dell Inc. [DELL]	Rohm and Haas Co. [ROH]
Deluxe Corp. [DLX]	RTI Int'l Metals, Inc. [RTI]
Diebold, Inc. [DBD]	SanDisk Corp. [SNDK]
Digi Int'l Inc. [DGII]	Sanmina-SCI Corp. [SANM]
Dionex Corp. [DNEX]	Sara Lee Corp. [SLE]

Manufacturing	
Donaldson Co., Inc. [DCI]	Schawk, Inc. [SGK]
Dow Chemical Co. [DOW]	Schering-Plough Corp. [SGP]
Dresser-Rand Group Inc [DRC]	Scotts Miracle-Gro Co. (The) [SMG]
Eastman Kodak Co. [EK]	Seagate Technology [STX]
Eaton Corp. [ETN]	Select Comfort Corp. [SCSS]
Echelon Corp. [ELON]	Sepracor, Inc. [SEPR]
EchoStar Holding Corp. [SATS]	Sequenom, Inc. [SQNM]
Ecolab Inc. [ECL]	Sherwin-Williams Co. (The) [SHW]
Edwards Lifesciences Corp. [EW]	SiRF Technology Holdings, Inc. [SIRF]
Electronics For Imaging, Inc. [EFII]	Skyworks Solutions, Inc. [SWKS]
Elizabeth Arden, Inc. [RDEN]	Sonicwall, Inc. [SNWL]
EMC Corp. [EMC]	SPX Corp. [SPW]
EMCORE Corp. [EMKR]	St. Jude Medical, Inc. [STJ]
Emulex Corp. [ELX]	Standard Register Co. [SR]
Entegris, Inc. [ENTG]	Stanley Works (The) [SWK]
Exterran Holdings, Inc. [EXH]	STERIS Corp. [STE]
Extreme Networks, Inc. [EXTR]	Stryker Corp. [SYK]
Exxon Mobil Corp. [XOM]	Symmetricom, Inc. [SYMM]
Federal Signal Corp. [FSS]	Synaptics Inc. [SYNA]
FEI Co. [FEIC]	Tekelec [TKLC]
Finisar Corp. [FNSR]	Teledyne Technologies, Inc. [TDY]
First Solar, Inc. [FSLR]	Teleflex Inc. [TFX]
Flow Int'l Corp. [FLOW]	Tellabs, Inc. [TLAB]
Flowserve Corp. [FLS]	Temple-Inland Inc. [TIN]
Forest Laboratories, Inc. [FRX]	Tennant Co. [TNC]
FormFactor, Inc. [FORM]	Teradyne, Inc. [TER]
Fossil, Inc. [FOSL]	Terex Corp. [TEX]
Gardner Denver, Inc. [GDI]	Tesoro Corp. [TSO]
Garmin Ltd. [GRMN]	Tessera Technologies, Inc. [TSRA]
Genentech, Inc. [DNA]	Thermo Fisher Scientific [TMO]
General Dynamics Corp. [GD]	Thomas & Betts Corp. [TNB]
General Electric Co. [GE]	Timberland Co. (The) [TBL]
General Mills Inc. [GIS]	Timken Co., (The) [TKR]
Genomic Health Inc [GHDX]	TomoTherapy, Inc. [TOMO]
Genzyme Corp. [GENZ]	Toro Co. [TTC]
Gerber Scientific Inc. [GRB]	Trimble Navigation Ltd. [TRMB]
Gilead Sciences, Inc. [GILD]	TriQuint Semiconductor, Inc. [TQNT]
Goodrich Corp. [GR]	TRW Automotive Holdings Corp. [TRW]
Goodyear Tire & Rubber Co. [GT]	Tyco Int'l Ltd. [TYC]
Graco Inc. [GGG]	Tyson Foods, Inc. [TSN]
Graphic Packaging Holding Co. [GPK]	Under Armour, Inc. [UA]
Green Mountain Coffee Roasters, Inc. [GMCR]	United States Steel Corp. [X]
Gymboree Corp. (The) [GYMB]	United Technologies Corp. [UTX]
Haemonetics Corp. [HAE]	Universal Electronics, Inc. [UEIC]
Hain Celestial Group, Inc. (The) [HAIN]	USG Corp. [USG]
Hansen Natural Corp. [HANS]	UTStarcom, Inc. [UTSI]
Harley-Davidson, Inc. [HOG]	Valero Energy Corp. [VLO]
Harmonic, Inc. [HLIT]	Varian, Inc. [VARI]
Harris Corp. [HRS]	VeriFone Holdings, Inc. [PAY]

Manufacturing

Harris Stratex Networks, Inc. [HSTX]	Vertex Pharmaceuticals Inc. [VRTX]
Hasbro, Inc. [HAS]	ViaSat, Inc. [VSAT]
Hershey Co. (The) [HSY]	Vishay Intertechnology, Inc. [VSH]
Hess Corp. [HES]	Volcano Corp. [VOLC]
Hewlett-Packard Co. [HPQ]	Watson Pharmaceuticals, Inc. [WPI]
Hill-Rom Holdings, Inc. [HRC]	West Pharmaceutical Services, Inc. [WST]
Hologic Inc [HOLX]	Western Digital Corp. [WDC]
Honeywell Int'l, Inc. [HON]	Weyerhaeuser Co. [WY]
Hospira, Inc. [HSP]	Whirlpool Corp. [WHR]
Huntsman Corp. [HUN]	Wyeth [WYE]
IDEXX Laboratories, Inc. [IDXX]	Xerox Corp. [XRX]
Illumina, Inc. [ILMN]	Xilinx, Inc. [XLNX]
Imation Corp. [IMN]	Zebra Technologies Corp. [ZBRA]
Immersion Corp. [IMMR]	Zhone Technologies, Inc. [ZHNE]
Infinera Corp. [INFN]	Zimmer Holdings, Inc. [ZMH]
Ingersoll-Rand Co. Limited [IR]	ZOLL Medical Corp. [ZOLL]
Integrated Device Technology Inc. [IDTI]	Zoran Corp. [ZLAN]

Wholesale Trade

Agilysys, Inc. [AGYS]	Ingram Micro, Inc. [IM]
Airgas, Inc. [ARG]	Insight Enterprises, Inc. [NSIT]
AmerisourceBergen Corp. [ABC]	Interline Brands Inc. [IBI]
Anixter Int'l Inc. [AXE]	inVentiv Health, Inc. [VTIV]
Arrow Electronics, Inc. [ARW]	McKesson Corp. [MCK]
Ashland Inc. [ASH]	MSC Industrial Direct Co., Inc. [MSM]
Avnet, Inc. [AVT]	Nash Finch Co. [NAFC]
Black Hills Corp. [BKH]	OfficeMax, Inc. [OMX]
Cardinal Health, Inc. [CAH]	PSS World Medical, Inc. [PSSI]
Copart, Inc. [CPRT]	Schnitzer Steel Industries, Inc. [SCHN]
Digital River, Inc. [DRIV]	SYNNEX Corp. [SNX]
Equitable Resources, Inc. [EQT]	Tech Data Corp. [TECD]
Grainger (W.W.), Inc. [GWW]	World Fuel Services Corp. [INT]

Transportation and Warehousing

AirTran Holdings, Inc. [AAI]	Genco Shipping & Trading, Ltd. [GNK]
Alaska Air Group, Inc. [ALK]	Iron Mountain, Inc. [IRM]
C.H. Robinson Worldwide, Inc. [CHRW]	JetBlue Airways Corp. [JBLU]
Carnival Corp., Inc. [CCL]	Norfolk Southern Corp. [NSC]
Continental Airlines, Inc. [CAL]	Southwest Airlines Co. [LUV]
Con-way Inc [CNW]	US Airways Group, Inc. [LCC]
CSX Corp. [CSX]	Werner Enterprises, Inc. [WERN]
El Paso Corp. [EP]	YRC Worldwide, Inc. [YRCW]
FedEx Corp. [FDX]	

Retail Trade

99 Cents Only Stores [NDN]	Medco Health Solutions, Inc. [MHS]
Abercrombie & Fitch Co. [ANF]	New York & Co., Inc. [NWY]
Advance Auto Parts, Inc. [AAP]	NutriSystem, Inc. [NTRI]
Amazon.com, Inc. [AMZN]	Office Depot, Inc. [ODP]
American Eagle Outfitters, Inc. [AEO]	PC Connection, Inc. [PCCC]
AnnTaylor Stores Corp. [ANN]	Penney (J.C.) Co., Inc. [JCP]
AutoZone, Inc. [AZO]	Penske Automotive Group, Inc. [PAG]
Barnes & Noble, Inc. [BKS]	PetSmart, Inc. [PETM]
Bed Bath & Beyond, Inc. [BBBY]	RadioShack Corp. [RSH]
BJ's Wholesale Club, Inc. [BJ]	Rite Aid Corp. [RAD]
Cabela's, Inc. [CAB]	Ross Stores, Inc. [ROST]
CarMax, Inc. [KMX]	Safeway Inc. [SWY]
Chico's FAS, Inc. [CHS]	Saks, Inc. [SKS]
Circuit City Stores, Inc. [CCTYQ]	Sears Holdings Corp. [SHLD]
Coldwater Creek, Inc. [CWTR]	Stamps.com, Inc. [STMP]
CVS Caremark Corp. [CVS]	Staples, Inc. [SPLS]
DSW, Inc. [DSW]	Stein Mart, Inc. [SMRT]
Family Dollar Stores, Inc. [FDO]	Systemax Inc. [SYX]
Foot Locker, Inc. [FL]	Talbots, Inc. (The) [TLB]
GameStop Corp. [GME]	Target Corp. [TGT]
Gap, Inc. (The) [GPS]	TJX Companies, Inc. [TJX]
GSI Commerce, Inc. [GSIC]	Tractor Supply Co. [TSCO]
Home Depot, Inc. (The) [HD]	United Stationers Inc. [USTR]
J. Crew Group, Inc. [JCG]	Urban Outfitters, Inc. [URBN]
Kohl's Corp. [KSS]	Walgreen Co. [WAG]
Kroger Co. [KR]	Wal-Mart Stores, Inc. [WMT]
Lowe's Companies, Inc. [LOW]	Williams-Sonoma, Inc. [WSM]
Macy's, Inc. [M]	Winn Dixie Stores, Inc. [WINN]

Information

Accelrys, Inc. [ACCL]	Magma Design Automation, Inc. [LAVA]
ACI Worldwide, Inc. [ACIW]	Marchex, Inc. [MCHX]
Activision Blizzard Inc. [ATVI]	McAfee, Inc [MFE]
Actuate Corp. [ACTU]	MedAssets, Inc. [MDAS]
Acxiom Corp. [ACXM]	Media General, Inc. [MEG]
Adobe Systems Inc. [ADBE]	MetroPCS Communications, Inc. [PCS]
Advent Software, Inc. [ADVS]	Microsoft Corp. [MSFT]
Affiliated Computer Services, Inc. [ACS]	MicroStrategy Inc. [MSTR]
Akamai Technologies, Inc. [AKAM]	Morningstar, Inc. [MORN]
American Greetings Corp. [AM]	Move, Inc. [MOVE]
Ariba, Inc. [ARBA]	National Instruments Corp. [NATI]
Art Technology Group Inc. [ARTG]	NeuStar, Inc. [NSR]
AT&T Inc. [T]	New York Times Co. [NYT]
athenahealth, Inc. [ATHN]	NextWave Wireless, Inc. [WAVE]
Autodesk, Inc. [ADSK]	NIC, Inc. [EGOV]
Automatic Data Processing, Inc. [ADP]	Nuance Communications, Inc. [NUAN]
Belo Corp [BLC]	Omniture, Inc. [OMTR]
Blackbaud, Inc. [BLKB]	Online Resources Corp. [ORCC]

Information	
Blackboard, Inc. [BBBB]	Openwave Systems, Inc. [OPWV]
BMC Software, Inc. [BMC]	OPNET Technologies, Inc. [OPNT]
Bottomline Technologies, Inc. [EPAY]	Oracle Corp. [ORCL]
CA, Inc. [CA]	PAETEC Holding Corp. [PAET]
Cablevision Systems Corp. [CVC]	Parametric Technology Corp. [PMTC]
Cadence Design Systems, Inc. [CDNS]	Pegasystems Inc. [PEGA]
Callidus Software, Inc. [CALD]	Phase Forward, Inc. [PFWD]
CBS Corp. [CBS]	Phoenix Technologies Ltd. [PTEC]
Centennial Communications Corp. [CYCL]	Playboy Enterprises, Inc. [PLA]
CenturyTel, Inc. [CTL]	Premiere Global Services, Inc. [PGI]
Charter Communications, Inc. [CHTR]	Priceline.com, Inc. [PCLN]
Cincinnati Bell, Inc. [CBB]	Progress Software Corp. [PRGS]
Citrix Systems, Inc. [CTXS]	PROS Holdings, Inc. [PRO]
Comcast Corp. [CMCSA]	QAD Inc. [QADI]
Commvault Systems Inc [CVLT]	Quest Software, Inc. [QSFT]
Compuware Corp. [CPWR]	RealNetworks, Inc. [RNWK]
Concur Technologies, Inc. [CNQR]	Red Hat, Inc. [RHT]
CoStar Group, Inc. [CSGP]	Rightnow Technologies, Inc. [RNOW]
Cox Radio, Inc. [CXR]	salesforce.com, inc. [CRM]
CSG Systems Int'l, Inc. [CSGS]	Sapient Corp. [SAPE]
CyberSource Corp. [CYBS]	SAVVIS, Inc. [SVVS]
DealerTrack Holdings, Inc. [TRAK]	Scholastic Corp. [SCHL]
Deltek, Inc. [PROJ]	Sirius XM Radio Inc. [SIRI]
DIRECTV Group, Inc (The) [DTV]	Smith Micro Software, Inc. [SMSI]
DreamWorks Animation, Inc. [DWA]	Sonic Solutions [SNIC]
DST Systems, Inc. [DST]	Sprint Nextel Corp. [S]
E.W. Scripps Co. (The) [SSP]	SPSS, Inc. [SPSS]
EarthLink, Inc. [ELNK]	SuccessFactors, Inc. [SFSF]
eBay, Inc. [EBAY]	SumTotal Systems, Inc. [SUMT]
Electronic Arts Inc. [ERTS]	SupportSoft, Inc. [SPRT]
Embarq Corp. [EQ]	Sybase, Inc. [SY]
Epicor Software Corp. [EPIC]	Symantec Corp. [SYMC]
EPIQ Systems, Inc. [EPIQ]	Symyx Technologies, Inc. [SMMX]
Equinix, Inc. [EQIX]	Synopsys, Inc. [SNPS]
eResearchTechnology, Inc. [ERES]	Taleo Corp. [TLEO]
FactSet Research Systems, Inc. [FDS]	TechTarget, Inc. [TTGT]
Fairpoint Communications [FRP]	Telephone and Data Systems, Inc. [TDS]
Fiserv, Inc. [FISV]	Teradata Corp. [TDC]
GeoEye, Inc. [GEOY]	THQ, Inc. [THQI]
Hewitt Associates, Inc. [HEW]	Tibco Software, Inc. [TIBX]
Hughes Communications, Inc. [HUGH]	Time Warner, Inc. [TWX]
i2 Technologies, Inc. [ITWO]	TiVo, Inc. [TIVO]
Informatica Corp. [INFA]	Ultimate Software Group, Inc. (The) [ULTI]
InfoSpace, Inc. [INSP]	United Online, Inc. [UNTD]
Interactive Data Corp. [IDC]	United States Cellular Corp. [USM]
InterNAP Network Services Corp. [INAP]	ValueClick, Inc. [VCLK]
Internet Capital Group, Inc. [ICGE]	VeriSign, Inc. [VRSN]
Interwoven, Inc. [IWOV]	Verizon Communications [VZ]
Intuit, Inc. [INTU]	Vignette Corp. [VIGN]

Information

Iowa Telecommunications Services, Inc. [IWA]	Vital Images, Inc. [VTAL]
iPCS, Inc. [IPCS]	Vonage Holdings Corp. [VG]
JDA Software Group, Inc. [JDAS]	Walt Disney Co. (The) [DIS]
Journal Communications, Inc. [JRN]	Warner Music Group Corp. [WMG]
Lawson Software, Inc. [LWSN]	Websense, Inc. [WBSN]
Level 3 Communications, Inc. [LVLT]	Windstream Corp. [WIN]
Lionbridge Technologies, Inc. [LIOX]	World Wrestling Entertainment, Inc. [WWE]
Liveperson, Inc. [LPSN]	Yahoo! Inc. [YHOO]

Finance and Insurance

ACE Limited [ACE]	Interactive Brokers Group, Inc. [IBKR]
Aetna, Inc. [AET]	IntercontinentalExchange, Inc. [ICE]
AFLAC, Inc. [AFL]	Int'l Assets Hldg Co [IAAC]
Allstate Corp. (The) [ALL]	Invesco Ltd [IVZ]
American Express Co. [AXP]	Janus Capital Group, Inc. [JNS]
Amerigroup Corp. [AGP]	JPMorgan Chase & Co. [JPM]
Ameriprise Financial, Inc. [AMP]	Legg Mason, Inc. [LM]
Anchor Bancorp Wisconsin, Inc. [ABCW]	Lehman Brothers Holdings Inc. [LEHMQ]
Argo Group Int'l Holdings [AGII]	Lincoln National Corp. [LNC]
Associated Banc-Corp [ASBC]	Loews Corp. [L]
Assurant, Inc. [AIZ]	M&T Bank Corp. [MTB]
Bank of America Corp. [BAC]	Marsh & McLennan Companies, Inc. [MMC]
Bank of New York Mellon Corp. (The) [BK]	Marshall & Ilsley Corp. [MI]
BlackRock, Inc. [BLK]	MasterCard Inc. [MA]
BOK Financial Corp. [BOKF]	Metavante Technologies, Inc. [MV]
Boston Private Financial Holdings, Inc. [BPFH]	Metlife, Inc. [MET]
Capital One Financial Corp. [COF]	Molina Healthcare, Inc. [MOH]
Centene Corp. [CNC]	MoneyGram Int'l, Inc. [MGI]
Chemical Financial Corp. [CHFC]	Morgan Stanley [MS]
Chimera Investment Corp. [CIM]	NASDAQ OMX Group, Inc. [NDAQ]
Chubb Corp. [CB]	National Interstate Corp. [NATL]
CIGNA Corp. [CI]	Northern Trust Corp. [NTRS]
CIT Group, Inc. [CIT]	NYSE Euronext [NYX]
Citigroup Inc. [C]	OneBeacon Insurance Group Ltd [OB]
Citizens & Northern Corp. [CZNC]	Penson Worldwide, Inc. [PNSN]
City National Corp. [CYN]	Peoples Bancorp Inc. [PEBO]
CNA Financial Corp. [CNA]	PHH Corp. [PHH]
Comerica Inc. [CMA]	PMI Group, Inc. [PMI]
Commerce Bancshares, Inc. [CBSH]	PNC Financial Services Group, Inc. [PNC]
Delphi Financial Group, Inc. [DFG]	Progressive Corp. (The) [PGR]
Discover Financial Services [DFS]	Prudential Financial, Inc. [PRU]
E*Trade Financial Corp. [ETFC]	Raymond James Financial, Inc. [RJF]
East West Bancorp, Inc. [EWBC]	Regions Financial Corp. [RF]
Eaton Vance Corp. [EV]	RiskMetrics Group Inc. [RMG]
eHealth, Inc. [EHTH]	RLI Corp. [RLI]
Employers Holdings, Inc. [EIG]	Schwab (Charles) Corp. [SCHW]
Encore Capital Group, Inc. [ECPG]	SEI Investments Co. [SEIC]
Erie Indemnity Co. [ERIE]	Selective Insurance Group, Inc. [SIGI]

Finance and Insurance

Everest Re Group, Ltd. [RE]	State Street Corp. [STT]
Express Scripts, Inc. [ESRX]	SunTrust Banks, Inc. [STI]
Fannie Mae [FNM]	T. Rowe Price Group, Inc. [TROW]
Federated Investors, Inc. [FII]	TCF Financial Corp. [TCB]
Fidelity National Financial, Inc. [FNF]	TD AMERITRADE Holding Corp. [AMTD]
Fifth Third Bancorp [FITB]	TNS, Inc. [TNS]
First American Corp. (The) [FAF]	TradeStation Group, Inc. [TRAD]
First Citizens BancShares, Inc. [FCNCA]	Travelers Companies, Inc. (The) [TRV]
First Financial Bancorp. [FFBC]	U.S. Bancorp [USB]
First Horizon National Corp. [FHN]	Umpqua Holdings Corp. [UMPQ]
First Marblehead Corp (The) [FMD]	Union Bankshares Corp. [UBSH]
Flagstar Bancorp, Inc. [FBC]	UnitedHealth Group Inc. [UNH]
Freddie Mac [FRE]	Unum Group [UNM]
Guaranty Bancorp [GBNK]	Visa Inc. [V]
Hanover Insurance Group, Inc. (The) [THG]	WellCare Health Plans, Inc. [WCG]
Harleysville Group, Inc. [HGIC]	WellPoint, Inc. [WLP]
Hartford Financial Services Group (The) [HIG]	Wells Fargo & Co. [WFC]
HCC Insurance Holdings, Inc. [HCC]	Western Union Co. (The) [WU]
Health Net, Inc. [HNT]	Wilmington Trust Corp. [WL]
Huntington Bancshares Inc. [HBAN]	Wright Express Corp. [WXS]
Independent Bank Corp.-Michigan [IBCP]	Zions BanCorp. [ZION]
Infinity Property and Casualty Corp. [IPCC]	

Real Estate and Rental and Leasing

Avis Budget Group, Inc. [CAR]	McGrath RentCorp. [MGRC]
CB Richard Ellis Group, Inc. [CBG]	Redwood Trust, Inc. [RWT]
CEVA, Inc. [CEVA]	RSC Holdings, Inc. [RRR]
Choice Hotels Int'l, Inc. [CHH]	Ryder System, Inc. [R]
DTS Inc. [DTSI]	United Rentals, Inc. [URI]
Equity Residential [EQR]	Wyndham Worldwide Corp. [WYN]
Hertz Global Holdings, Inc. [HTZ]	United Rentals, Inc. [URI]
Jones Lang LaSalle Inc. [JLL]	Wyndham Worldwide Corp. [WYN]
LoopNet, Inc. [LOOP]	

Professional, Scientific, and Technical Services

Accenture Ltd. [ACN]	Manhattan Associates, Inc. [MANH]
AECOM Technology Corp. [ACM]	ManTech Int'l Corp. [MANT]
Alliance Data Systems Corp. [ADS]	Mercury Computer Systems, Inc. [MRCY]
Allscripts-Misys Healthcare Solutions, Inc. [MDRX]	Michael Baker Corp. [BKR]
Arbitron Inc. [ARB]	Micros Systems, Inc. [MCRS]
ATC Technology Corp. [ATAC]	Monster Worldwide, Inc. [MWW]
BigBand Networks, Inc. [BBND]	Navigant Consulting, Inc. [NCI]
Block (H&R), Inc. [HRB]	NCI, Inc. [NCIT]
Broadridge Financial Solutions, Inc. [BR]	NetScout Systems, Inc. [NTCT]
CBIZ, Inc. [CBZ]	Novell, Inc. [NOVL]
Cerner Corp. [CERN]	PAREXEL Int'l Corp. [PRXL]
CIBER, Inc. [CBR]	Paychex, Inc. [PAYX]
Cogent, Inc. [COGT]	PDF Solutions, Inc. [PDFS]
Computer Sciences Corp. [CSC]	Perot Systems Corp. [PER]
comScore, Inc. [SCOR]	PharmaNet Development Group, Inc. [PDGI]
Constant Contact, Inc. [CTCT]	PRG-Schultz Int'l, Inc. [PRGX]
Corporate Executive Board Co. [EXBD]	Radiant Systems, Inc. [RADS]
Covance, Inc. [CVD]	S1 Corp. [SONE]
CPI Corp. [CPY]	SAIC, Inc. [SAI]
CRA Int'l, Inc. [CRAI]	SeaChange Int'l, Inc. [SEAC]
DivX, Inc. [DIVX]	SRA Int'l, Inc. [SRX]
Duff & Phelps Corp [DUF]	Stanley, Inc. [SXE]
Eclipsys Corp. [ECLP]	Sykes Enterprises, Inc. [SYKE]
F5 Networks, Inc. [FFIV]	TeleCommunication Systems, Inc. [TSYS]
FTI Consulting, Inc. [FCN]	Tetra Tech, Inc. [TTEK]
Gartner, Inc. [IT]	The Advisory Board Co. [ABCO]
Huron Consulting Group Inc. [HURN]	Tyler Technologies, Inc. [TYL]
ICF Int'l, Inc. [ICFI]	Unisys Corp. [UIS]
IMS Health Inc. [RX]	URS Corp. [URS]
Integral Systems, Inc. [ISYS]	UTI Worldwide Inc [UTIW]
Int'l Business Machines Corp. [IBM]	VistaPrint Limited [VPRT]
Interpublic Group of Companies, Inc. [IPG]	VSE Corp. [VSEC]
Jackson Hewitt Tax Service, Inc. [JTX]	Watson Wyatt Worldwide, Inc. [WW]
Kendle Int'l, Inc. [KNDL]	Wind River Systems, Inc. [WIND]
Keynote Systems, Inc. [KEYN]	Watson Wyatt Worldwide, Inc. [WW]
L-1 Identity Solutions, Inc. [ID]	Wind River Systems, Inc. [WIND]
LECG Corp. [XPRT]	

Educational Services

Apollo Group, Inc. [APOL]	ITT Educational Services, Inc. [ESI]
Capella Education Co. [CPLA]	Learning Tree Int'l, Inc. [LTRE]
Career Education Corp. [CECO]	Strayer Education, Inc. [STRA]
Corinthian Colleges, Inc. [COCO]	Universal Technical Institute, Inc. [UTI]
DeVry Inc. [DV]	

Administrative and Support and Waste Management and Remediation Services

Administaff, Inc. [ASF]	Kelly Services, Inc. [KELYA]
AMN Healthcare Services, Inc. [AHS]	Kforce, Inc. [KFRC]
Brink's Co. (The) [BCO]	Magellan Health Services, Inc. [MGLN]
CDI Corp. [CDI]	Manpower Inc. [MAN]
Clean Harbors, Inc. [CLH]	Maximus, Inc. [MMS]
Comsys IT Partners Inc. [CITP]	Moody's Corp. [MCO]
Convergys Corp. [CVG]	MPS Group, Inc. [MPS]
Cross Country Healthcare, Inc. [CCRN]	Robert Half Int'l Inc. [RHI]
DynCorp Int'l, Inc. [DCP]	Spherion Corp. [SFN]
EnerNOC, Inc. [ENOC]	Team, Inc. [TISI]
Equifax Inc. [EFX]	TeleTech Holdings, Inc. [TTEC]
Expedia, Inc. [EXPE]	TrueBlue, Inc. [TBI]
Geo Group, Inc. (The) [GEO]	Volt Information Sciences, Inc. [VOL]
IHS Inc [IHS]	Waste Management, Inc. [WMI]

Health Care and Social Assistance

Amedisys, Inc. [AMED]	Healthspring, Inc. [HS]
Assisted Living Concepts, Inc. [ALC]	Healthways, Inc. [HWAY]
Brookdale Senior Living, Inc. [BKD]	Humana Inc. [HUM]
Coventry Health Care, Inc. [CVH]	Kindred Healthcare Inc [KND]
DaVita, Inc. [DVA]	Laboratory Corp. of America Holdings [LH]
Emergency Medical Services Corp. [EMS]	MedCath Corp. [MDTH]
Emeritus Corp. [ESC]	Quest Diagnostics Inc. [DGX]
Gentiva Health Services, Inc. [GTIV]	RehabCare Group, Inc. [RHB]
Health Management Associates, Inc. [HMA]	Tenet Healthcare Corp. [THC]
HealthSouth Corp. [HLS]	Universal Health Services, Inc. [UHS]

Arts, Entertainment, and Recreation

Bally Technologies, Inc. [BYI]	Penn National Gaming, Inc. [PENN]
Int'l Game Technology [IGT]	Scientific Games Corp. [SGMS]
MGM Mirage, Inc. [MGM]	WMS Industries, Inc. [WMS]
Multimedia Games Inc. [MGAM]	

Accommodation and Food Services

Brinker Int'l, Inc. [EAT]	Marriott Int'l, Inc. [MAR]
Burger King Holdings, Inc. [BKC]	McDonald's Corp. [MCD]
Cheesecake Factory, Inc. (The) [CAKE]	Panera Bread Co. [PNRA]
CKE Restaurants, Inc. [CKR]	Starbucks Corp. [SBUX]
Domino's Pizza, Inc. [DPZ]	Starwood Hotels and Resorts Worldwide, Inc. [HOT]
Jack in the Box, Inc. [JACK]	Yum! Brands, Inc. [YUM]

Other Services (except Public Administration)

G&K Services, Inc. [GKSR]	Service Corp. Int'l [SCI]
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Graduate School
Southern Illinois University

Andrew J. Aken

Date of Birth: November 20, 1963

Current Address: 1323 N Lincoln Ave.; Apt 1004A; Urbana, IL 61801

Permanent Address: 173 Cherry Lane; Murphysboro, IL 62966

ajaken@akenbros.com

Southern Illinois University Carbondale
Bachelor of Science, Computer Science, May 1991

Southern Illinois University Carbondale
Master of Science, Computer Science, May 1993

Special Honors and Awards:

2006-2007 Outstanding Term Faculty of the Year

2004-2006 Nominated for SIU Term Faculty of the Year Award

National Dean's List

Dissertation Title:

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Aken, A. (2009). "The Reciprocal Impact of Strategic Information Systems on Organizational Structure." In Proceedings of the 2009 Hawaii International Conference on Business (Honolulu, Hawaii, USA, June 12 – 15, 2009).

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