

See the Good, Speak the Good, Do the Good:
Three Essays on Organizational Change for Sustainability

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ABSTRACT

PETER JACK GALLO: See the Good, Speak the Good, Do the Good: Three Essays on Organizational Change for Sustainability
(Under the direction of Albert Segars)

This research provides a descriptive analysis of radical organizational change in the context of corporate adoption of sustainability policies. The study consists of three essays which focus on three different aspects of change towards sustainability. The first essay uses survey data from 922 senior-level executives and is aimed at understanding how the concept of sustainability is framed by organizations and their managers. By contrasting the practical application of sustainability principles with the varied academic definitions in the literature, this essay provides a further refinement on the theoretical understanding of corporate sustainability. Survey results demonstrate a widespread use of uni-dimensional definitions of sustainability, and there is evidence that size and ownership impact the dimensionality of managers' sustainability definitions.

The second essay investigates how organizations determine the content of a change process. In particular, it tests whether the diffusion of a specific environmental practice (implementation of environmental management systems) is directed by institutional pressures. I argue that change may be suboptimal if the choice of change is driven by these institutional pressures rather than by firm specific contingencies. Therefore, this essay examines one mechanism by which action towards organizational change can fail to attain beneficial results for the organization. The study finds that institutional pressures do impact

the adoption of environmental practices; however the direction of impact for mimetic pressures is in the opposite direction of that theorized. These results reveal some interesting differences between mimetic pressures for market versus non-market driven corporate objectives.

The final essay analyzes the process and implementation of organizational change toward sustainability. Using a simulation methodology this essay studies how different change sequences impact the duration and performance of a change process. The simulations show that the sequence in which different organizational elements are changed does indeed impact the length of the period of organizational transformation. The results also demonstrate a relationship between sequence and a firm's ability to maintain or recover competencies during a period of transition. With these three essays, my dissertation captures the evolution of organizational change by analyzing; 1) how the need for change is framed, 2) what organizational elements are selected for adaptation, and 3) the order in which these elements are changed.

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CHAPTER 1

INTRODUCTION

In the last decade there has been increased interest in the concept of sustainability in business. While the exact meaning of the term is not always clear, it generally references corporate strategy that incorporates more attention to the social and environmental impacts of a firm's operations. In more recent years, skyrocketing natural resource costs and the increasing incidence of extreme weather events have led the business press and some more traditional corporations to embrace the concept of sustainability. Issues of corporate social responsibility (CSR) and environmental management (EM) are not new to the management literature; in fact some highly seminal work in strategic management addressed the responsibilities that firms owe to society (Learned, Christensen, Andrews, & Guth, 1965). Since Learned et al.'s chapter on "relating corporate strategy and moral values" the literature has produced some excellent work on social and environmental management issues; however studies that address sustainability in a more holistic manner have been rarer. The aim of this research is to develop some theoretical insights into how firms are responding to the concept of sustainability and the strategic implications of this response.

Much of the existing management literature in this area focuses on the drivers of sustainability practices in corporations. (Why companies implement beyond compliance pollution standards, for example) An almost equal number of studies are dedicated to testing the link between sustainability performance and firm financial performance. However,

relatively little of the literature focuses on what practices companies pursue once they choose to act on sustainability and how successful these practices are at addressing the environmental and social challenges they intend to improve. Some scholars have argued that the contractarian view of the firm has led many researchers to study the link between corporate social performance (sustainability practices) and corporate financial performance to the detriment of research into the descriptive and normative dimensions of corporate sustainability practice (Margolis & Walsh, 2003).

This dissertation intends to provide solid descriptive analysis of the process by which firms respond to the challenges of sustainability. The main emphasis of this work will be on the process of sustainability, a process of ongoing organizational adaptation. Theories of strategic alignment and structural contingency have encouraged many studies of organizational change and adaptation; however these studies most often focus on adaptation to changes faced in the task environment. How do firms change in response to shifts in the markets for capital, inputs of production, customer demand? These are environmental changes that have a direct impact on a firm's operations. However, firms also face a dynamic general environment, which can create indirect impacts on firm performance. The challenge of sustainability is to successfully monitor changes in the general environment and determine which necessitate adaptation for sustained competitive advantage. One reason that the content of sustainability definitions can be quite ambiguous (i.e. does it include climate change considerations, fair labor standards, or animal rights), is that by definition these content issues will become more or less salient as an organization interacts with its task and general environment. Rather than focus on a list of environmental or social issues as a means

of defining sustainability, this work defines sustainability as the process of adapting to the task and general environment.

To understand this process the three essays will address three separate stages of organizational change, the see, speak, and do of the title. The first essay addresses how firms are interpreting the concept of sustainability. The management and policy literatures have produced a number of definitions for the sustainability concept; however it is not clear which of these definitions, if any, resonates with firms. The second essay focuses on how firms determine the content of a sustainability change initiative. Even if there was universal consensus on the definition of sustainability, exactly how firms translate this definition into concrete actions is an important area of study. Finally, the third study focuses on the implementation of sustainability strategies. The link between sustainability initiatives and traditional metrics of corporate success are sometimes tenuous, therefore implementation strategies for these initiatives may be quite different than those traditionally used for organizational change.

See the Good: Organizational Conceptions of Sustainability

This chapter is focused on understanding how firm's are defining sustainability in practice. While the management and policy literatures have produced a number of definitions for sustainability, few studies have investigated which definitions are taking hold in corporate practice. Firms' interpretation of the sustainability concept is not shaped by academics alone. The recent increase in media coverage of sustainability issues creates additional sources of firm influence. This media dialogue around sustainability is increasing as exemplified by the many business publications and leisure magazines producing "green"

issues in recent years: *Fortune*, *Vanity Fair*, *Sports Illustrated*, *Outside*. All of this discussion of sustainability is occurring without a consensus definition in place. Some publications seem to use the term interchangeably with the idea of environmental responsibility, while others make reference to the variety of definitions that have emerged in the policy literature. While this increased media attention is good news for activists supporting environmental or social responsibility, it contributes to the ambiguity surrounding the term sustainability. Therefore, different organizations and even different individuals in the same organization can hold sustainability definitions that vary greatly. If firms can have very distinct definitions of sustainability, then comparing organizational change towards sustainability is not possible unless we study firm level understanding of the concept of sustainability and how it is interpreted by individuals.

The first study will attempt to address this challenge by analyzing the sustainability policies of firms, as elaborated by its managers. We use a survey instrument to determine the prevalence of formal sustainability policies and practices and how these policies address the social, financial and environmental dimensions of sustainability. These results are used to determine the impact of organizational characteristics on the choice of sustainability policy and the prevalence of sustainability reporting.

The survey also incorporated an open-ended question that asked respondents to provide their firm's definition of sustainability in comparison to a general definition provided. While the answers to this question don't provide quantitatively useful data, they do provide some useful insight into the translation of formal written corporate policy into managerial understanding. The purpose of this open ended question is exploratory and is aimed at providing some insight into the prevalence of common sustainability elements

(environment, social, intergenerational) in managers' definitions of sustainability. The distribution of responses is presented and discussed separately from the empirical results of the likert-type questions.

Speak the Good: Corporate Adoption of Environmental Management Practices

Chapter three investigates how companies determine which activities or practices to adopt in response to sustainability. The work in chapter two emphasized the considerable ambiguity in the definition of sustainability. Therefore, in order to study the content of sustainability change initiatives it was necessary to choose a content area from a more universally understood dimension of sustainability. For example, changes in the regulatory and socio-cultural sectors of the general environment in regards to environmental conservation have been consistently increasing for the last thirty years, and have also increasingly crossed over into the task environment of firms. As a result, a majority of firms now understand that corporate action must be taken to improve environmental performance. These increased regulatory, stakeholder, and strategic pressures to improve environmental performance can lead companies to implement a variety of environmental management practices. However, institutional forces can arise to promote certain environmental management practices over others (DiMaggio and Powell, 1983). These institutional forces can lead companies to choose change actions which may not best address their specific environmental challenges. This chapter investigates this phenomenon by studying the impact of isomorphic pressures on the implementation of environmental management systems in US firms.

Using data from the US Toxic Release Inventory from 1996-2005, the implementation of environmental management systems at publicly traded firms with US manufacturing facilities are identified. The implementation history is used to test the predictions of institutional theory and to parse out the influence of mimetic, normative and coercive isomorphism on the adoption of EMS at US manufacturing facilities. The study does identify a trend towards isomorphism over the ten year period (well over 50% of US manufacturing facilities have an EMS by the end of the study period), however the contribution of mimetic pressures is contrary to the results of previous isomorphism studies.

Do the Good: The Sequencing of Organizational Change

This chapter is concerned with the process by which sustainability changes are implemented. The process by which firms implement organizational change is an important and understudied dimension of the adaptation literature. In the sustainability literature, the question of implementation could possibly explain why some firms have success with sustainability initiatives while others don't. Actions in response to changing environments are often multifaceted and complex and allow for a variety of implementation strategies. Following one strategy over another could easily lead to the variances in performance captured in some of the sustainability literature.

One key aspect of organizational change is that it breaks up existing organizational routines, which contributes to a drop in firm competency (Amburgey, Kelly and Barnett 1993). Once the change process has concluded, a firm develops new routines and can recover and perhaps surpass previous competency levels. This suggests that the period of change is a time of vulnerability for the firm, and a faster change will allow a firm to recover

competency sooner. The punctuated equilibrium literature provides a descriptive theory which predicts that transformative change occurs rapidly (Tushman and Romanelli 1985). However, there is evidence of both rapid and gradual transformation in the literature. These differences may be explained by the sequence in which change is implemented. This study investigates if differences in implementation can impact the duration and performance of organizational change.

Computational methodologies are used to investigate how the sequence in which organizational changes are implemented will impact the speed of the transformation process. The computational methodology allows for a generalized investigation of this question and the results are not specific to transformations inspired by sustainability. However, the speed of a transformation process is a particularly relevant metric for sustainability given the urgency of many social and environmental challenges that firms may face. Efforts to transform corporate behavior towards a more ecologically and environmentally responsible paradigm will require adaptation to various elements of corporate strategies and structures. The investigation in this study should provide some early insight for understanding how the sequence in which these elements are addressed may lead to quicker and more effective sustainability change.

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CHAPTER 2

ORGANIZATIONAL CHARACTERISTICS AND CONCEPTIONS OF SUSTAINABILITY

Questions about the corporate role in environmental renewal or degradation and questions about the boundaries of firm social responsibilities increasingly concern academics and non-academics alike (Pollan, 2008; Porter & Kramer, 2006). The term “corporate sustainability” can encompass these issues and now pervades the industry press and business journals (Engardio, 2007; Montiel, 2008). In particular, with greater usage of the term “sustainability” there has been a concomitant rise in the prevalence of corporate sustainability reports (Dittrick, 2007; GRI 2009) —which potentially relates to an increase in sustainability-related behaviors on the part of the firm. While researchers and practitioners continue to debate the exact meaning of the term, many definitions indicate that “sustainability” refers to economic and/or ecological and/or social aspects of the relationship between business and society. Management scholars originally used the term to refer to organizational survival in strictly financial terms (Baumol, Bailey, & Willig, 1977; Dierickx & Cool, 1989). However, over time, strategic management principles of sustained competitive advantage converged with organizational research on corporate social responsibility (CSR), ecological economics, and environmental management to evolve a new understanding of sustainability—one that incorporates more than continued financial success (Gladwin, Kennelly, & Krause, 1995; Sharma & Henriques, 2005; Starik & Rands, 1995).

Specifically, newer definitions encompass the idea that organizations must address financial, social, and environmental impacts of their actions in order to strive for full “sustainability” (Montiel, 2008). However, to date, most work in the management field has effectively focused on CSR (Hemingway & MacLagan, 2004; for meta-analyses see Margolis & Walsh, 2003; Orlitzky, Schmidt, & Rynes, 2003; Scholtens, 2006), or environmental management (Bansal & Hunter, 2003; Christmann, 2004; Delmas & Montiel, 2008; Sharma, Pablo, & Vredenburg, 1999; Williamson, Lynch-Wood, & Ramsay, 2006) instead of on “sustainability” as a multidimensional construct comprised of these elements and more (for exceptions see Bansal, 2005; Wheeler & Elkington, 2001). Thus, studies of sustainability as a broader concept that captures the integrative and interdependent nature of the financial, social, and environmental dimensions of the sustainability definition are rare. To date, where empirical studies of sustainability have been undertaken, they have usually focused on single industries (Shrivastava, 1995; Bansal, 2005) or single dimensions, such as environmental strategy (Sharma & Vredenburg, 1998).

If sustainability is a new and more complete construct to describe particular individual and firm behaviors then it may have different antecedents and different outcomes than do these related constructs of CSR, environmental management, ethics, or ecology. Thus, it seems necessary to focus on how firms define *and* enact sustainability in order to understand more about its nature and relationships with other constructs. For example, no research has focused on which firm characteristics relate to how firms define the concept of sustainability or how they support sustainability-- and less work focuses on firm sustainability reports. Data from senior managers about these phenomena would make contributions to the strategy and the organizational behavior literatures as it would increase

academic understanding of definitions-in-use and work environments while also enabling refined approaches to the management audience. The study contributes to research that focuses on sustainability as a multidimensional concept distinct from environmental management and corporate social responsibility alone. This study builds on previous sustainability work by studying drivers of corporate definitions, support, and reporting for sustainability policies in a multi-industry sample that includes both public and private firms.

In pursuing such a study, I investigated firm-level characteristics and top management accounts of sustainability-related policies and practices as well as the presence or absence of corporate sustainability reports across multiple industries in both public and private firms. The study unfolds as follows: after describing background information on the history of the term sustainability, stakeholder theory (Freeman, 1984) is used to suggest which firm characteristics relate to multidimensional firm sustainability definitions. The study proceeds to use theories of corporate control mechanisms (Ouchi, 1979, 1980) and corporate culture (Mischel, 1977) to suggest firm characteristics that relate to supportive behaviors such as the presence of corporate sustainability policies and reports. I introduce the data sample; discuss the econometric tools, and present results in the methodology section. The study closes with a discussion of results and implications for future research.

Defining Sustainability: A Multi-Dimensional Term

Historically, the term “sustainability” as used primarily in biology described the potential for a process or condition to be maintained indefinitely (Holdren, Daily, & Ehrlich, 1995). In the strategic management literature the word was often used in reference to

corporations and their day-to-day evolutionary struggles to survive. This interpretation is best exemplified by the Resource Based View of the firm with its premise that the goal of a firm is to attain *sustained competitive advantage* (Barney, 1991; Peteraf, 1993). More recently, the term describes corporate agendas which integrate a variety of financial and (potentially) extra-financial goals including: social responsibility, environmental preservation, poverty alleviation, and stakeholder engagement. Though the use of the term “sustainability” to address these varied corporate goals and the teaching of sustainability in business school curricula is more recent (Christensen, Peirce & Hartmann, 2007), the idea that firms carry a certain responsibility for the public good is long standing in the management literature (Learned, Christensen, Andrews, & Guth, 1965).

For example, in their collection of classic case studies (1965), Learned and his colleagues presented a framework for strategy formulation that called for the manager to identify and accept “the social responsibilities of the firm.” Even in the earliest years of the environmental movement, the authors realized that “...new emphasis on the conservation of natural resources, the purification of waterways and atmosphere...” would significantly impact firm strategies and their impact on society (Learned et al., 1965). Therefore, there is evidence that as early as 1965 there existed an argument for firm strategies to take into account impacts on social and environmental welfare.

The social responsibility of the firm espoused by Learned and colleagues was later enhanced by academic interest in corporate ethics and corporate social responsibility (Elbing 1970). Over time, as the impacts of firm activities on natural systems became more noticeable and environmental regulations increased, an additional research stream in environmental management emerged (Kneese, 1973). Scholars in these distinct fields have

contributed to the management literature, and—as stated above—an integrative phrase referring to a multiplicity of issues has emerged to be captured in the term “sustainability” (Engardio, 2007; Montiel, 2008). Some representative examples of definitions of sustainability include: The Brundtland definition from *Our Common Future* (WCED, 1987) and the triple bottom line definition (Elkington, 1994; Elkington 2004).

The Brundtland definition states: “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Most citations of the definition focus on the first sentence of the Brundtland definition (above), with its emphasis on the concept of intergenerational equity. Cites rarely address the concepts of environmental limits and poverty alleviation which dominate the remaining text of the document. A closer look at the Brundtland definition reveals both a clarification that the term “needs” is primarily focused on the needs of the world’s poor and an emphasis on the limits set by the environment’s carrying capacity (WCED, 1987). The additional concepts in the full Brundtland definition, make it clear that sustainability can be considered multidimensional; incorporating economic development, social welfare, and environmental limits with a goal towards intergenerational equity.

Unlike the Brundtland definition, which was developed for a broad audience of policymakers, the triple bottom line definition is newer and was developed specifically for a corporate environment. The triple bottom line perspective focuses corporations’ attention on the social and environmental costs and benefits of their actions, not just the economic (Elkington, 2004). This perspective does not, however, demand that social and environmental consequences be tabulated into fully objective measures that can be aggregated with corporate financial results as suggested by some critics (Norman & MacDonald, 2004).

Advocates of the triple bottom line approach, generally, do not support the idea that social welfare and environmental fitness can be measured by single numbers. The triple bottom line perspective is best understood as a framework aimed at helping firms achieve economic value creation while improving or sustaining social and environmental welfare.

These two definitions compete with a variety of others from fields as divergent as biology, ecology, environmental economics, public policy and development. A full review of the multi-disciplinary definitions of sustainability is beyond the scope of this work. While the variety of multidisciplinary definitions can demonstrate the multi-dimensionality of sustainability relevant to our discussion, they can introduce a number of additional dimensions; connectivity, inclusiveness, equity, prudence, and security (Gladwin, Kennelly, Krause, 1995) beyond those most salient to business managers. However there are two additional definitions worth discussing that can help demonstrate that even the approach to the traditional economic, environmental, and social dimensions can vary greatly among different sustainability conceptions.

The first of these definitions arises from the field of natural resource economics and builds an analytical interpretation of the sustainability concept. Heal (2000) proposes that three axioms are central to sustainability; discounting that places a positive value on the very long run, valuing the economic benefits of environmental assets, and recognizing the constraints of environmental dynamics. With these three axioms it is suggested that the tools of economics can be used to attain sustainable business decisions. The main focus of this definition is economic, however the axioms allow for integrating environmental factors into analytical calculations while the use of utility maximization techniques is supposed to address the social dimension.

Yet another interpretation arises from the proposal that much of the confusion regarding sustainability definitions can be addressed through the use of a sustainability hierarchy to prioritize exactly what is being sustained. The proposed hierarchy has four levels, including sustaining: the survival of humans; human life expectancy and health indicators, survival of species or preservation of human rights, and quality of life and aesthetic benefits (Marshall and Toffel, 2005). Essentially the hierarchy puts less importance on whether an issue is economic, social, or environmental and more importance on the magnitude of a given issue. Therefore, any balancing between dimensions is determined by the hierarchy. A 5% drop in profitability may be considered appropriate if it averts an economic disaster that can impact the survival of the species. Likewise, protecting an endangered species may not be justified if it decimates a regional economy that supports millions of human lives. The hierarchy seems to suggest that there should not be a dominant dimension in the concept of sustainability; however the framing of the hierarchy is clearly designed with the interests of humans in mind which essentially suggests that the social dimension is dominant. Every issue subjected to the hierarchy will be analyzed in terms of its impact on human society.

All four of these definitions incorporate social, environmental, and economic dimensions into the concept of sustainability. However, from this brief introduction it is evident that the weights placed on each dimension can vary greatly. Figure 2.1 provides a rudimentary mapping of these main dimensions across the four definitions discussed here. The chart emphasizes not only that different definitions will emphasize different dimensions, but that the interpretation of dimensions can vary greatly across definitions. This level of complexity arising from just four different conceptualizations of sustainability suggests that

it is tremendously important to understand the definitions of sustainability as understood by managers and employees.

For the purpose of this study the Brundtland and Triple Bottom Line definition provide sufficient foundation for the investigation of firms' assimilation of the sustainability concept—in part because they are frequently cited and expected to be familiar to managers and academics (Hart, 1995; Marshall & Toffel, 2005). Both the triple bottom line and the Brundtland definition conceive of sustainability as incorporating up to three key dimensions (economic, social, and environmental), with the full Brundtland definition specifically incorporating issues of poverty alleviation and intergenerational equity. Thus, one of the earliest and one of the more recent definitions share this dimensionality and expansive scope. Because the triple bottom line approach is more recent and was designed for corporate application, it is used to examine the dimensionality of firm sustainability definitions and other forms of support for sustainability.

Dimensionality of Firm Sustainability Definitions

A broad conception of corporate sustainability definitions accepts that firm policies and practices reflect firm interpretations of sustainability. Such a conception allows one to consider multiple cultural artifacts in the work environment (Florida, Atlas, & Klein, 2001). Accordingly, the mottos, corporate slogans, mission statements, voluntary management systems, and externally audited reporting commitments that companies may adopt in response to the ideas of sustainability reflect corporate definitions of sustainability (Florida, Atlas, & Klein, 2001). While formal and informal statements about activities and beliefs relate to definitions of sustainability, I distinguish between definitions that are one-

dimensional versus those that are multidimensional. For example, the following policy statement from the World Wildlife Fund embodies a one-dimensional motto/policy: “we are in the business of saving our one and only planet”(WWF, 2009). This statement shows a focus on the ecological/environmental aspects of sustainability, but it does not explicitly embrace or include the social or economic. Also, it only loosely implies intergenerational concerns. A slight difference is found in the Procter & Gamble slogan/policy which states: “Sustainability- improving lives now and for generations to come”(P&G, 2009). This policy is more dimensional than the first because it explicitly covers social aspects *and* intergenerational aspects. In stark contrast to both of these organizational statements, consider the example of a multidimensional policy in the vision statement from the Interface carpet manufacturing company: “Our vision is to be the first company that, by its deeds, show the entire industrial world what sustainability represents in all its dimensions: people, process, product, place and profits- by 2020- and in doing so we will become restorative through the power of influence”(Interface, 2009).

This last statement is so explicit and particular that it may be an outlier in the category of artifacts reflecting a multidimensional definition of sustainability. However, its presence signifies the potential scope for such corporate policies. In fact, because of the heterogeneous range of responses represented in this sample of real-world policies, it is vital to distinguish between the presence of a policy and its definitional dimensionality. Therefore, the study investigates formal sustainability policies and the numbers of these policies that incorporate economic, social, and environmental dimensions of sustainability.

Firm Support for Sustainability- Beyond Policies

While understanding definitional specificity of firm sustainability policies is important to understanding how firms enact the term, I argue that defining the sustainability phrase or stating the existence of policies does not provide sufficient evidence of firm support for sustainable endeavors. Thus, I also investigate whether firms create work environments that are supportive of sustainability through the use of codes of conduct and job requirements that help embed sustainability-related behaviors into the corporate culture—such practices reinforce the principles behind the definitions and provide evidence of strategy affecting behavior (Hofmann & Jones, 2005; Mischel, 1977; O'Reilly, 1989). One way to create work environments that are supportive of sustainability is to create work cultures supportive of sustainability-related behaviors. Precedent supports the corollary that when firms want to promote safety behaviors, they must create a safety culture (Hofmann & Morgeson, 1999; Hofmann, Jacobs, Landy, 1995). I argue for the same logic related to sustainability but understand that such attempts may or may not take hold in different firms or within different units of firms (Ouchi, 1979, 1980). Thus, it remains important to study what firm characteristics may have greater or lesser effect on the practices, codes of conduct, and cultural norms related to sustainability.

Sustainability Reporting

The study also investigates the very specific practice of firm sustainability reporting. Evidence suggests that firms increasingly report a commitment to one or more variations of sustainability reports. A joint report of KPMG and the United Nations Environment Program

(UNEP) revealed that in 2006 over half of the Fortune 250 produced sustainability reports (Dittrick, 2007). In 2008, over 966 firms filed the highest standard (G3-compliant) reports with the Global Reporting Initiative; a multi-stakeholder network organization working to advance sustainability through transparency (GRI, 2009). These indicators and research support (Wheeler & Elkington, 2001) suggest that the popularity of the sustainability concept is clearly growing amongst organizations. However, previous studies of corporate reporting behaviors have emphasized environmental (Adams, 2002) or social (Cowen, Ferreri, & Parker, 1987) elements in isolation, and have not studied both. More recently, this practice is changing and researchers have begun to discuss the specific act of sustainability reporting (Gray, 2006a; Gray 2006b; Wheeler & Elkington, 2000). Thus, I extend the growing movement to study the specific act of sustainability reporting by empirically testing firm-level predictors of the practice.

Theory and Hypotheses

The background information provided above motivates the study of 1) the dimensionality of formal sustainability definitions, 2) firm-level support for sustainability, and 3) the prevalence of sustainability reporting. Specifically, I investigate these firm-level sustainability-related behaviors in relation to firm size and firm ownership structure. Organizational size in particular is a common variable in mature strategy research. Previous work with a construct of corporate sustainable development has used organizational size as a control variable citing that the resource based and institutional processes they were studying work through firm size (Bansal, 2005). However, I believe it would be premature to consider

size as a control variable until it is consistently shown to have a relationship with the dependent variables. Instead, I use the lens of control theory (Ouchi, 1979; Jiang, 2009) and stakeholder theory (Freeman, 1984) to explore if and why size (and ownership) have a direct effect on all three sustainability-related firm behaviors.

Organizational Size and Sustainability Behaviors

Larger firms are by nature much more visible organizations and therefore attract the attention and scrutiny of a greater number of stakeholders. These larger firms interact with a greater number and variety of stakeholders, which would influence the complexity and multidimensionality of any formalized sustainability policy (Hart & Sharma, 2004).

Additionally, larger firms presumably have more slack resources in the form of human and financial capital. Previous research has shown that environmental initiatives (Ramus & Steger, 2000; Sharma et al., 1999) and social initiatives (Seifert, Morris, & Bartkus, 2004) require such resources. With sufficient funds and manpower to respond to stakeholders and to react to sustainability-related pressures, larger firms can devote time and attention to sustainability-related details and to researching and using more exhaustive practices.

Therefore:

Hypothesis 1a: As firm size increases, firms will increasingly report sustainability policies that incorporate all three dimensions of sustainability (social, economic, and environmental).

Regarding the issue of corporate support for sustainability, I invoke corporate control arguments to suggest that organizational size positively relates to such support. Early work in the design of organizational control mechanisms indicates that markets, clan behavior, and formal bureaucracy all exert control over employee behavior in a firm (Ouchi, 1979, 1980).

Fines or incentives comprise the market form of control; cultural norms constitute the clan form of control; and policies and codified practices are bureaucratic forms of control. Recent simulation work found evidence that firms get greater control benefits from utilizing multiple control mechanisms and targets (Long, Burton, & Cardinal, 2002).

These finding suggests that a robust corporate sustainability policy that engages and activates employees and managers would incorporate multiple control mechanisms. However, since the benefits of sustainability policies are often hard to quantify, particularly in the short term, the profit focus of most firms makes it unlikely that management justifies the cost of market control—particularly if other forms can work. Instead, there arises a need to manage control internally using some combination of the other two forms (Jiang, 2009; Long et al., 2002). Thus, I investigate whether firms have codes of conduct (bureaucratic control) and/or internalized cultural norms and social expectations (clan control) related to sustainability. Related research on organizational culture indicates that firm-level and work-unit norms exert a strong influence on employee behaviors (DiMaggio & Powell, 1983; Hofmann & Jones, 2005; Mischel, 1977; O'Reilly, 1989) and further indicates that employees themselves can name and identify strong cultures (Hofmann & Jones, 2005).

Given this background, I argue that firm size should affect sustainability-related behaviors in several ways. Certainly, as firms grow they become ever more challenging to manage and ad-hoc management practices are typically replaced by formalized routines and bureaucracy (Watson, 1980). However, bureaucratic rules tend to be explicit in order to promote clarity and replication which may not be as effective in helping employees navigate the complex interdependent dimensions of sustainability. Greater firm size would lead to an increased need to inculcate employee support across a large organization using a variety of

methods (Long et al., 2002). For example, as a large firm attempts increased sustainability, one could expect more clan mechanisms (such as social norms) and an increase in bureaucratic elements (such as codes of conduct) as well as increased specificity in job requirements to emerge at the firm. All of these would be increasingly prevalent due to the larger number of people involved in the effort. Since larger firms tend to increase in formality and complexity they are more likely than smaller firms to turn to clan and bureaucratic control mechanisms such as cultural norms, written rules, job definitions, and codes of conduct in their efforts to support sustainability. Therefore:

Hypothesis 1b: As firm size increases, firms increasingly utilize control mechanism that support sustainability behaviors.

Finally, regarding sustainability reports, the earlier argument regarding the attention and scrutiny of a wider scope of stakeholders would suggest that larger firms would be more likely to engage in sustainability reporting to communicate their sustainability policies to the greater number of constituents interested in and affected by their operations (Freeman, 1984; Donaldson & Lee, 1995; Hart & Sharma, 2004). Larger firms are also in greater need of the legitimacy benefits that can stem from publishing reports and being explicit with stakeholders, as large firms encounter the public more frequently and tend to more often invite public comment (Hart & Sharma, 1995). Larger firms also need license to operate (Shocker & Sethi, 1974) that transparency via reporting enables (Preston & Post, 1975). Therefore:

Hypothesis 1c: As firm size increases, firms will increasingly produce sustainability reports.

To exemplify these claims, consider the case of the retail giant Wal-Mart and the firm's work in sustainability since 2005. Specifically, the company developed a

sustainability policy with a multidimensional definition,¹ it created new formal titles and job descriptions directly related to sustainability (e.g. Chief Sustainability Officer) (a form of bureaucratic control), it attempted to implement voluntary and personal sustainability plans (PSP) (a form of clan control because there are no associated financial incentives) among their 1.3 million employees, and the company began publishing a sustainability report (Plambeck, 2007; Wal-Mart, 2009). Wal-Mart is a publicly- traded organization, so these facts support the arguments above while also illustrating additional arguments about organizational ownership.

Organizational Ownership and Sustainability Behaviors

Previous work in the implementation of environmental management systems (EMS) indicates that publicly traded firms have greater complementary capabilities than private firms—a fact which allows for lower implementation costs (Darnall & Edwards, 2006). Thus, firms may accomplish the same “amount” of sustainability progress for less if they are public versus privately held. These findings in EMS implementation, an activity which represents the environmental dimension of sustainability, suggest that publicly traded firms would be able to incorporate more dimensions of sustainability than private firms with the same use of resources. Publicly traded firms are subject to greater regulatory oversight than private firms from a wide range of institutional actors including the government, banks, stock exchanges and shareholder activist groups. This oversight and interaction with a broad base of stakeholders would likely expose public firms to a greater variety of perspectives on the firm’s financial, social and environmental impacts (Freeman, 1984; Hart & Sharma, 2004).

¹ Definition: Sustainability- sustains the planet; makes individuals happy; affects the community; regular and continuous in one’s daily life; takes visible actions that can be shared with others (Plambeck, 2009 Exhibit 11).

Coping with these additional perspectives likely expand the complexity and multidimensionality of firm formal sustainability definitions. Therefore:

Hypothesis 2a: Publicly traded firms are more likely than privately-owned firms to report sustainability policies that incorporate all three dimensions of sustainability (social, economic, and environmental).

Similarly, as stated above, public firms must comply with regulatory agencies and must provide public validation of compliance or non-compliance with regulations. Agencies and institutional investors can require information and results on a quarterly basis due to the public nature of the firm. Financial or social or environmental setbacks for public firms can motivate bad press and reduce shareholder confidence (Hamilton, 1995). The requirement for evidence and the necessity to avoid bad press implies that public firms become increasingly professional and capable of accomplishing sustainability-related behaviors (Bansal & Clelland, 2004). Research also shows that firms can offset these risks by simply expressing commitment to environmental (Bansal & Clelland, 2004) or social causes (Cowen, Ferreri, & Parker, 1987). This fact creates situations where firms may use social norms and professional expectations (clan mechanisms) as well as formal reporting requirements and job descriptions (bureaucratic mechanisms) along with impression management techniques (Ginzel, Kramer, & Sutton, 1992) in order to engage employees and motivate them to enact sustainability-related behaviors. Thus:

Hypothesis 2b: Publicly traded firms are more likely than privately-owned firms to utilize control mechanisms that support sustainability behaviors.

Many of the arguments described above also apply to the issue of sustainability reporting. For example, the need for public firms to submit to significant requirements for mandatory public disclosure indicates that public firms typically have more experience with reporting than privately held firms. The resource complementarity argument expressed earlier (Darnall

& Edwards, 2006) also suggests that public firms may be able to expand existing reporting structures or use existing staff to focus on sustainability reports more efficiently and cost-effectively than can private firms. Research also indicates that significant legitimacy incentives accrue when firms provide transparency to shareholders in the form of reports and official statements (Bansal & Clelland, 2004). Together, these arguments suggest that public firms are more likely than private firms to offer stakeholders formal sustainability reports. Also, stakeholders of public firms, which include shareholders, have significant power over firms in terms of their ability to grant or revoke the license to operate (Hart & Sharma, 2004) and their literal ability to limit the flow of funds to the firm. This phenomenon has been studied broadly for social responsibility and specifically for reporting (Roberts, 1992; Ullmann, 1985). Stated formally:

Hypothesis 2c: Publicly traded firms will practice sustainability reporting more extensively than will privately held firms.

Data and Methods

Sample

The authors were given a one-time opportunity to add short questions to the quarterly survey of certified public accountants (CPA) carried out by the American Institute of Certified Public Accountants (AICPA). The questions were included in the survey conducted of AICPA Business & Industry members between July 22, 2008 and August 5, 2008. The survey was sent to approximately 23,500 senior managers and the AICPA received 1,293 responses—a response rate of 5.5%. While this rate may at first seem low, in its context it conforms to the historical precedent and the expectations of the AICPA.

According to researchers at the AICPA, a response rate of 5% is typical for this type of quarterly economic outlook survey (personal correspondence with AICPA Research Manager, August 2009). Thus, the addition of these questions neither lifted nor lowered the response rate.

The sample was primarily comprised of respondents in upper management, as over half of the respondents (55%) were CFOs, 5% were CEOs or COOs, and less than 29% were Controllers. Privately owned entities comprised 64% of all responses with 16% of responses coming from public companies, 13% from government, education and not-for-profits, and 6% from foreign owned companies. Ten percent came from organizations with annual revenues of \$1 billion or more, 22% from organizations with \$100 million to under \$1 billion in annual revenues, 49% from organizations with \$10 million to \$100 million and 18% from organizations with under \$10 million in revenues.

The majority of the survey (21 questions) is devoted to standard questions regarding the demographics and economic outlook of the respondents. Towards the end of the survey six questions were added for the purposes of this study (see Appendix 2A for the complete set of questions added). The first additional question offered a definition of sustainability followed by specific questions about the dimensionality of firm sustainability definitions.

The question defined sustainability as:

A broad definition of sustainability encompasses the pursuit of 1) economic vitality, 2) ecological integrity, and 3) social welfare, often referred to as the “triple-bottom-line.”

As detailed in the Appendix, they were asked to consider this definition when characterizing the presence and type of sustainability policy at their firm; as well as when answering

additional questions regarding the extent to which sustainability principles were formalized in a code of conduct or engrained in the culture of the firm.

Dependent Variables

Sustainability Multi-Dimensionality. I measured this dependent variable by asking respondents to select from the following description of the firm's approach to sustainability: nonexistent, ad-hoc, ecological/environmental, or triple bottom line as just defined (See Appendix 2A, Question 22). The survey instrument provided a broad triple bottom line definition of sustainability consistent with the definitions published by the AICPA (AICPA, 2008) rather than expecting respondent's to recall the dimensions of the triple bottom line definition. Cueing the respondent's memory to a particular definition improves accuracy and lowers response distortion and clarifies that respondents had equal opportunity to access the definition under scrutiny (Fowler, 1995).

Originally more response options were included – such as “policy is focused on social issues”-- but the Association limited the response options. Because of the predominance of the environmental dimension in much extant managerial literature (Montiel, 2008) I opted to offer the options listed above. The resulting variable measures the dimensionality of the sustainability definition (entitled SMD in the analysis) as a categorical variable with four categories; I test Hypotheses 1b and 2b by comparing the responses of “triple bottom line” (coded as 4) to the responses of “ecological/environmental” (coded as 3).

Support for Sustainability and Sustainability (versus CSR) Reporting. I constructed measures of sustainability supporting and reporting with questionnaire items that used a five-point Likert-type scale. I used exploratory factor analysis (EFA) followed by confirmatory

factor analysis (CFA) to investigate the relationships between the seven items and the separate sustainability supporting and reporting constructs (Anderson and Gerbing, 1988). A review of the seven items in the Appendix indicates that three items comprise the support for sustainability measure and two items each measure sustainability reporting and CSR reporting—totalling seven. The EFA indicated that the seven items loaded on three distinct variables. This fit with the theory about the variables so I constructed a full CFA model using maximum likelihood estimation to determine the validity of the three measures (chi-square = 45.51, 10 degrees of freedom, $p < 0.001$, CFI = 0.994, RMSEA = 0.0621). The value of the Root Mean Square Error of Approximation (RMSEA) is greater than 0.05 but less than 0.08, which indicates reasonable errors of approximation in the population (Browne and Cudeck, 1993). The parameter loadings were all significant ($p < 0.04$), supporting convergent validity, and the 95% confidence interval for each of the factor covariances did not include unity, supporting discriminant validity (Bollen, 1989). Reliability estimates for the three variables were all greater than 0.60, suggesting good consistency among the items (Nunnally, 1967). The loadings from the CFA model were used as weighting factors to construct aggregate scores for each variable in the final analysis (Pedazhur and Schmelkin, 1991). The resulting variables are named Support for Sustainability (SS), Sustainability Reporting (SR), and Corporate Responsibility Reporting (CRR)².

Independent Variables

Organization Size. Prior work on corporate social responsibility or environmental management have found size measures based on total assets (Bansal, 2005), Fortune 500

² The Corporate Responsibility Reporting measure is used to test the robustness of our regression models and is not used to test hypotheses.

rankings (Cowen, Ferreri and Parker, 1987), and revenue (Patten, 1992) to be significant. Because of these empirical precedents, I chose to represent organizational size using total revenue as opposed to number of employees. The survey offered four response options for revenues. Thus, I used three dummy variables to capture the four levels of revenue. The “Medium” variable was coded as “1” for all responses reporting revenue between \$10 million and \$100 million; zero otherwise. The “Large” variable was coded “1” for all responses reporting revenue between \$100 million and \$1 billion; zero otherwise. The “Extra Large” variable was coded “1” for all responses reporting revenue of \$1 billion or more; zero otherwise. The omitted variable in the analysis is “Small” which represents the \$0 to under \$10 million category.³

Organizational Ownership. Organization ownership structures were reported in five categories, but were condensed to four by combining the Government and Other categories (as they were similar in their non-corporate nature). Three dummy variables served to capture the four ownership categories. The “Public” variable represented firms being a U.S. public company. The “Other” variable used in analysis represents the aforementioned consolidation of the Government, Education, Not-for-Profit and Other categories. Responses indicating any of these categories were coded as “1” zero otherwise. The “Foreign” variable represents foreign-owned firms. The omitted variable in the analysis is “Private” which allows for testing the hypotheses that public firms are more likely than private firms to define, support, and report sustainability.

³ As a robustness check we also compared these results using revenue to results using data on the number of employees. The resulting coefficients had the same direction and significance but the overall model did not have as strong of fit. Both the revenue and employee-based categorical variables are somewhat ordinal, though the intervals between the ordered levels of the measures are not of equal size, which suggests the use of dummy coding. Again, we compared our results with another alternative model that used ordinal representations of the variables (i.e. small=1, medium=2, large=3, x-large=4) and as before, results were similar but the models did not have as strong of fit. Precedent supports using revenue as the measure, so we used this in the final models.

Control Variables

Industry Affiliation. The AICPA survey included 18 industry sectors in the quarterly survey. These sectors were dummy coded into 17 variables; the manufacturing sector was the omitted industry sector in the analysis.

Data Analysis

The final data sample consisted of 992 respondents, after accounting for surveys with missing data. I used multinomial logistic regression to model the impacts of the independent variables on the propensity for triple bottom line (TBL) sustainability definitions versus environmental-only sustainability definitions. For this question, the two independent variables are measured as polytomous categorical variables. In order to study the effects of the polytomous independent variables on the models I tested for the proportion of variance accounted for by a given categorical variable in non-orthogonal and non-experimental research designs as outlined by previous researchers (Pedhazur, 1982). This procedure requires testing the proportion of variance due to a given polytomous categorical variable when it is entered last into the model. For the multinomial logistic regression analysis this is accomplished by using the chi-square difference test between the full and restricted model where the degrees of freedom is calculated by subtracting the number of vectors in each model. I used the 10.0 version of the STATA software package to test the models. I tested the remaining hypotheses using standard OLS regression techniques.

Results

The sample size, means, standard deviations and correlations for the dependent and independent variables are provided in Table 2.1 (excluding the industry dummies). A review of Table 2.1 indicates that most of the pairwise correlations are within acceptable ranges. There are some high correlations in the table, particularly between the employee and revenue measures. However, I used these variables to test for robustness tests of the size variable and not used in the same model so the correlations do not present problems.

I address the hypotheses using a total of eight models, four models to test TBL versus ecological/environmental and two models each for support for sustainability and sustainability reporting. Table 2.2 reports the results from models 1 - 4 which test hypotheses: 1a and 2a. Model 1 starts with a multinomial logistic regression with the 17 industry affiliation dummy variables regressed on the *dimensionality of definition (SMD)* dependent variable. Model 2 incorporates the three vectors representing the polytomous categorical independent variable *Ownership* and Model 3 does the same with the independent variable *Size*. The addition of each of these categorical variables provides a significant increase in the total variance explained by the model as measured by the likelihood-ratio chi-square test ($p < 0.001$). The full model represented in Model 4 includes both sets of independent variables and industry dummies. The likelihood-ratio chi square test run between Model 4 and Model 2 determines if the additional variance explained by including *Size* is significant. Similarly, the test is run between Model 4 and Model 3 to determine if the variance explained by the *Ownership* variable is significant. The tests reveal that the

additional variance explained by each categorical variable is significant, with $p < 0.001$ for *Size* and $p < 0.01$ for *Ownership*.

Model 4 is therefore the full model and it reveals no significant coefficients for the dummy variables representing the *Size* variable; therefore I have no evidence regarding the probability that *Medium*, *Large*, and *X-Large* firms define sustainability as TBL as opposed to ecological/environmental compared with *Small* firms. Hypothesis 1a is therefore not supported. Likewise, the non-significant coefficients on all three *Ownership* dummy variables demonstrate no significant difference in the probability to define sustainability with TBL versus ecological/environmental between the *Other*, *Foreign*, and *Public* categories as compared to the *Private* category. These results are not consistent with the prediction of Hypothesis 2a, that public firms are more likely than private firms to define sustainability as TBL versus ecological/environmental. I find no significant difference between any of the independent variables in the TBL versus ecological/environmental comparison, as most of the variance explained in Model 4 is captured in the differences between other categories of the SMD variable.⁴

Models 5-6 (see Table 2.3) report the results of ordinary least squared regression on the SS dependent variable. Model 6 represents the full model, including both the categorical dummy variables for *Size* and *Ownership*. There was no evidence of heteroskedasticity in the residuals and the variance inflation factors for all variables were less than 2. The coefficient on the *X-Large* variable is significant at the $p < 0.05$ level and indicates that the mean score on *Support for Sustainability* for the *X-Large* group is greater than that for the *Small*. While

⁴ The *Size* and *Ownership* variables result in significant coefficients when comparing the triple bottom line category of SMD with the no policy category (See Appendix C). These results support the idea that larger firms are more likely than smaller firms to implement a TBL defined sustainability policy versus having no sustainability policy at all. However, our hypotheses were based on predicting the difference between one-dimensional sustainability definitions and multi-dimensional ones, so we do not report tests from the rest of the model. Appendix C gives the results from our model for; TBL vs. No Policy, Ecological vs. No Policy, and Ad-hoc vs. No Policy.

this does provide partial support for Hypothesis 1b, it suggests that only of the very largest companies incorporate a combination of control mechanisms to support sustainability within their firms. The remaining results in Model 6 provide full support for Hypothesis 2b ($p < 0.05$) such that the mean score of *Support for Sustainability* for the *Public* group is greater than for *Private*.

Table 2.3 also reports the results of Models 7-8 which represent ordinary least squared regression for the dependent variable *Sustainability Reporting*. Model 8 represents the full model and the variance inflation factors for all variables were acceptable at less than two (Kutner et al., 2004). Due to evidence of heteroskedasticity in a plot of the residuals which was confirmed by running the Breusch-Pagan/Cook-Weisberg test in STATA, I report the robust standard errors in Table 2.3. However, the changes in standard errors are not large enough to impact the significance of any of the coefficients in Model 8. The coefficients on the *X-Large* ($p < 0.001$) and *Large* ($p < 0.1$) variables are significant, indicating that the mean scores on *Sustainability Reporting* for both the *Large* and *X-Large* groups is greater than that for the *Small*. This provides partial support for Hypothesis 1c, by indicating that the two largest size categories are more likely to extensively engage in sustainability reporting than firms in the *Small* category. The regression coefficient on the *Public* variable in Model 8 provides support for Hypothesis 2c ($p < 0.01$) that the mean score of *Sustainability Reporting* for public firms is greater than for privately-held firms. Table 2.4, reported below, presents a summary of all six hypotheses tests.

Models 1, 5 and 7 were run with the *Industry Affiliation* dummy control variables. All three models suggest that the *Industry Affiliation* variables explain very small amounts of the variance in the three dependent variables. However, in the full models there are some

industries that maintain significant regression coefficients. In Model 4, I still find no significant correlations. In Model 6, which predicts scores on the *Support for Sustainability* measure, four industries demonstrate mean scores significantly ($p < 0.01$) lower than those for the Manufacturing Industry. The four industries are Finance/Insurance, Other, Retail Trade, and Wholesale. Coefficients in Model 8 indicate that Finance and Insurance ($p < 0.01$) and Other Industry ($p < 0.05$) are both significantly less likely to engage in extensive sustainability reporting than the Manufacturing Industry. I note these results in response to questions from anonymous reviewers about the value of sharing industry data (particularly with such a high response rate from private firms in this sample), but I do not further test these means since I do not offer hypotheses regarding industry.

Supplemental Data: Sustainability Definitions-in-Use

The last question included in the AICPA survey used a free-response format to ask “what definition of sustainability does your organization use?” I sorted the 525 responses into nine categories according to the nature and dimensionality of the responses (the categories: None/Trivial, Hostile, Economic, Environmental, Social, Economic plus Environmental, Economic plus Social, Social plus Environmental, Triple Bottom Line plus Intergenerational Equity).⁵ While I used respondent’s answers to the survey questions to test the hypotheses as reported above, I share the distribution of the open-ended responses in Figure 2.2 to demonstrate the diversity of sustainability definitions-in-use. Samples of the types of definitions in each category are found in Appendix 2B.

⁵ Note: We selected these categories post-hoc using the logic of definitional dimensionality and we do not suggest that they represent theory-building representations. We thank an anonymous reviewer for this distinction.

Inspection of the first column in Figure 2.2 reveals that 43% of respondents expended the effort to *write in* that their company has no sustainability policy. Respondents had already been exposed to the TBL definition by this point in the survey, so this response possibly indicates that some respondents failed to recognize that any firm striving to succeed is at least pursuing a financially-motivated dimension of sustainability. Despite the fact that the financial definition of sustainability was the primary definition in the management literature for many years, perhaps social and environmental interests now dominate managers' understanding of the term "sustainability." The relatively small number of respondents (77 of 525) that mentioned more than a single dimension suggests that the interdependencies amongst the dimensions of sustainability are not yet well understood in practice. A final interesting outcome from these open-ended responses is the relatively small number of respondents (less than 1%) report a sustainability definition that includes the intergenerational aspect integral to the Brundtland definition so commonly quoted in academic studies. This suggests a potential, yet unsurprising, division between the academic definitions and those of practitioners.

Discussion

This study explored definitions of sustainability and investigated how two key organizational characteristics (firm size and ownership) impact how a firm defines and enacts sustainability. I first tested the relationships between organizational size and firm ownership on the propensity for firms to report a triple-bottom-line definition of sustainability as opposed to an ecological/environmental only definition. I found no evidence that firm size influences this propensity. I had predicted a positive effect, based on prior research regarding

slack resources and stakeholder theory. However, the null results suggest that if these phenomena are at play there must be other factors that encourage smaller firms to adopt multidimensional sustainability policies equally as frequently as do very large firms. These results suggest a need to study other variables that may be able to explain the differences in propensity to incorporate a TBL bottom line versus an ecological only definition. Adams (2002) suggests that both contextual factors as well as internal firm processes should be tested for their impact on the presence and quality of sustainability reporting; likewise it is possible that these factors could capture more of the variance in the investigation of definitional multi-dimensionality. Future research that builds on these findings and explicitly tests for this may find such effects.

The ownership variable did improve the fit of the definitional multi-dimensionality model; however, there was no statistically significant evidence that public firms were more likely to use the TBL definition than were private firms. The sample gave us the almost unprecedented opportunity to study a large number of private firms, and I expected that this would highlight the differences that are often missed when studying only public firms. The combined set of inconclusive results for size and ownership in relation to definitional dimensionality could suggest that the differences between the dimensionality of definitions are driven more by contextual or internal causes – as stated above.

I found evidence that both ownership and firm size influence firms to enact support behaviors towards sustainability. The firm size results are consistent with prior work using a construct of “sustainable development” that found significant positive results for an assets-based measure of size (Bansal, 2005). The previous measure of “sustainable development” was based on reports about firm policing and measurement activities while the *Support for*

Sustainability measure was based on the extent to which firms utilized clan and bureaucratic control mechanisms to enact sustainability. Therefore, the results are complementary to those from previous work, and suggest control methods as one possible explanation of the manner in which larger firms achieve greater “sustainable development.”

In this model I did find differences between private and public firms, and those differences were in the direction hypothesized. The public firms in the sample scored significantly higher on the Supporting Sustainability measure than did private firms. This suggests an opportunity to focus more research on the sustainability practices of private firms to understand how effectively they implement and enact sustainability.

Sustainability reporting was positively correlated with both ownership and size. Prior research in social and environmental accounting has found mixed results on the influence of organizational characteristics on the propensity towards environmental or social disclosures (Adams, 2002). The positive findings with regards to firm size contribute to this research by finding significant differences in sustainability reporting between the largest and smallest firms in the sample. These differences may result from focusing on sustainability reporting, as opposed to either social or environmental reporting. The complexity entailed in successfully preparing reports that communicate firms’ economic, social, and environmental impacts may require substantially more resources and capabilities than smaller firms can rally. I also found support for the hypothesis that public firms are more likely to extensively practice sustainability reporting. While these results are not particularly surprising given the intense requirements for financial reporting required of public companies, they do highlight a challenge for smaller firms to successfully accomplish reporting sustainability goals. Combined with recent trends towards corporate privatization (Claburn, 2007) which suggest

that firms are migrating away from being publicly held, these results portend challenges towards efforts at creating corporate transparency in relation to sustainability.

Limitations

As mentioned at the outset, this was an exploratory and opportunistic study with some attendant limitations. First, the non-random data sample suggests great caution in generalizing the findings. However, there is significant merit in the fact that top managers responded to the survey and that all respondents were presumably trained in the accounting tradition. Results from such a sample could potentially generalize to other top managers trained with significant finance and accounting emphases. Second, due to the time and space constraints related to embedding the mini-survey in the Economic Outlook Survey I was unable to incorporate more robust survey items. Third, as I rely on survey results for the dependent and independent variables, the study is subject to the challenges of same-source variance. Due to the anonymous nature of the study it was not possible to identify the firms represented and match them with external sources of information on size and ownership. I did follow the suggestion of to reorder the items on the questionnaire so that the items comprising the dependent variables appear after the questions representing the independent variables and controls (Podsakoff and Organ, 1986). Finally, because of the exploratory nature of the investigation, it is possible that I have omitted variables beyond those identified in the survey which could have explained more of the variance in the dependent variables. Despite these limitations, I do offer data from one of the first multi-industry surveys representing both publicly and privately-held firms and I break new ground by exploring definitions, firms support for sustainability, and reporting in the same investigation.

Future Research and Conclusions

The results of this research suggest several possibilities for the study of corporate sustainability as interpreted by organizations and the managers within. These results join with the suggestions of others to argue that academics and practitioners in the management field need to fully identify and rationalize the theoretical bases behind the myriad definitions of sustainability adopted from multiple disciplines. On a micro level, the study found significant differences between predictors of sustainability definitions and sustainability support & reporting – both of which suggest opportunity for future study. These results indicate that it would be fruitful to study organizational aspects besides beyond firm characteristics (such as micro-organizational behavior phenomena) in order to better understand differences in definitional multi-dimensionality. Differences between private and public firms also suggest a need to focus more on the effectiveness of sustainability initiatives at private firms since they appear to lag some public firm behaviors. Finally, this study focused on the defining, supporting, and reporting of corporate sustainability—all of which may be predictors of sustainability performance. A logical next step would be to test how definitions, firm support via control mechanisms, and firm sustainability reports each relate to measures of sustainability performance and measures of economic performance.

The study of sustainability as described and enacted by firms remains an important area of research, as it provides prescriptive knowledge as well as the potential to refine and inform theory. This study has contributed to an understanding of corporate interpretations and enactment of sustainability as well as the organizational drivers of those interpretations. Such analyses of organizational conceptions of sustainability begin to identify how this

multi-disciplinary concept -- and corporate behaviors related to it -- can promote a more just, inclusive, and restorative business world.

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TABLE 2.1
Descriptive Statistics and Pairwise Correlations

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Other	0.15	0.36	1.00														
Foreign	0.06	0.23	-0.10	1.00													
Public	0.14	0.35	-0.17	-0.10	1.00												
Medium	0.50	0.50	0.02	-0.02	-0.18	1.00											
Large	0.21	0.41	-0.04	0.03	0.05	-0.52	1.00										
X-Large	0.09	0.29	-0.06	0.09	0.38	-0.32	-0.17	1.00									
Revenue	2.20	0.86	-0.09	0.10	0.33	-0.24	0.48	0.67	1.00								
To250	0.36	0.48	0.04	-0.05	-0.11	0.39	-0.20	-0.21	-0.18	1.00							
To1000	0.20	0.40	-0.01	-0.03	-0.05	0.02	0.30	-0.12	0.18	-0.38	1.00						
1000Plus	0.17	0.38	-0.06	0.16	0.34	-0.37	0.24	0.59	0.61	-0.34	-0.23	1.00					
Employees	2.28	1.04	-0.06	0.12	0.29	-0.21	0.41	0.46	0.73	-0.20	0.35	0.75	1.00				
Defining	1.73	0.83	0.01	0.15	0.17	-0.13	0.06	0.28	0.27	-0.04	-0.02	0.28	0.26	1.00			
SS	6.58	2.75	0.08	0.09	0.09	-0.06	0.02	0.12	0.10	-0.01	0.01	0.10	0.11	0.54	1.00		
SR	3.01	1.92	0.05	0.17	0.15	-0.11	0.04	0.22	0.20	-0.05	-0.03	0.22	0.20	0.57	0.52	1.00	
CRR	3.78	2.42	0.10	0.12	0.21	-0.14	0.07	0.26	0.25	-0.11	-0.02	0.29	0.25	0.39	0.42	0.62	1.00

n=922

All correlations greater than 0.08 are significant at $p < 0.01$

TABLE 2.2
Multinomial Logistic Regression Analysis TBL vs. Ecological/Environmental Definition

Variables	Model 1	Model 2	Model 3	Model 4
Agriculture	0.51	0.60	0.48	0.68
Arts ⁶				
Construction	0.51	0.76	0.52	0.63
Education	-0.18	-0.87	-0.11	-0.96
Finance & Insurance	0.73	0.56	0.61	0.49
Healthcare	1.07	0.77	1.11	0.79
Hospitality	0.73	0.84	0.51	0.61
Information and Media ⁷				
Other Industry	-0.88	-1.18	-0.95	-1.33
Mining and Oil & Gas	0.22	0.14	-0.06	-0.17
Professional Services	0.73	0.77	0.60	0.51
Real Estate	1.07	1.27	0.95	1.10
Retail Trade	-0.69	-0.57	-0.63	-0.72
Technology ⁸				
Transportation	-0.18	-0.18	-0.47	-0.61
Utilities ⁹				
Wholesale	1.20	1.29	1.32	1.37
Other		1.24		1.26
Foreign		0.50		0.48
Public		0.65		0.48
Medium			0.36	0.24
Large			-0.81	-0.89
X-Large			0.63	0.55
Constant	0.18	-0.23	0.16	-0.07
n	922	922	922	922
Degrees of Freedom	51	60	60	69
Pseudo R ²	0.0296	0.0677	.0736	0.0931
Likelihood-ratio chi-square	56.16	128.61	139.79	176.87

† p < 0.10; * p < 0.05; ** p < 0.01; *** p < 0.001

⁶ No Arts, Entertainment, Recreation Firms Selected Ecological/Environmental

⁷ No Information and Media Firms selected Ecological/Environmental

⁸ No Technology Firms selected Ecological/Environmental

⁹ No Utilities Firms selected TBL

TABLE 2.3
OLS Regression Analysis Support for Sustainability and Sustainability Reporting DVs

Variables	Sustainability Supporting		Sustainability Reporting	
	Model 5	Model 6	Model 7	Model 8
Agriculture	0.52	0.60	0.33	0.45
Arts	-0.41	-0.69	-0.59	-0.66
Construction	-0.49	-0.19	-0.71 **	-0.36
Education	0.03	-0.44	-0.25	-0.42
Finance & Insurance	-0.58 †	-0.70 **	-0.55 *	-0.62 **
Healthcare	0.24	0.03	0.03	-0.04
Hospitality	-0.94	-0.85	0.12	0.27
Information and Media	-0.78	-0.68	-0.30	-0.15
Other Industry	-0.78 *	-0.94 **	-0.64 *	-0.65 *
Mining and Oil & Gas	0.74	0.55	0.20	-0.03
Professional Services	0.25	0.38	-0.10	0.10
Real Estate	-0.60	-0.34	-0.29	0.03
Retail Trade	-1.07 *	-1.00 **	-0.48	-0.39
Technology	-0.42	-0.55	-0.46	-0.61
Transportation	-0.34	-0.30	-0.32	-0.29
Utilities	-0.34	-0.72	0.42	0.08
Wholesale	-1.12 **	-1.03 **	-0.51 †	-0.39
Other		0.95 **		0.69 **
Foreign		1.15 **		1.49 ***
Public		0.68 *		0.76 **
Medium		0.03		0.02
Large		0.31		0.32 †
X-Large		0.88 *		1.12 ***
Constant	6.94 ***	6.49 ***	3.29 ***	2.77 ***
n	922	922	922	922
Degrees of Freedom	17 , 904	23 , 898	17 , 904	23 , 898
R ²	0.0311	0.066	0.0255	0.1195
Adjusted R ²	0.0129	0.0421	0.0072	0.0969

† p < 0.10; * p < 0.05; ** p < 0.01; *** p < 0.001

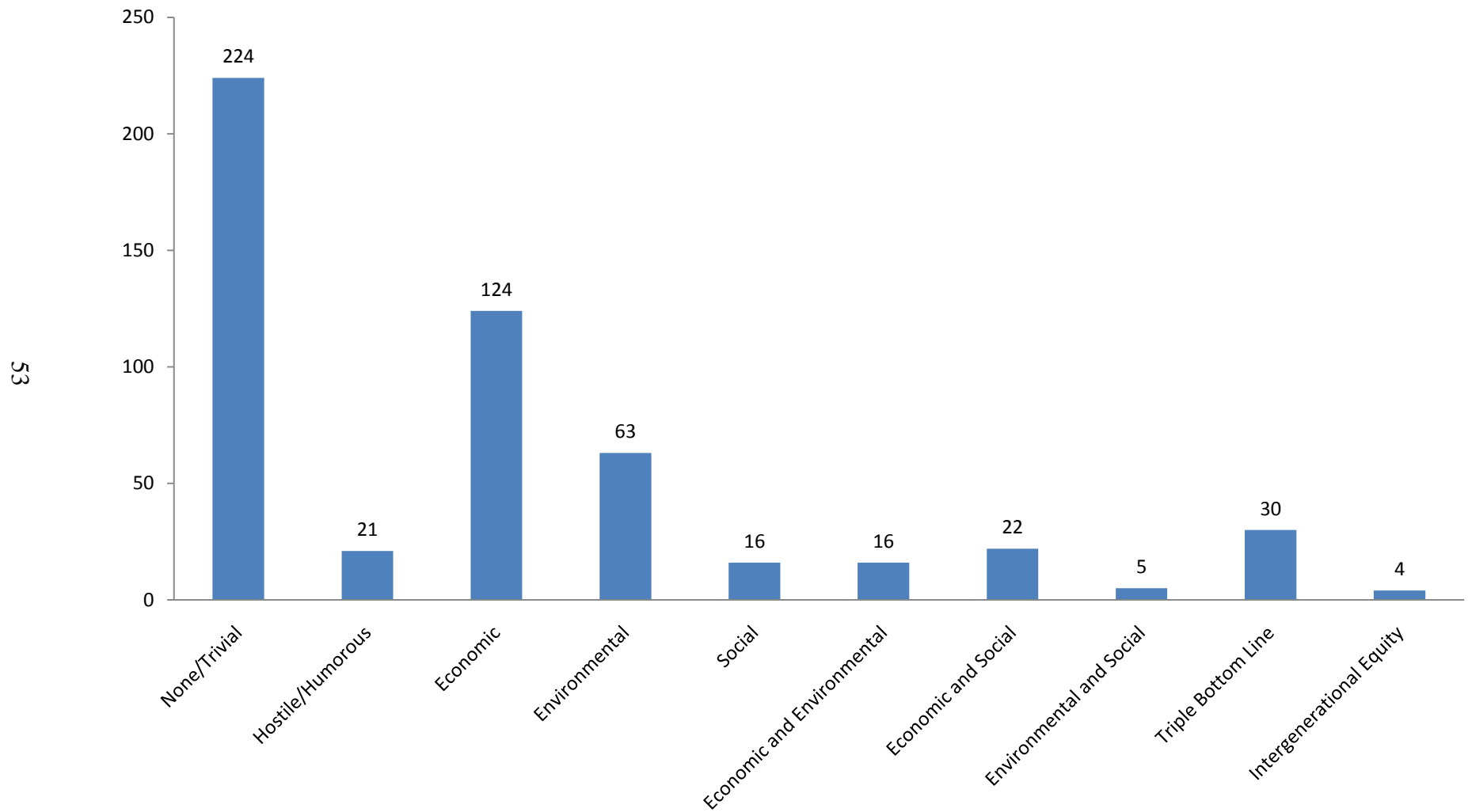
TABLE 2.4
Hypotheses Testing Results

Hypothesis 1a	+Size + Probability TBL vs. Ecological/Environmental	Not Supported
Hypothesis 1b	+Size + Support for Sustainability	Partially Supported (X-Large)
Hypothesis 1c	+Size + Sustainability Reporting	Partially Supported (Large & X-Large)
Hypothesis 2a	Public > Private + Probability TBL vs. Ecological	Not Supported
Hypothesis 2b	Public > Private + Support for Sustainability	Supported
Hypothesis 2c	Public > Private + Sustainability Reporting	Supported

FIGURE 2.1
Mapping the Dimensions of Sustainability Definitions

	Sustainable Development	Triple Bottom Line	Natural Resource Economics	Sustainability Hierarchy
Economic	Growth by itself is not enough	Company Benefits	Altered optimality criterion	Subordinate to the hierarchy
Environmental	Ability to meet needs is limited by state of technology and social organization	Environment Benefits	Valued as input of production and for services provided by stocks	Subordinate to the hierarchy
Social	Focused on improving the lives of the world's poor	Customer Benefits	Utility Maximization	1. Survival of humans 2. Life expectancy 3. Species extinction or human rights 4. Quality of Life
Dominant Dimension	Social	Environmental	Economic	Social
Intergenerational	Yes	Not explicit	Yes	Not explicit

FIGURE 2.2
Sustainability Definitions Provided by Financial Executives (n=525)



CHAPTER 3

THE GREEN LEADING THE GREEN: CORPORATE ADOPTION OF ENVIRONMENTAL MANAGEMENT PRACTICES

Much of the private sector's response to environmental issues, particularly in the early years of the environmental movement, was focused on compliance with government regulations. Neo-Institutional theory, particularly the mechanism of coercive isomorphism, has been used to explain firms' adoption of environmental management practices. However, the role of private enterprise in environmental protection has evolved dramatically (Hoffman, 1999) and environmental concerns have been raised to the level of a strategic issue for the corporation. (Sharma & Vredenburg, 1998) In this article, I investigate whether neo-institutional theory still applies to corporate environmentalism now that voluntary environmental management practices are more common.

Now that corporations are more often responding proactively to environmental issues, do we witness a greater variety of corporate environmental management practices or is there homogeneity in response to environmental issues as predicted by the mechanisms of coercive, mimetic, and normative isomorphism? (DiMaggio & Powell, 1983) Corporations may be thinking more strategically about the environment; however, this does not preclude the possibility that managers' search methodologies and subsequent actions are dominated by the institutional environment. A more proactive approach to environmental challenges does

suggest a shrinking role for the mechanism of coercive isomorphism, which may be supplanted by normative and mimetic mechanisms.

In a regime of voluntary adoption, focus would shift from the coercive pressures of government regulation to the mimetic and normative institutional pressures encouraging firms to go beyond compliance with government regulation. However, coercive pressures can still be at play in managers' actions to "voluntarily" adopt new environmental management practices. Coercive pressures for beyond compliance environmental management could originate from any number of corporate stakeholders including customers, vendors, and the government. Government coercion in this example could include policy statements or direct communications suggesting the potential for stricter regulation if firms don't pursue environmental improvements independently. Vendors and customers can exert coercive pressure if the target firm is reliant on supplies or sales to these important stakeholders for survival. (Pfeffer, 1978) This type of coercion is common in the Japanese automotive industry, where car manufacturers' relationships with suppliers are highly integrated and insist on specific management practices from firms that supply parts. These examples indicate that even for voluntary adoption of environmental practices there will still be some coercive isomorphism present. However the potential for normative and mimetic mechanisms is much greater in this non-regulatory regime.

Normative isomorphism derives from the taken for granted practices and norms of the institutional field. (DiMaggio et al., 1983) These practices and norms are most often supported through industry associations and professional organizations that allow members of different firms to interact and share information. Firms operating in an institutional field form opinions about exactly which practices are required to attain legitimacy. Through

interactions with industry associations firms learn what is expected of them, once they act on these requirements in an effort to acquire legitimacy the resulting uniformity of firm behavior is called normative isomorphism.

Mimetic isomorphism arises when firms copy the practices of other firms within the field whom they perceive as successful. (DiMaggio, 1991) Firms facing an environment or decision space with causal ambiguity will have to decide on a search strategy with little indication of what defines a successful decision. (Lippman & Rumelt, 1982) When companies direct their search by focusing on the practices of other firms they perceive as successful, the resulting homogeneity in the institutional field is termed mimetic isomorphism. The three types of institutional isomorphism are at the core of neo-institutional arguments; because they demonstrate mechanisms by which firms make decisions that are not dictated by the assumptions of economic rationality.

All three institutional pressures lead to similar outcomes, therefore the distinction between them lies in managers' decision making and intent. (Mizruchi & Fein, 1999) The challenges of distinguishing the various forms of isomorphism have been addressed in Mizruchi and Fein's (1999) study on the use of the isomorphism concept in the organization literature. The study found that a majority of published research purported to investigate only one of the three concepts, when in fact it was not possible to distinguish between the three types of isomorphism with the methods used.

The first question this study wishes to address is whether institutional isomorphism exists in the regime of voluntary environmental practice. Beyond this initial question, it would be enlightening to parse out the drivers of isomorphism if possible and determine the role of each of the three pressures; coercive, normative, and mimetic. This would be valuable

because the three drivers of isomorphism have different implications for the success of firms' actions.

In a natural resource context, copying is particularly susceptible to an inefficient outcome. The successes of environmental initiatives are not only subject to the business environment, but are contingent on the actual natural environment within which each firm operates. Therefore, any environmental practice copied from another firm may not prove to be successful for the mimicking firm, either because the competitive environment faced by the two firms is different or because the actual natural environment facing each firm is different. For example, optimal environmental strategy is certainly different for electric utilities operating in cold and wet climates from those of utilities in hot and dry climates. The importance of physical and economic context to the success of environmental initiatives implies that mimetic isomorphism is less effective for firms than normative or coercive isomorphism. Regardless of whether environmental management practices are chosen for social fitness or legitimacy reasons (normative or coercive isomorphism), or if firms copy the practices of successful firms (mimetic isomorphism); the potential for economically inefficient solutions exists. The win-win scenarios of improved environmental and financial performance often highlighted in case study literature may not be widespread because institutional pressures are promoting the homogenization of environmental practices, when firm or facility specific practices must be pursued instead.

If this homogenization is driven by mimetic isomorphism then the potential consequences on firm performance are all the greater. Copying the voluntary environmental practices of another company, even successful companies, may not come with the legitimacy benefits inherent in normative and coercive isomorphism. Normative and coercive

isomorphism grant firms legitimacy; even if the chosen solution is not financially efficient the mimicking company will accrue some benefits. Mimetic isomorphism in a natural resource context does not necessarily come with legitimacy benefits. Modeling behavior on successful organizations normally yields legitimacy benefits by signaling to stakeholders that the firm is trying to be proactive and keep up with industry leaders. (DiMaggio et al., 1983)

In the context of environmental management, however, different stakeholders have different preferences. An action that signals a proactive stance to one stakeholder may signal a squandering of firm resources to another. Whereas the threat of government regulation can act to encourage coercive isomorphism, and trade associations or industry bodies can be clear and unambiguous in regards to environmental requirements leading to normative isomorphism, the road to legitimacy through mimetic isomorphism is not definitive. The environmental preferences of customers, employees, NGOs, shareholders, and various other stakeholders are usually at odds with each other. Therefore, any mimicking behavior is equally likely to anger as well as please some stakeholders. This isn't as much of a problem if the environmental practice being copied is in fact an efficient solution for the company. However, mimetic isomorphism that leads to inefficient solutions and does not accrue legitimacy benefits would have costly implications for firm performance.

The implications for firm performance of isomorphism, particularly mimetic isomorphism, suggest that understanding the prevalence of these institutional responses is important. This study will model the prevalence of mimetic isomorphic responses in voluntary environmental management practices.

Background

Neo-Institutional theory has been well applied to many questions of environmental management in private corporations. A brief discussion of past theory and findings will be presented to provide the foundation for the ideas I hope to test in this study.

Hoffman (1999) applies institutional theory to environmental management issues by defining the organizational field as formed around issues not markets or technologies. The organizational field is the environmental movement itself and the context in which firms make environmental decisions is not limited to industry peers but may include other industries, government, and NGOs. (Hoffman, 1999) A longitudinal study is employed to confirm that organizational fields change over time. Using content analysis of court records and trade publications he maps the changes in constituency of the corporate environmentalism field facing the US chemical industry from 1960-1993. Four distinct stages are identified in which particular institutions dominate. Starting with 1962-70 a cognitive institution dominated the organizational field; the prevailing cognitive institution centered on technological optimism evidenced in a taken for granted belief that any environmental problems could be solved by industry through technology. In the stages two and three regulative and normative pillars dominated, respectively. In the fourth and final stage, from 1989-93, normative and regulative pillars were still influential but a new cognitive institution focusing on the integration of economic and environmental issues emerged. (Hoffman, 1999) Under this cognitive schema, beliefs that environmental solutions could be economically advantageous for firms became more accepted.

The cognitive institution which emerges in Stage 4 of the chemical industry environmental institutional field is in line with Sharma and Vredenburg's (1998) assertion that the publication of the Brundtland Commission Report elevated environmental concerns to a strategic issue for the corporation. Under the taken-for-granted belief that environmental issues can be strategically tackled to provide both environmental and economic benefit, a variety of strategic management theories become relevant to environmental management practice. Sharma and Vredenburg (1998) use comparative case studies and a mail survey to empirically test Hart's (1995) theorizing that the resource-based view of the firm may be applied to proactive environmental practice. Hart's theory proposed that, by strategically addressing environmental problems, firms could develop specific capabilities (pollution prevention, product stewardship, sustainable development, transparency, stakeholder engagement, and collaboration) that could lead to sustained competitive advantage and social legitimacy. (Hart, 1995) Sharma and Vredenburg's (1998) empirical test of this natural-resource-based theory of the firm in the Canadian Oil and Gas industry found that capabilities for stakeholder integration, higher-order learning, and continuous innovation were developed in the firms they labeled environmentally proactive. Additionally, self-report survey data suggested that these capabilities accounted for more than 50 percent of the variance in firms' competitive benefits. (Sharma et al., 1998) This study provides evidence that proactive environmental management can lead to capabilities which firms believe have competitive benefits; however it does not address our concern with how firm's choose their environmental management strategies. If isomorphic pressures are prevalent and firms merely implement the visible practices of firms perceived as successful, then acquired capabilities may not lead to sustainable competitive advantage. The successful firm's

environmental strategy and subsequent capabilities may be valuable in the natural resource context it faces, but not valuable for copying firms. This suggests that these environmental capabilities are inimitable; both because the practice which leads to them and the resulting value of the capability are dependent on characteristics of the implementing firm.

Additionally, it is argued that the complexity of environmental issues requires that capabilities be continually generating new information and adapting dynamically to be successful. (Lenox, 2000) Therefore, mimicking firms may be implementing a practice or striving for a capability that is no longer valuable because the requirements for environmental success have changed. These challenges to acquiring value from and imitating the visible environmental management practices of successful firms are two key assumptions of a resource based theory of the firm. (Barney, 1991) Truly sustainable competitive advantage in environmental capabilities requires firms to pursue firm/facility-specific environmental practices that engender dynamic capabilities. (Teece, Pisano, & Shuen, 1997) The importance of dynamic capabilities to successful environmental management practice further highlights the trouble with isomorphism in this context.

The acquisition of competencies in an environmental management setting is also studied by Marcus and Geffen (1998). The context of their study is US electric utility pollution prevention efforts arising from the Clean Air Act. They use an extensive case study methodology and conclude that through more effective search and proper balance of internal and external knowledge, firms can acquire new competencies if government sets ambitious goals and the market is evolutionary. (Marcus & Geffen, 1998) A later study focused on the form of government regulation and found that more flexible regulations that set ambitious goals have positive productivity consequences. (Majumdar & Marcus, 2001) Though these

studies are concerned with regulatory compliance, the findings on flexibility make them applicable for voluntary environmental management initiatives. For example, Clean Air Act regulations stipulate maximum emission levels but allow flexibility in the method by which utilities can achieve reductions. This flexibility in implementing the regulation makes this process more similar to voluntary environmental strategies, and these results may suggest implications for voluntary efforts. We could extrapolate these findings to voluntary environmental strategy if we propose that corporate headquarters act like governments by establishing environmental performance targets for divisions/facilities. These findings might be translated for the voluntary context to suggest that corporations wishing to successfully build environmental management competencies need to set ambitious goals for environmental stewardship but allow divisions or facilities flexibility in the implementation of these goals. Simply copying the efforts of other facilities within the firm, regardless of how successful, cannot recreate the conditions for acquiring new competencies. These arguments further reinforces the idea that isomorphism will not lead to optimal environmental performance.

The relationship between environmental practice and resulting environmental performance is studied in an institutional context by King and Lennox (2000) in their work on trade-association-sponsored industry standards. The empirical setting is the Chemical Industry and the study finds that participation in the Responsible Care Program of the Chemical Manufacturers of America (CMA) does not lead to better environmental performance. They propose that opportunism (adverse selection and moral hazard) in the absence of strong sanction capabilities explains why industry self-regulation does not provide desired results. Free riders may feign implementation of the standard in order to gain

legitimacy, but fail to follow through with action, thereby lowering the average environmental performance of the program. (King & Lenox, 2000) There may be other explanations for the lower environmental performance improvements of firms in the Responsible Care Program compared to those not in the program. Membership in the program may not necessarily lead to environmental improvement because the principles and codes of the standard may be too generalized and provides less benefit than what individual firms developing firm specific strategies can attain. For example, facilities in industrial parks can benefit by the proximity of clients for their waste streams, if the recycling of waste through sale as a feedstock to other manufacturing processes is not identified as a best practice or norm, then managers may overlook this lucrative emission reduction strategy. An industry sponsored standard is a codified example of normative isomorphism, and the desired environmental performance may not be attained for the same reasons presented for mimetic isomorphism.

Isomorphism in environmental management practice in general is undesirable, because if firms are made up of unique resources and face unique environments then no one practice can be successful for all firms. These studies suggest that isomorphic pressures in the institutional field would lead to less than optimal results. There is research, however, that may explain why mimetic isomorphism may prevail despite these suboptimal results. Bansal and Roth (2000) developed a multilevel model of corporate ecological responsiveness which identifies three contexts which influence three types of firm motivations for ecologically responsible initiatives. The study applies analytic induction to a sample of UK and Japanese firms to reveal the motivations and their contextual influences. The three contextual dimensions identified include issue salience (certainty, transparency, emotivity), field

cohesion (proximity, interconnectedness), and individual concern (ecological values, discretion). (Bansal & Roth, 2000) The three firm motivations which lead to ecologically responsible initiatives are identified as competitiveness, legitimation, and environmental responsibility. Legitimation was the only firm motivation which was driven by all three contextual dimensions, additionally the influence of each context on legitimation was found to be positive. (Bansal et al., 2000) Therefore, the model suggests that the most likely motivation for firms to “go green” is to establish legitimacy and not competitiveness or environmental responsibility, though both of these motivations are also present. In their model, legitimacy motivations can result in regulatory compliance and voluntary actions and the authors point out that firms motivated by legitimacy exhibited mimetic isomorphism. (Bansal et al., 2000) This study indirectly addresses concerns that voluntary environmental initiatives may be dominated by mimetic isomorphism; however the study was carried out on a sample of 53 firms in two countries. Therefore, a direct empirical test of mimetic isomorphism in voluntary environmental management practice on a larger archival sample, as I propose in this paper, will contribute to the literature.

This limited review of work in environmental management through an institutional lens demonstrates that there is considerable evidence that the complexity of environmental issues requires firm specific resources and capabilities to achieve profitable voluntary environmental initiatives. Despite these findings, there is still a compelling argument that firms will not develop individual environmental competencies but rather mimic the practices of other successful firms. This study hopes to address the prevalence of institutional isomorphism in firms’ adoption of voluntary environmental practice, which should provide

some insight into understanding how firms can or cannot attain profitable environmental management.

Theory and Hypotheses

Organizations in an institutional field can be diverse on some dimensions and homogenous on others (DiMaggio & Powell, 1991), therefore it is necessary to carefully define what indicator will be studied to determine the presence of isomorphism. Rather than attempt to create an aggregate measure of firms' voluntary environmental management strategy, this study will focus on a particular environmental management practice and determine if firms pursue this strategy independently or as a result of isomorphic pressures from the institutional field. I have chosen to focus on environmental management systems (EMS) in this study. An EMS is a codified set of procedures and practices which provide a firm with a framework for integrating environmental issues into the day to day operations of a firm. There is considerable flexibility in the forms an EMS can take; therefore they can be implemented in most firms. I chose to study a more generic practice because a more specific environmental practice might set an a priori limit to my sample size. Additionally, an EMS is a fairly well defined and documented process that may lead to valuable capabilities. It is relatively easy for a firm to determine what the basic requirements of an EMS are, but successfully implementing this into the operations of a firm or using an EMS to achieve specific capabilities are more opaque processes. An EMS is an example of a visible management practice that may encourage imitation attempts, but where the success of imitation is reliant on firm specific characteristics. Success is a function of how a firm

chooses to imitate an EMS as well as the particular environmental context in which a firm operates.

An EMS encourages firms to meticulously document their environmental policy, structure, responsibilities, and impacts. Firms have considerable flexibility in the form of EMS adoption, and the general goal of an EMS is to provide firms with a systematic framework to assist in addressing their environmental impact. It may seem difficult to argue that implementing an EMS, whether done mimetically or not could be inefficient. However, homogenous adoption of a generic EMS can lead to suboptimal solutions because the documentation and implementation guidelines of a particular standard may hinder firms from engaging in other more optimal environmental practices. An example of this could be that the requirements of the standard consume firm resources that would otherwise be applied to searching for environmental solutions. Additionally, the structure and rigidity of the standard itself can inhibit experimentation and innovation that could yield better environmental performance. Finally, the success of EMS systems is contingent on the organizations commitments to the spirit of the EMS, and this commitment seems less likely if adoption results from institutional pressures.

Mimicking Successful Organizations

Prior research has suggested that firms imitate organizations which the focal firm's management perceives as successful. For private enterprises profitability has been used as the measure of success in prior studies of mimetic isomorphism. (Haveman, 1993) A major concern with environmental management is the potential for adverse impacts on firm performance. Managers may think that an EMS will require a costly investment in terms of

human resources spent to establish and maintain the system while providing little benefit. Managers may also have concerns that environmental management systems may impose undue restrictions on firms' operating procedures, hindering the productivity of the firm. If very profitable firms adopt environmental management systems, managers may be reassured that adoption will not adversely impact firm performance but is rather a legitimate business practice.

Hypothesis 1: The rate of EMS adoption will be positively related with the number of highly profitable organizations that have adopted an EMS in the institutional field.

A second measure of success in the US market is organizational size. Haveman (1993) also tested for and found evidence that firms choose to imitate the actions of large firms. Size is proposed as a measure of success since there is a relentless emphasis on venture growth in western markets, and the largest firms serve as role models for firms that wish to grow. In the case of environmental management systems, firms' managers may be concerned that environmental systems will discourage venture growth thereby conflicting with traditional ideals of business success. Large firms with extant EMS systems will serve as models for other firms that growth and environmental management are not antithetical.

Hypothesis 2: The rate of EMS adoption will be positively related with the number of large organizations that have previously adopted an EMS in the institutional field.

Data and Methods

These hypotheses will be tested on a large sample of facilities drawn from the population of U.S. manufacturing firms from 1996-2005 reporting toxic release data to the

U.S. Environmental Protection Agency. Data for the study was drawn from the Toxic Release Inventory (TRI) of the U.S. EPA and Compustat. I use this data sample because it encompasses a group of industries beholden to a government institution, and therefore provides a better proxy for an institutional field than a single industry. The EPA publishes regular reports based on TRI data, and therefore the membership of this institutional field and information on their toxic releases is very transparent to both field members and outside constituents. The TRI requirements includes all companies releasing greater than specific threshold amounts of listed chemicals, employing 10 or more full-time employees, and operating in a variety of industry sectors beyond manufacturing. I have limited the institutional field to include manufacturing industries as defined by SIC codes 20-39. The omitted industries include various mining, utilities, chemical, petroleum, and federal facilities all of which are subject to additional institutional pressures beyond those influencing manufacturing, therefore I assume they make up separate institutional fields.

TRI data collected in 1996 is used to determine firms that have adopted an environmental management system and identify a set of firms at risk of adopting an EMS. Data on the set of at risk firms is collected from 1997-2005, and every year the risk set is adjusted to account for firms that adopt an EMS (drop out of the risk set) and for newly reporting firms to the TRI with no evidence of an EMS. Some newly entering firms to the TRI dataset enter with evidence of an EMS system; these firms are not included in the risk set. However their data is used in calculating the size and profitability mimetic density variables. The risk set was developed using all firms reporting SIC codes 20-39, however the need to calculate mimetic density variables and control variables necessitated the restriction

of our sample to publically traded firms with financial data available on Compustat. A total of 582 firms were observed over the 10 years of the study.

Measures

Dependent variables. The dependent variable used to test our hypotheses is implementation of an EMS system. The variable will equal 1 if the firm has an EMS in place and 0 otherwise. In their study of firms seeking ISO 14001 certification King et al. (2005) make a point of distinguishing the internal act of adopting an environmental management system (EMS) from the very public act of ISO 14001 certification. They propose that firms only incur the extra cost of ISO certification as a means of addressing information asymmetry, since the environmental benefits of an EMS accrue with the system and not with certification. (King, Lenox, & Terlaak, 2005) This distinction is very relevant to this study. ISO 14001 certifications are not used as a proxy for the presence of an EMS system because that would limit the scope of our sample. The presence of an EMS is determined by the method proposed by King et al. (2005). The toxic release database contains data on source reductions for every chemical reported, and a code for the reduction method employed by a facility. The toxic release inventory forms provide eleven codes for source reductions methods; four of these provide evidence that a facility has an EMS in place (King et al., 2005). These methods include the following:

- T01: Internal pollution prevention opportunity audit(s)
- T03: Materials balance audits
- T04: Participative team management
- T06: Employee recommendation (under a formal company program)

A full list of the eleven source reductions methods is included in Appendix A, including information on which codes are used to construct our institutional measures.

Each facility reporting to the TRI completes a form for each chemical for which they are required to report. It is unlikely that facilities will adopt an EMS system for a single chemical, therefore for the first year in which a facility reports one of the codes listed above for a reduction in any of its chemicals that facility is considered to have adopted an EMS. Any future reductions referencing these codes are just evidence of the success of the EMS program in helping the firm to reduce toxic emissions. For firms with multiple facilities reporting in the database, the firm is considered to have implemented an EMS when at least two of its facilities have adopted an EMS. I count second facilities with evidence of an EMS because it is possible that firms experiment with EMS at individual facilities first before making a firm wide commitment. *EMS* will be set to 1 if there is evidence of an EMS and 0 otherwise; this measure will be lagged 1 year ahead of the independent and control variables.

Independent variables. Hypothesis 1 requires a count of the number of firms that have previously adopted an EMS that are highly profitable. Haveman's (1993) study of mimetic isomorphism in the market diversification of California savings and loan thrifts used a count of firms in the top quartile based on Return on Assets (ROA) that had diversified into specific markets. Since my sample is intra-industry and since managers have limited resources I define profitable as the number of firms in the top 5% by ROA in the institutional field. *Profitability Density* will equal the number of firms in the top 5% by ROA for the TRI manufacturing institutional field that have adopted an EMS. Hypothesis 2 requires a count of large firms that had previously adopted an EMS. Similar to the profitability measure I create a measure using the number of firms in the top 5% by Total Assets that have adopted an EMS. *Size Density* will equal the number of firms in the top 5% by Total Assets for the TRI manufacturing institutional field that have adopted an EMS.

Institutional *Control Variables*. The source reduction method codes also provide information which can be used to distinguish between the three drivers of isomorphism. I consider each of the following codes to represent normative pressures on firm adoption of an EMS system:

- T05: Employee Recommendation (independent of a formal company program).

Employees are most likely to be emboldened to make recommendations that fall within the accepted standards of the institutional field. If firms implement an EMS in the year following a source reduction motivated by independent employ advice, this would signal a normative mechanism.

- T09: Trade association/industry technical assistance program.

If a firm adopts an EMS within a year after effecting a source reduction as the result of trade association assistance, this suggests that a normative mechanism is at work.

Normative will be a dummy variable coded 1 if a firm had a source reduction that mentions any of the two codes listed above and 0 otherwise.

The remaining source reduction methods codes provide evidence for coercive isomorphism.

- T02: External Pollution prevention opportunity audit(s)
- T07: State government technical assistance program
- T08: Federal government technical assistance program
- T10: Vendor Assistance

All four of these methods codes suggest that reduction occurs as the result of interaction with entities that may have impacts on the focal firm's ability to acquire resources.(Pfeffer, 1978)

An example from the case literature includes the adoption of an EMS by Benzinger Winery.

The firm "voluntarily" chose to participate in a California EPA pilot program for the design

of a Wine Industry specific Environmental Management System. The managers of Benzinger clearly stated that their participation in the pilot program was motivated by a desire to have a hand in shaping any future CalEPA legislation (Benzinger 1998). Therefore, these managers chose to voluntarily adopt an EMS system in an attempt to forestall stricter future statutory requirements. If a firm adopts an EMS system after a year in which a reduction is accomplished with any of these methods, it would suggest that a coercive mechanism is in effect. *Coercive* will be a dummy variable coded 1 if a firm had a source reduction that mentions any of the four codes listed in the list above and 0 otherwise.

It is important to note that the source reduction method codes are not mutually exclusive and firms can report any combination of up to 3 codes for any one reduction.

Other Control Variables. Control variables which may provide alternate impacts on a firm's adoption of an EMS are also included. Firm size could influence the propensity to adopt an EMS. Larger firms are more likely to turn to bureaucratic mechanisms of firm control than smaller firms, increasing the likelihood of adopting a formal environmental management system. (Ouchi, 1979) Prior studies in the environmental management literature have also suggested firm size is an important determinant of proactive environmental conduct. (Aragon-Correa, 1998) The variable *firm size* is measured using the log of total employees. Financial performance can also influence the propensity to adopt environmental management systems. The variable *firm profitability* is measured using ROA.

A measure for overall EMS adoption density was included to distinguish the impact of mimetic pressures as defined by DiMaggio and Powell 1983, from a more general bandwagon effect. The variable *bandwagon* is measured as the number of firms in the TRI institutional field that have already adopted an EMS.

Table 3.1 provides summary statistics for our dependent and independent variables as well as correlations.

Methods

The phenomenon of EMS adoption is best studied using event-history analysis. I will use a hazard rate model to account for both censored and uncensored cases. (McGrath & Nerkar, 2004) The dependent variable will be the hazard rate, defined as the instantaneous probability of adopting an EMS.

$$h(t) = \lim_{\Delta t \rightarrow 0} \frac{\Pr(t \leq T < t + \Delta t)}{\Delta t}$$

The baseline hazard of EMS adoption would ideally be modeled as constant, since there is no reason that EMS adoption should vary with time. The appropriate model for the hazard function would be the maximum-likelihood proportional hazard model with an exponential parameterization, if all the variables which influence the rate of EMS adoption could be identified. However, if all variables influencing adoption are not identified one must assign a role to time by using a different parameterization.

The variables identified in this isomorphic study may not capture all of the pressures leading to firms' adoption of EMS. In particular, the data captures the influences of firm-level variables and institutional pressures at the organizational level. The increasing level of concern with environmental issues in the general population (as evidenced by the growing environmental movement) would also impact the adoption of EMS through the values and priorities of individual managers making organizational decisions. Increasing societal awareness of environmental challenges and growing evidence of environmental degradation, which are not controlled for in this study, would suggest the need to assume an increasing

baseline hazard for EMS adoption. The Weibull distribution is selected as the appropriate parameterization for this study because it assigns a monotonically increasing baseline hazard of EMS adoption.

$$h(t|x_j) = \lambda t^{\lambda-1} \exp\{\beta_0 + x_j \beta_x\}$$

This choice of parameterization is confirmed by calculating the Akaike Information Criterion (Akaike, 1974) for a variety of possible distributions. The test reported that the Weibull distribution provided the best model fit as compared to the exponential, Gompertz, log-normal, and log-logistic distributions.

Analysis and Results

Table 3.1 provides descriptive statistics and correlations for the dependent and independent variables. At the start of the study in 1997 nearly 37% of the publically trade firms in the sample had already adopted an EMS. This number climbs to 52% by the end of the study in 2005. Therefore, a majority of publicly traded manufacturing firms reporting to the TRI had adopted an EMS by the close of the study period.

The correlations between the mimetic density variables is quite high, therefore it is necessary to estimate separate models for each mimetic density variable to avoid multicollinearity challenges. (Haveman, 1993) The correlation coefficients also indicate that the variable Size Density is highly correlated with the bandwagon control variable. This may create a challenge in testing Hypothesis 2, and this will be addressed later when discussing Model 3.

Table 3.2 provides a summary of the hazard ratios resulting from a Weibull proportional hazards model of the EMS adoption data. Model 1 provides a test of the control variables. Both the normative and coercive isomorphic variables are in the expected direction, however only the variable for normative isomorphism is significant. The hazard ratio suggests that the instantaneous hazard of adopting an EMS is 235% greater in the year following a year in which a source reduction code indicating normative pressures is recorded on a firm's TRI forms.

The hazard ratio for the bandwagon variable is also significant and suggests that a firm's instantaneous probability of implementing an EMS drops by 18% with each additional firm that adopts an EMS. This result is surprising and runs counter to the bandwagon concept.

Model's 2 and 3 are used to test the two mimetic isomorphism hypotheses identified for this study. With a significant hazard ratio value less than 1 in Model 2, there is no support for hypothesis 1 that the rate of EMS adoption is positively related to the number of highly profitable firms that have adopted EMS. In fact these results suggest that as more highly profitable firms adopt an EMS the rate of EMS adoption for surviving firms will decrease. This result is directly contrary to the predictions of institutional theory regarding the impact of mimetic isomorphism. These results hold up even under different definitions of profitability density. Models were run where profitability density was defined as the number of firms in the top 10% and 20% of ROA and the results were consistent with the top 5% definition used here. The results of Model 2 provide no support for hypothesis 2 that increases in the number of large firms implementing EMS will increase the rate of EMS adoption in surviving firms. The results of Model 3, however, may be suspect to issues of

multicollinearity. A separate model was run in which the bandwagon variable was omitted, the hazard ratio for size density remained <1 and yet the overall model fit was much worse than any of the three models presented here.

Haveman's 1993 study predicted and found evidence for an inverted-U-shaped relationship between profitability density and the entry into new markets. While this study did not present an inverted-U-shaped hypothesis, it is possible that the limitations of the study period can explain why these results are not in line with the predicted mechanism of mimetic isomorphism. Our study begins in a year when 36% of at risk firms had already adopted an EMS and it is possible that this 36% is beyond the inflection point for the adoption of this organizational innovation. In other words, the years of our study are capturing the right hand side of the inverted-U-shape found in previous mimetic isomorphism studies.

Despite the limitations of the time period of the study, we do find significant results for our normative isomorphism variable. The inverted-U-shaped hypothesis presented in Haveman 1993 concerned entry into new markets and the negative impact of competition was used to explain the expected shape. Adoptions of new organizational practices are not subject to the same negative influence of competition, so it is possible that these results suggest that a different theory of mimeses may be worthy of study. Perhaps normative and coercive pressures do act towards isomorphism in the adoption of environmental management practices; however mimetic pressures act to constrain isomorphism. Managers could interpret the adoption of these practices by large and profitable firms to mean that only firms of large size and sufficient financial health can risk pursuing these extra-financial goals.

Discussion

Testing the strength of institutional pressures in the adoption of a new management practice requires cautious interpretation and extrapolation of our findings. Previous research in institutional theory has found considerable support for the notion that economic explanations are more powerful than social in explaining early adoption, and only recently in the context of sustainable development practices has institutional pressure been found significant in the early years of a new administrative form. (Bansal, 2005) It may be that issues regarding the environment and society are unique in business strategy and are more immediately susceptible to institutional pressures. Though this may turn out to be the case, it is important to keep in mind the prevailing literatures perspective on the influence of institutional pressures in the early stages of a new practice when interpreting the results we have generated.

This study was envisioned as a simple test of isomorphic pressure in the adoption of one particular environmental management practice. The focus was on mimetic isomorphism in particular, though the study did address both normative and coercive isomorphic pressures and controls for their impact on the adoption of EMS. Mimetic isomorphism was signaled out because the constraints of the natural environment on firms' opportunities for environmental management improvement suggest that mimetic behaviors could lead to suboptimal decision making. If mimetic isomorphism could be identified in the adoption of environmental management practices it would serve to explain some contradictory evidence on the efficacy of beyond compliance environmental efforts by organizations. The study

found no evidence of mimetic isomorphism, though the results actually suggested an opposite mechanism at work, suggesting that firms were less likely to adopt environmental management practices the more successful and large forms adopted such practices.

While these results are not helpful in addressing the questions posed in this study they do lead to a whole new area of exploration. What is unique about the environmental management context that would reverse the impact of mimetic pressures? Future work could help identify theory that explains this reverse mimeses, and allow for testing new reverse mimeses hypotheses. Such studies would be invaluable to both management practitioners and policymakers to help address the challenges involved with the diffusion of environmental innovations.

Limitations. The singular focus of testing the hypotheses on EMS implementation limits the generalizability of the results. Future research efforts may attempt a more ambitious configurational approach to the question in this study. A study could ask if there are identifiable archetypes of voluntary environmental management practice, and if so does their pattern of development and evolution demonstrate the influence of isomorphic pressures. Such a study might be applied to a multidimensional construct like sustainable development, where the identification of archetypes and the pressures that form them could help to address much of the contradictory results in analysis of economic, social and environmental business practice.

The study attempted to study mimetic pressures and to distinguish these from both normative and coercive pressures. While the measure for normative pressure did show a significant impact on the adoption of EMS, the coercive measure was not significant. The

coercive measure provide some more variance in the full sample, however, once the study was limited to publically traded companies most of the information in the coercive variable was lost, and the resultant mean of the coercive variable was zero. This suggests that it might be necessary to identify a different coercive variable. Perhaps data on environmental fines might allow for enough data to truly capture the impact of coercive forces. While the data source reduction codes identified with the coercive variable do indeed capture coercive pressures, it appears that these particular codes were rarely used by public companies and it significantly limited the effectiveness of the resultant measure.

Conclusion

This study has focused on understanding how firms acting proactively in response to environmental concerns, may fail to implement optimal proactive management strategies. I have argued that institutional isomorphism is responsible for homogeneity of firm response to environmental issues. This homogeneity is only partly attributable to coercive pressures, since more and more frequently firms are formulating environmental management practices independent of government regulation. Success in environmental management is rife with causal ambiguity and firms' environmental goals are not always consistent, either temporally or spatially. Therefore, it is challenging for firms to develop sophisticated responses to environmental challenges and opportunities. This study predicted that considerable homogeneity in voluntary environmental practice exists, and this homogeneity is driven by mimetic isomorphism.

Hypotheses developed from DiMaggio and Powell's (1991) discussion of institutional pressures and mimetic isomorphism were tested for one singular type of environmental management practice. The implementation of EMSs was empirically modeled to detect the mechanism of mimetic isomorphism, and the results demonstrated no evidence that mimetic pressures explained the rate of adoption of an environmental management innovation. While the analysis did provide evidence of normative pressures contributing to isomorphism, the results for the mimetic variables were actually significant but in the opposite direction of that hypothesized. These results contradict the neo-institutional predictions of mimetic isomorphism and suggest a need to explore the potential of a reverse mimetic pressure in the context of environmental business practice.

Neo-Institutional arguments are well worn in the management literature, and isomorphism has been addressed in much of the literature on environmental management practice. Much of this work, however, has focused on the coercive isomorphism which accompanies government environmental regulations or the normative isomorphism created by voluntary industry standards or trade associations. This study has contributed to the literature by addressing the role that mimetic isomorphism plays in defining the variety of firm responses to environmental issues.

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TABLE 3.1
Descriptive Statistics and Pairwise Correlations

	Variable	Mean	s.d.	Min	Max	1	2	3	4	5	6	7
1.	EMS	0.05	0.22	0	1							
2.	Firm Size	0.99	1.35	-4.71	5.31	0.09						
3.	Firm Profitability	0.12	0.17	-6.38	0.78	0.02	0.26					
4.	Normative	0.09	0.29	0	1	0.16	0.15	0.04				
5.	Coercive	0.00	0.05	0	1	0.08	0.05	0.01	0.07			
6.	Bandwagon	268.60	28.64	214	304	-0.08	-0.03	-0.07	-0.12	-0.06		
7.	Size Density	32.00	2.28	27	35	-0.06	-0.04	-0.06	-0.09	-0.04	0.67	
8.	Profitability Density	16.82	3.15	12	22	-0.02	-0.02	-0.06	-0.03	-0.02	0.26	0.67

n= 3298

All correlations > 0.035 or < -0.035 are significant at p > 0.05

TABLE 3.2
Weibull Regression in the PH Metric for EMS Adoption

	Model 1			Model 2			Model 3		
Variable	Haz Ratio	Std. Err.		Haz Ratio	Std. Err.		Haz Ratio	Std. Err.	
Firm Size	1.29	0.09	***	1.28	0.09	***	1.28	0.09	***
Firm Profitability	0.77	0.47		0.67	0.30		0.74	0.36	
Normative	3.35	0.61	***	3.30	0.61	***	3.33	0.61	***
Coercive	2.57	1.51		2.40	1.42		2.52	1.48	
Bandwagon	0.82	0.01	***	0.77	0.02	***	0.81	0.01	***
Profitability Density				0.76	0.03	***			
Size Density							0.71	0.06	***
/ln_p	2.14	0.08	***	2.39	0.07	***	2.24	0.08	***
p	8.48	0.66		10.94	0.81		9.42	0.73	
1/p	0.12	0.01		0.09	0.01		0.11	0.01	
No. of subjects	582			582			582		
No. of failures	157			157			157		
No. of observations	3227			3227			3227		
Log likelihood	-293.58			-267.86			-284.12		
Chi-square (df)	307.04	(5)		358.47	(6)		325.96	(6)	

***p< 0.001

CHAPTER 4

THE SEQUENCING OF ORGANIZATIONAL CHANGE

Much of the sustainability literature is dominated by anecdotal discussion of dramatic transformational change to sustainable business practice. One common example is the story of Interface carpets which deals with a CEO's awakening to environmental and social management challenges and the ensuing changes in culture, process, and product implemented throughout the organization (Hawken, Lovins & Lovins, 1999). There are also stories of the new vanguard of organizations which appear to form with their CSR or Sustainability strategies fully articulated at inception, these would include companies such as The Body Shop, Patagonia, Herman Miller and Grameen Bank. However, even these sustainability leaders undergo continual change and evolution as new environmental and social issues emerge as challenges or opportunities. The Body Shop must respond to growing consumer health concerns regarding the use of sodium lauryl sulfate in lathering products. Patagonia, one of the first retail companies to introduce the use of organic cottons, must respond to the growing customer demand for clothes with low environmental impact and has been working on a program to create a closed loop for the materials used in their apparel. The transformation of Herman Miller, a perpetual leader in the realm of corporate CSR, towards the use of the Cradle-to-Cradle design protocol is an excellent example of a transformative change that incorporates changes to various aspects of organizational strategy, structure, and culture in an effort to achieve greater environmental performance goals (Lee & Bony, 2009).

Finally, the much lauded Grameen Bank has move well beyond its original microfinance banking strategy to incorporate a telephony business and the renewable energy technology transfer and education services of Grameen Shakti.

The important point of these examples is that organizational change towards sustainability is a continual process. While there are certainly interesting stories in the transformation from a business-as-usual company to a sustainable business, there is no end state to sustainability. The study of sustainability will always be the study of organizational change and adaptation. Change is constant in sustainability; it is the content of change that evolves over time as the demands and needs of the general environment shape the need for proactive corporate adaptation. The existing literature on organizational change and adaptation is extensive and provides excellent guidance for study of organizational change towards sustainability.

One key element of the existing literature on organizational change is the tension between the need for change and the risks associated with change. The literature argues that change increases the failure rate of organizations, either by disrupting existing organizational routines that promote competence (Nelson & Winter, 1982) or by threatening the institutional relationships a firm has established (Hannan & Freeman, 1984). Therefore, despite the positive anecdotal stories about sustainability, the mere fact that sustainability incorporates continual change means the strategy is imbued with a tremendous amount of risk. A risk, that often fails to be conveyed in the win-win-win stories often portrayed in the general media and business press. This risk of change is not unique to change in pursuit of sustainability, and there are many arguments why an organization would pursue change despite the advantages of stability. Leana and Barry (2000) provide a nice concise discussion of

motivations for change versus the motivations for stability. The motivations for change include adaptability, cost containment, impatient capital markets, control, and competitive advantage; while the motivations for pursuing stability include institutionalism, transaction costs, sustained advantage, organizational social capital, and predictability (Leana & Barry, 2000). This tension between change and continuity emerges as a central theme of a special issue of the Academy of Management Review on change and pluralism. The editors of the special topic forum find that some expected themes, such as the punctuated equilibrium do not emerge as central themes to the works included in the forum (Eisenhardt, 2000). This is surprising, since the original work on punctuated equilibrium touches on the tension between change and stability most cogently (Tushman & Romanelli, 1985). Organization change that follows a pattern of punctuated equilibrium can maximize the periods of stability and minimize the periods of change when organizations are at greater risk for failure. Therefore, the theory of punctuated equilibrium is an excellent starting point for developing a sustainability theory of continual change.

The theory of punctuated equilibrium, as elaborated by Tushman and Romanelli (1985), identifies five key areas of organizational activity that are critical for organizational survival; organizational culture, strategy, structure, power distribution, and control systems. (Tushman & Romanelli, 1985) These are the key domains which an organization can change in response to altering market conditions or shifts in the general environment. The main thrust of the theory of Punctuated Equilibrium is that organizations undergoing radical changes will change most or all of these key domains in a relatively short period of time. Though these changes are expected to occur in rapid succession, there is little in the theory about the order in which firms will implement changes to the five key domains.

Consequently, much of the empirical research into Punctuated Equilibrium has focused on the content of these changes or on examining the pace at which firms make changes in the key domains (Sastry, 1997), and rarely on the order in which these changes are implemented. Scholars have argued that studying both the content and process of organizational change can help resolve some of the contradiction and fragmentation in the existing empirical literature (Barnett and Carroll, 1995). The order in which change is implemented, the sequence of change, offers an important area of research to progress both the sustainability and change literatures.

The sequence of change has received attention in the strategy literature, where contingency theory research has studied whether changes in organizational structure follow or lead changes in strategy (Amburgey & Dacin, 1994). Some more recent empirical research has integrated a study of the pace of punctuated equilibrium with the sequence and linearity of organizational change and found support for a sequence hypothesis that organizations undergoing radical change must alter high-impact elements early on in the process of radical transformation (Amis, Slack, & Hinings, 2004). High-impact elements were operationalized in the Amis et. al. study as decision-making structures, which does not map directly onto the five domains introduced in the original theory. Therefore, this study hopes to contribute to an understanding the impact of different change sequences while focusing on changes to the key elements of the punctuated equilibrium model. The sequence in which change is implemented may have an impact on the pace of change which is frequently studied in the punctuated equilibrium literature; raising the possibility that those previous studies may have been confounded if differences in change sequence were not controlled for. While it is also likely that the sequence of change may impact firm performance after transformation, this

aspect of sequencing is not investigated in this study. This work focuses on how the sequence of change affects the progression of the organizational transformation itself. How does sequence impact the pace and effectiveness of an organizational transformation?

This study models a hypothetical organization and explores how different sequences of change in the five key domains impact the change process. The modeling is accomplished using SimVisionTM, an agent based computational model. The modeling software defines an organization by its various tasks and the aggregate characteristics of the workers assigned to those tasks. The software simulates the information processing demands on time constrained individuals and is well suited to test the impacts of changes in organizational activity on the productivity of the organization. By tweaking the workflow design, task variables, and worker variables it is possible to create alterations that correspond to the five organizational domains identified by Tushman and Romanelli (1985). Two archetypal organizational configurations are modeled, and the research design simulates the variety of sequences an organization can follow when transforming from one archetype to another through changes to key domain attributes. In other words, the transformation from one archetype to another is repeated using each of the possible sequences of change to gain insight into the impact of change sequence on organizational effectiveness. These insights are then used to suggest some propositions for a prescriptive theory of the sequence of transformative organizational change.

Theoretical Background

The theory of punctuated equilibrium originated in the field of Biology as a challenge to the Darwinian view of gradual evolution. Over time this new paradigm of change has

infiltrated various fields of academic study including the organizations literature. Gersick (1991) provides a thorough account of the history of the theory and its application in various fields including history of science, biology, philosophy, organizations, groups, and individuals. The theory is based on the observations that natural systems tend to remain in static equilibrium for extended periods of time in which they are resistant to pressures to change. Over time the pressure to change can build up enough strength to overcome the inertia of natural systems, resulting in dramatic and quick change. Applied to organizations, the theory of punctuated equilibrium produces a model where organizations build competencies by performing the same routines over time. These competencies form the basis of organizational inertia which makes organizations highly resistant to change. The main tension in the theory is that organizations resist change because it destroys firm competencies, yet over time these competencies may become less useful for firm survival (Tushman et al., 1985). In the original model, the pressure for radical organizational change comes in the form of deteriorating performance, and firms don't react until this pressure is sufficiently strong to warrant the loss in competency. The discussion of sustainability suggests that there are other signals besides failing economic performance that will drive change. Regardless of where the signals emanate, when the signals for change are strong enough then organizations experience rapid and discontinuous change in the five key domains.

Tushman and Romanelli (1985) use the term reorientation to describe simultaneous and discontinuous change in strategy, power distribution, structure, and control systems. The term re-creation is used if a change in core firm values is also included. It is important to note the use of the word "simultaneous" in the definition of a reorientation. This may explain why

much of the literature has focused on the pace of these reorientations and not on the sequence of changes. However, the term simultaneous is not used exclusively; and in a later empirical paper their own operationalization of reorientation demonstrates that the changes are not in fact simultaneous (Romanelli & Tushman, 1994). Therefore, though the theory does not address the sequence of change, punctuated change can unfold in many patterns depending on the order in which the organization alters its strategy, culture, structure, power distribution, and control system. These patterns may or may not have impacts on the change process or firm performance.

Some scholars have called for further examination into the sequence of punctuated change and the consequences for organizational performance (Pettigrew, Woodman, & Cameron, 2001). There have even been some responses to this call. In a study of radical organizational transition at Canadian Olympic Non-Profits, Amis et. al. (2004) hypothesized that organizations that complete radical transitions tend to make changes to high-impact organizational elements early in the change process. The hypothesis was supported when high-impact change was operationalized as change in the decision making authority of the organization, which incorporates elements of change in power distribution and structure (Amis et al., 2004). However, the theory behind the high-impact hypothesis relies on the presumption that change has symbolic impact on the functioning of the organization, and that changes with higher impact signify the organizations commitment to the change process. However, any of the five elements could vary in symbolism and impact depending on the extent of the change and the tolerance for change in the organization. Therefore, the concept of high-impact change does not help tease out the difference between say starting a transformation by changing strategy or control systems. Regardless of whether those changes

were more symbolic or not, the sequence in which the change is implemented should introduce different temporary work environments that may impact the effectiveness of workflow. By exploring different sequences of transformative change this study intends to get a better understanding of how each element contributes to the transformation process, and help to explain some of the variance in organizational transformations.

Computational Methods

SimVisionTM, an actor-based simulation software package used for project management, is used to model the impact of change sequence on the pace of change. This software has been used extensively as an organizational research tool, including studies on alternate control strategies (Long, Burton, & Cardinal, 2002) and communication strategies (Carroll & Burton, 2000). SimVisionTM allows for manipulation of all five elements of organizational activity identified in the punctuated equilibrium model and analyzing the project performance of boundedly rational actors. One highly influential study of punctuated equilibrium used system dynamics to simulate the organizational change process (Sastry, 1997) and produced some useful findings for refining the punctuated equilibrium model. That study focused on modeling the process by which pressures for change overcome organizational inertia, which was well suited for the systems dynamic framework. In this study, the focus is the actual dynamics of change once it has been set in motion and SimVisionTM is chosen as the modeling software because it allows for modeling how the sequence of organizational changes impacts the performance of organizational activities.

Following the example of Romanelli and Tushman's (1994) test of punctuated equilibrium in the minicomputer industry, the model will focus on three of the dimensions

which define organizational reorientations; strategy, structure, and power distribution. While SimVisionTM does provide the opportunity to simulate different control systems or organizational cultures, I chose to limit this initial study to those which have been operationalized in the empirical literature. Therefore, the methods and measures used in the study of the minicomputer industry help to determine exactly how changes are implemented in the modeled organization. That is, what changes to tasks, actors, or actor characteristics need to be made to simulate transformation in the three elements; strategy, structure, and power distribution (Romanelli et al., 1994).

The hypothetical organization is modeled as a set of both defined tasks and individuals assigned to complete these tasks. For any pre-defined configuration of the three key elements the organization should perform in a fairly consistent manner, with only slight variation introduced by the stochastic component of the model. A simplification is introduced to the model, such that changes to key organizational elements do not occur while tasks are being performed. This simplification will allow for consistent comparison between different sequences. The workflow of the hypothesized organization is envisioned as a project shop. The simulation will proceed with the original configuration to complete one cycle of the project, at the conclusion of project one a second project is initiated after changing one of the three elements. At the conclusion of project two the second change is made and the third change is made after the completion of project four. After project four, regardless of the change sequence followed, all simulations will have achieved the final configuration and a final project five is run in the final configuration mode.

For each pattern of punctuated change simulated, the organization will start and end with identical settings for strategy, structure, and power distributions; these are the initial and

final organizational configurations (the archetypes) which are shown in the Appendix 4A and 4B. Since the simulated sequence of changes always start and end with the same configurations, the task duration and work volume will be the same at the beginning and end of each pattern of punctuated change. Any difference in performance during the punctuated change process being simulated will arise if the different intermediary configurations have different performance characteristics. This test is not a complete test of the impact of the sequence of organizational change because it does not account for impact of the change on the motivations and efficacy of individual actors; nonetheless it provides insight into the macro implications of change sequence that may or may not be important.

Structure

One of the measures used to operationalize change in organizational structure in the minicomputer industry study was the change in the ratio of the number of executives with functional titles to those with divisional titles (Romanelli et al., 1994). This measure served to capture a change of company structure between the multidivisional form (M-form) and the unitary form (U-form). For this simulation it is not necessary to rely on proxy measures, the model can directly incorporate a shift from M-form to U-form. The initial organizational structure for the simulations is the M-form or multidivisional structure. The organization starts with two divisions, one for each product line as seen in Figure 4.1. The change of structure modeled in our simulation is a shift from this multidivisional form to a functional structure, also referred to as the U-form. When the organization changes to a U-form structure, there remain two product lines, however the executives no longer oversee an entire product division but rather particular tasks for both product lines as shown in Figure 4.2. In

terms of the simulated executives, executive number one oversees product line 1 (tasks 1A-1D) under the M-form structure, but after the change to the U-form structure this executive now oversees the A and B tasks for both product line 1 and product line 2.

Strategy

In order to capture major changes in strategy one of the four measures used by Romanelli and Tushman (1994) to capture changes in strategy is selected—the introduction or abandonment of product lines. This measure captures the level of product diversification in which a company is engaged. The simulation starts with an organization with only two product lines and concludes with an organization with four product lines. In the modeled simulation, the original configuration consists of eight tasks (4 for each product line) while after changing strategy the organization is modeled with sixteen tasks. The change in task numbers introduced by the change in strategy will be important to remember when comparing the performance of the various change sequences.

This operationalization of change in strategy is a natural fit for the sustainability context of interest. The Herman Miller Cradle-to Cradle Protocol implementation mentioned earlier is a clear example of how during a transition to more sustainable business practices a firm can experience an increase in product lines. During the transition to the new protocol, Herman Miller continued with the production of their existing furniture lines even while starting production on the new PVC-free Mirra chair (Lee & Bony, 2009). In particular, if the processes and characteristics of a new sustainable product are vastly different few companies will be willing to abandon the revenue of existing product lines while the success of the new product is uncertain.

Power Distribution

Power distribution impacts how scarce resources are allocated within an organization (Tushman et al., 1985). This was operationalized in the minicomputer study using proxy measures, including executive turnover rates and shifts in functional orientation of a firm. Rather than rely on proxy measures, SimVisionTM allows for direct manipulation of how resources (in this case human resources) are allocated within the organization. The starting configuration for power distribution consists of an equal number of full-time employees (FTEs) assigned to all the tasks in each product line. A major change in power distribution is represented with a shift in FTEs from earlier tasks in the project to the later tasks; this could for example simulate a shift in emphasis from R&D to Sales.

Once again, it is very easy to imagine a sustainability scenario where this type of power shift would be relevant. The educational and marketing component of environmental sustainable or socially ethical products has always been quite challenging. A firm pursuing a change towards more sustainable products, which in all likelihood will increase production costs, will pursue a strategy of increased willingness to pay (WTP) from customers. A sophisticated marketing staff will be required to accomplish the brand recognition and customer education to accomplish this increased WTP. Even if jobs in R&D and manufacturing were maintained at pre-change levels, new positions in marketing and sales could very well change the balance between the earlier and later tasks of the simulated organization.

Change Sequences

This study simulates the reorientation of a hypothetical organization from one configuration of strategy, structure, and power distribution to a final configuration. The simulation starts with an M-form structure, with two product lines, with an equal distribution of FTEs across product line tasks and reorient to an organization with a U-form structure, running four product lines, with twice as many resources dedicated to the later tasks of a product line. The organization changes one of the three elements at a time to transform from the starting configuration to the final configuration, creating six possible sequences of reorientation (See Table 4.1). Each change sequence is simulated in SimVisionTM by changing the three elements as described above, all other elements of the simulation remained constant throughout.

Results

Table 4.2 presents the project duration for the six different sequences of punctuated change. These results are the mean value for a sample of 25 simulations (n=25), and the standard deviation is also included in the table. The results demonstrate a significant difference, at the 0.01 level, in the duration of the period of punctuated equilibrium depending on the sequence in which changes in the key elements of organizational activities are implemented. Total duration of the transformation process ranges from 26.9 weeks to 37.5 weeks depending on the sequence in which the change elements are implemented. The study of punctuated equilibrium in the mini-computer industry considered a change to be punctuated if all three elements were changed within a 24 month window (Romanelli & Tushman, 1994). By this definition, all six sequences can be considered punctuated, however

the more than ten week difference between sequence one and sequence six can certainly be considered substantial. The speed of product lifecycles is constantly quickening, particularly in the consumer electronics industry. Therefore, while two years may have been an appropriate window for punctuation in the mini-computer industry in the 1990s it is more likely that punctuated equilibrium be defined by a 3-4 month window in 2010. One of the most recent examples of these accelerated product cycles can be glimpsed in the release of Apple's iPad on April 3rd, 2010. Hewlett-Packard had been working on a Windows 7 based tablet device, but had not been able to match Apple's release date. After the tremendous sales success of the iPad, HP cancelled the Windows 7 tablet less than a month after the introduction of the iPad (Arrington, 2010).

Studying Table 4.2 reveals a challenge in comparing the results of the six simulated sequences. Because the simulated change in strategy consists of a doubling of product lines, the amount of work conducted over the period of the simulation is different depending on when the change in strategy is implemented. The work volume in the samples ranges between 50-70 work weeks (40 hours per work week); therefore measures of the duration of the punctuated equilibrium become confounded with the extra work accomplished during the reorientation. First, it is important to note that for the sequences with equal work volume (1/2, 3/5, and 4/6) the differences in work duration are indeed different at $p=0.01$, giving partial support for the idea that sequence impacts the duration of the punctuated equilibrium. Therefore, even with this complication the results do show that sequence in and of itself can have an important impact on the effectiveness of a change process. However, the confounding of duration with work volume suggests that different metrics may be needed.

The effectiveness of the reorientation depends on more than just the duration of the change process. Results of prior simulation work demonstrated significant drops in competency after a reorientation (Sastry, 1997) as had been stated in the original theory of organizational evolution (Tushman et al., 1985). Because the different sequences of change result in different volumes of work flow accomplished by the time the full reorientation is complete, it is likely that sequence influences the competency of the organization going forward. The literature on learning (Levitt & March, 1988) suggests that competency increases with experience. Therefore, the longer periods of transformation for some sequences may not be as important when considering the extra experience gained. The earlier the change of strategy is introduced in the simulated sequences, the greater total volume of work is completed during the transformation process. An organization may struggle more while waiting for the structure and power distributions to align with the new strategy, but this period of struggle provides useful experience in which organizational competency begins to recover because of the learning value of experience. While the impact of increased experience on organizational competency is not tested directly in these simulations, the results from the experiment suggest this is an important aspect of the impact of sequence.

The difference in work volume between sequence four and five is ten weeks while the difference in duration of the two sequences is only three weeks. The ratio of work volume to work duration may provide a useful effectiveness measure to compare the various sequences. The sequence which accomplishes the most work in the least amount of time is sequence two (Strategy to Structure to Power); however this does not coincide with the quickest sequence to reorientation which was sequence six. This suggests that the optimal sequence may vary

depending on an organization's needs or goals. Different organizations may have different goals for their change processes; some may emphasize accomplishing a change as quickly as possible while others may be interested in maintaining the greatest effectiveness during the change process. For example, if accelerating the recovery of competency is important one sequence may be better, whereas if signaling a change in strategic orientation to outside institutions by a certain date is important a second method may be better. If regulatory agencies or significant customers have established strict deadlines for enforcement of new polluting standards or products' environmental attributes, then certainly accomplishing the organizational transformation needed to meet these deadlines would be the highest priority. However, when deadlines are not an issue, as when a firm is making proactive changes it may be advantageous to follow a change sequence that preserves more firm competencies even if at the risk of prolonging the transformation duration. The different measures which may be used to define a successful change introduce additional challenges into understanding the impact of the change sequence, however these simulation results do support that different sequences can create significant differences in the duration of the change process.

Conclusion

This work is an exploratory study of the impact of the sequence of change in punctuated equilibrium using an agent-based simulation model. The theory of punctuated equilibrium established that punctuated change consists of major change to five key areas of organizational activity (Tushman et al., 1985). The pace of punctuated equilibrium has been tested in the literature, but neither the original theory nor subsequent work has provided

much study into the impact of the sequence of change. Six different change sequences an organization could follow, when reorienting from an initial configuration of strategy, structure, and power distribution to a final configuration, are simulated and results demonstrated significant differences in the duration of the change process. Based on the definition of strategic change, the six change sequences also demonstrated predictable differences in work volume, suggesting that sequence may impact the recuperation of organizational competency as well as the mere duration of the change process.

The existing change literature emphasizes the risk of change to the survival of organizations (Armenakis & Bedeian, 1999). However, sustainability is an ongoing process of change and adaptation to shifts in the task and general environments facing organizations. Sustainability is focused on survival, so change must be studied to understand this tension between the risks of organizational change and the benefits of change and adaptability. Punctuated equilibrium is proposed as a theoretical tool for creating the balance between change and stability that could lead to firm sustainability. Firms should strive to accomplish change in a manner consistent with punctuated equilibrium in order to maximize the periods of competence building stability and minimize duration of risky transformation. The process of change, in particular the sequence which different changes, is explored to determine if controlling change sequence is an appropriate lever for creating more punctuated changes that enhance sustainability aims. The simulations did find that change sequence could impact the duration of change and it might be possible to reach some prescriptive recommendations from future expansion of this work. However, a more interesting result of these experiments was the discovery of the confounding influence of change sequence on the experience and competencies of the changing organization. These results seem to coincide with prior

scholars' assertions that organizational change can be both disruptive and adaptive (Amburgey, Kelly, & Barnett, 1993). Not only does change sequence impact the total duration of radical change process, but can also impact the resulting level of firm competency. Therefore, any prescriptive advice becomes much more complicated than merely advising firms to pursue sequences that minimize the period of transformation.

Sequence does appear to be an important lever in the appropriate management of change processes. The results of these simulations suggest that firms may choose one sequence over another depending on their change goals. Firms that have operated under business-as-usual who may now be feeling pressures to address issues of environmental or social business management may find it necessary to pursue the quickest most punctuated change possible. Food companies in 2010 that have not yet launched an organic or all-natural food line, carbon intensive businesses looking to expand in the highly regulated European market, or any supplier of Wal-Mart's that has not pursued eco-labeling are all examples of firms that are experience a time pressure. They are currently ceding market share to competitors or risking the alienation of their customers. These are the types of firms that might need to pursue their change initiatives in a sequence that would lead to the shortest duration of transformation, because they need to signal to the marketplace or their important stakeholders that they are responding to sustainability issues.

Firms that have been leaders in environmental and social management that continue to evolve and improve their sustainability performance have the luxury to pursue change processes that sustain corporate competencies. These companies are acting proactively, sometimes years ahead of competitors and even the marketplace. There are no deadlines to be met, so they have the time to implement change in a fashion that may take longer but that

preserves other important firm capabilities. Herman Miller started the transformation towards Design for Environment (DfE) protocols in 1997, which included changes to culture, structure, power distribution and control systems. It wasn't until 2001 that the company decided that they were ready to implement DfE into an actual product launch (Lee and Bony, 2009). With the introduction of DfE to the Mirra chair product segment, Herman Miller had officially accomplished a re-creation though it had taken four years. This is well beyond the 24 month window defined for punctuated transformation. However, Herman Miller's adoption of DfE was well ahead of its time and this extra time to accomplish the transformation may have been worth it to the company if it allowed for competencies to be preserved throughout the organization.

Limitations

While this exploratory study has many limitations, it does suggest that the sequence of change in punctuated equilibrium provides insights into the organizational change process. This study only measured the impact of sequence on the information processing limitations of simulated agents, it does not even account for the psychological and motivational challenges associated with change. Therefore, this study is a conservative look at the impacts of sequence on change processes. This research on sequence could be expanded in the organizational behavior literature to understand how different implementations sequences may impact the motivation and effectiveness of individual employees and or managers. Future work will also try to integrate changes in culture and control systems, to fully align with the original theory. Additionally, future simulations can drop some of the simplifying assumptions of this first experiment. For example, if change is introduced while tasks are being processed the model could more accurately model the information processing

challenges that individuals face when change initiatives are implemented. This study provides a solid grounding for these future investigations which could help provide more descriptive guidance for balancing the paradox of change and sustainability, and thus providing firm's with information on how to implement sustainable change.

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TABLE 4.1
Change Sequences

Sequence	1st Change	2nd Change	Final Change
1	Strategy	Power	Structure
2	Strategy	Structure	Power
3	Power	Strategy	Structure
4	Power	Structure	Strategy
5	Structure	Strategy	Power
6	Structure	Power	Strategy

TABLE 4.2
Simulation Results

Sequence	Work Duration	Std. Deviation	Work Volume	Volume/Duration
	(weeks)	+/-	(work hours)	(work hours/week)
1	37.5	0.4	2800	74.7
2	36.4	0.3	2800	76.9
3	34.7	0.4	2400	69.2
4	28.8	0.3	2400	69.4
5	31.8	0.4	2000	75.5
6	26.9	0.3	2000	74.3

FIGURE 4.1
M-Form Structure

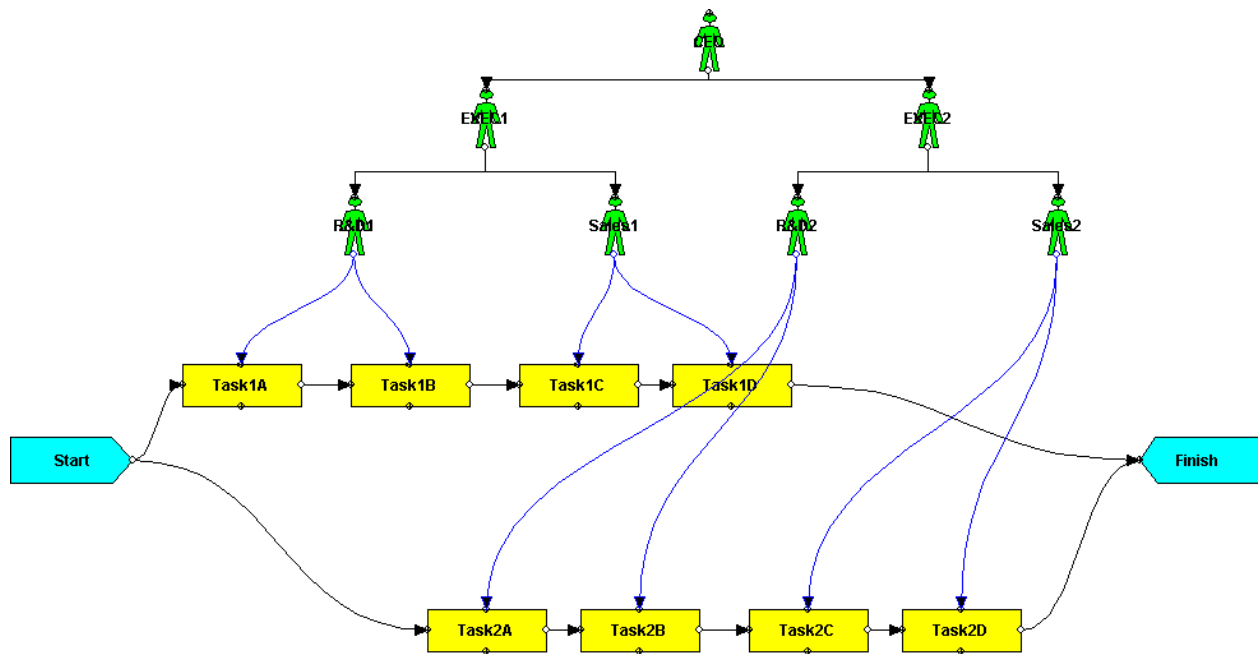
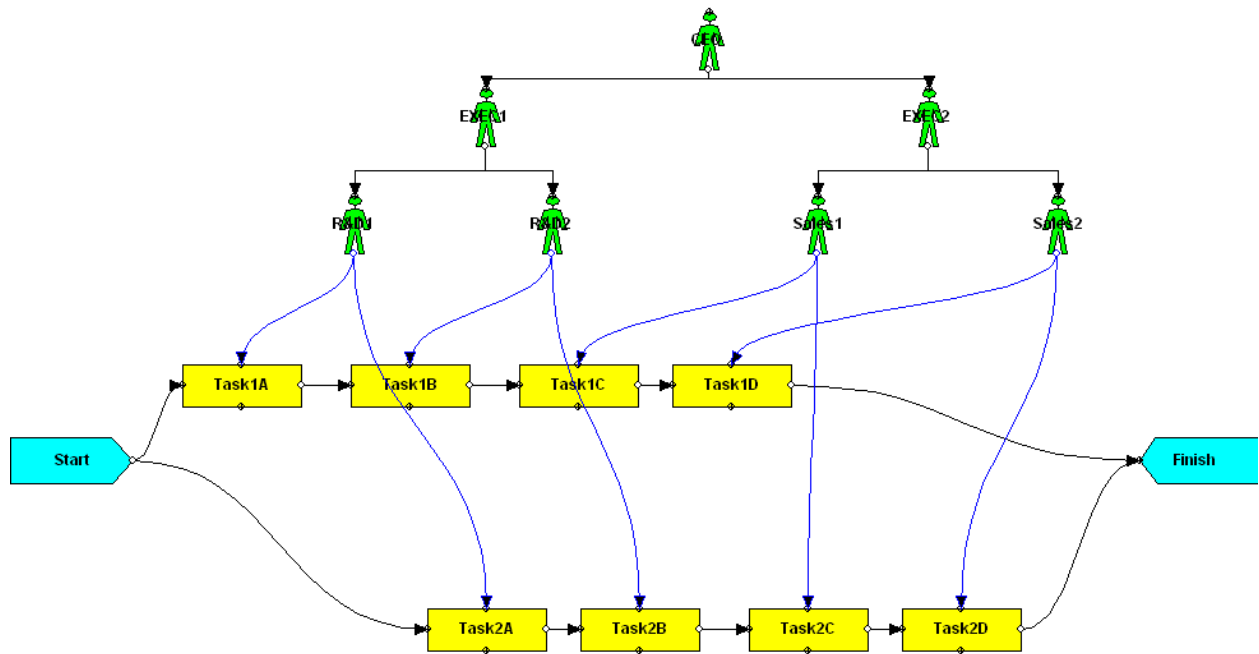


FIGURE 4.2
U-Form Structure



APPENDIX 2A: Sustainability Questions Added to the AICPA Economic Outlook Survey, 3rd Quarter 2008

22. Many organizations today are adopting sustainability policies. A broad definition of sustainability encompasses the pursuit of 1) economic vitality, 2) ecological integrity, and 3) social welfare, often referred to as the “triple-bottom-line.” Please use this definition as you answer the questions below; you will be able to provide your own definition below.

Please answer the following questions as they relate to sustainability at your company. Which of the following statements best describes your organization’s current approach to sustainability?

- We do not have a sustainability policy; and sustainability efforts in our company are limited.
- We do not have a formal sustainability policy; but do have some ad hoc sustainability efforts taking shape in our company.
- We have a formal sustainability policy and programs that are focused primarily on ecological or environmental considerations.
- We have a formal sustainability policy and programs that encompasses all three elements of the triple-bottom-line definition.

23. To what extent does the culture of your organization support sustainability as an expected part of the employee jobs?

1 - Not at all	2	3	4	5 - To a great extent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. To what extent does your organization establish a “code of conduct” or behavioral expectations with respect to sustainability?

1 - Not at all	2	3	4	5 - To a great extent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23. To what extent do you see helping the cause of sustainability to be an expected part of the job?

1 - Not at all	2	3	4	5 - To a great extent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. For the following questions, please consider “sustainability” and “corporate responsibility” as separate.

To what extent does your company engage in sustainability reporting?

1 - Not at all	2	3	4	5 - To a great extent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

To what extent does your company plan to use sustainability reporting?

1 - Not at all	2	3	4	5 - To a great extent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

To what extent does your company engage in corporate responsibility reporting?

1 - Not at all	2	3	4	5 - To a great extent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

To what extent does your company plan to use corporate responsibility reporting?

1 - Not at all	2	3	4	5 - To a great extent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX 2B
Sample Responses and Coding Examples for Open Ended Sustainability Definition Question

NAME	CODE	SAMPLE RESPONSE
None/Trivial	0	We do not define it.
Humorous/Hostile	1	- Free enterprise; free markets; and American capitalism - not socialist; communist government control and political correctness (Hollywood style). - Unfortunately, “economic vitality” is not part of our definition
Economic	2	Ability to incrementally increase revenue and profitability year-over-year through careful monthly and quarterly attention to planned vs. actual revenues; employee utilization and receivable collections.
Environmental	3	to limit our carbon footprint and be a good steward of the lands and other resources we are responsible for
Social	4	- Responsible citizenship, improve the well being of our communities. - We focus primarily on community involvement of time and money for charities
Economic and Environmental	5	Creating a long-term business plan that focuses on preserving capital, growing capital and paying some dividends while being good stewards of the environment.
Economic and Social	6	not vocalized; latent effort is on social welfare and economic vitality
Environmental and Social	7	Being a good corporate citizen that gives back to the community and is aware of the environment
Triple Bottom Line	8	Economic growth is the major factor with the conditions of operating in a manner that is environmentally and socially responsible.
Intergenerational Equity	9	Developing product and fulfilling the goals of the company responsibly, without hampering the ability of future generations to achieve the same due to our actions today.

APPENDIX 2C
Multinomial Logistic Regression Analysis for SMD

Variables	TBL vs. NoPolicy	ECO vs. NoPolicy	AdHoc vs. NoPolicy
Agriculture	0.85	0.17	-0.38
Arts ¹⁰	-0.37		-0.98
Construction	-0.46	-1.09	-0.18
Education	-0.84	0.12	-0.61
Finance & Insurance	-1.37 *	-1.86 *	-0.54 *
Healthcare	0.05	-0.74	0.05
Hospitality	1.17	0.56	-0.84
Information and Media ¹¹	0.71		-0.78
Other Industry	-2.22 *	-0.89	-0.55 †
Mining and Oil & Gas	-0.46	-0.30	-0.29
Professional Services	0.34	-0.17	-0.33
Real Estate	0.99	-0.11	-0.46
Retail Trade	-0.40	0.32	-0.20
Technology ¹¹	-1.53 †		-0.72 †
Transportation	-0.69	-0.09	-0.04
Utilities ¹¹		-0.22	-0.61
Wholesale	-0.23	-1.61	-0.54
Other	1.50 **	0.25	0.36
Foreign	2.21 ***	1.73 **	0.08
Public	1.66 ***	1.18 *	0.27
Medium	0.29	0.05	0.15
Large	0.78	1.67 *	0.54 *
X-Large	2.64 ***	2.09 **	0.85 *
Constant	-3.16 ***	3.09 ***	0.02
n	922	922	922
Degrees of Freedom	69	69	69
Pseudo R ²	0.0931	0.0931	0.0931
Likelihood-ratio chi-square	176.87	176.87	176.87

† p < 0.10; * p < 0.05; ** p < 0.01; *** p < 0.001

¹⁰ See footnotes 7-10 for explanation of missing coefficients

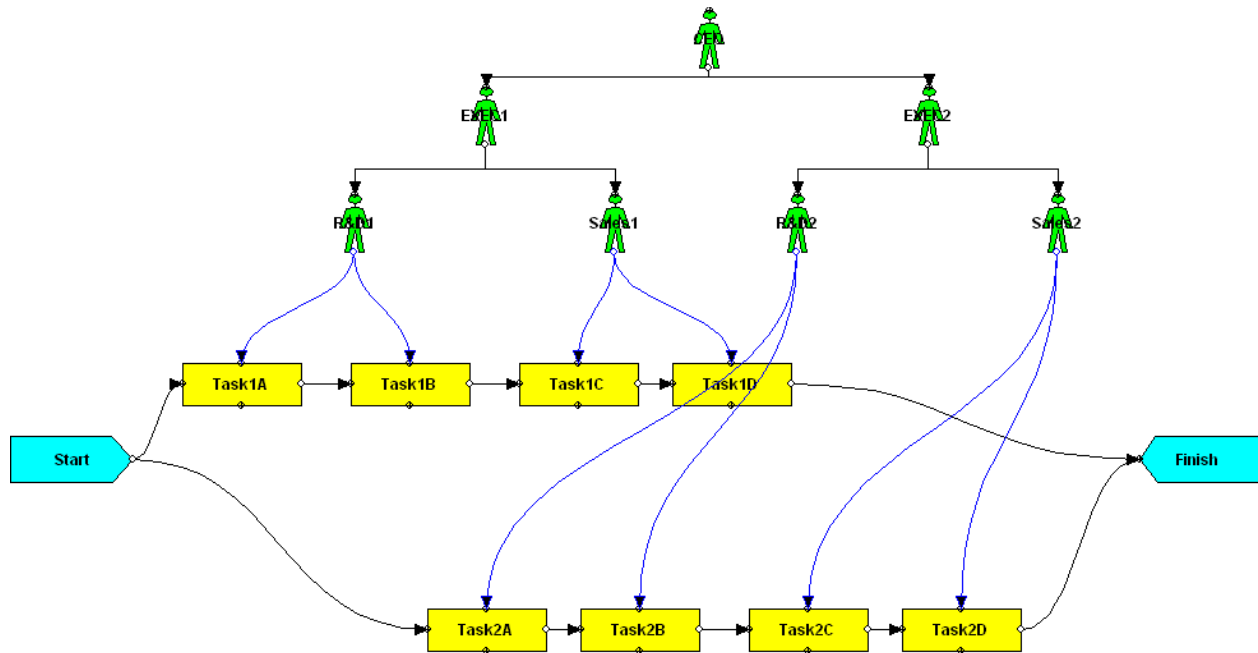
APPENDIX 3A
TRI “Form R” Source Reduction Methods Codes

Code	Source reduction method	Measure
T01	Internal pollution prevention opportunity audits	EMS*
T02	External pollution prevention opportunity audits	COERCIVE
T03	Materials balance audits	EMS*
T04	Participative team management	EMS*
T05	Employee recommendation (independent of a formal company program)	NORMATIVE
T06	Employee recommendation (under a formal company program)	EMS*
T07	State government technical assistance program	COERCIVE
T08	Federal government technical assistance program	COERCIVE
T09	Trade association/industry technical assistance program	NORMATIVE
T10	Vendor assistance	COERCIVE
T11	Other	

* Variables as defined in King et. al. 2005

APPENDIX 4A

Initial Organizational Configuration



APPENDIX 4B

Final Organizational Configuration

