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Abstract

Although institutional theory has demonstrated that social, political, and cultural pressures within organizational environments shape the diffusion of new practices, few studies have examined whether managers actually perceive different types of field-level pressures to be important and, if so, whether their perceptions are associated with practice adoption. This is particularly true in the context of institutional fields. In this paper, we use survey data from 425 managers to analyze their perceptions of broader field-level pressures relating to climate change, and the relationship between these perceptions and the adoption of green information systems (IS). Our preliminary results reveal that managerial perceptions of pressure from environmental activists are not significantly related to managerial commitment to adoption or to actual adoption, but that managerial perceptions of broader field-level pressures to address climate change are positively related to both. In addition, we find that activist pressures are positively related to field-level pressures, suggesting that activism is more influential as an indirect rather than a direct pressure on corporations in shaping the adoption of green IS.

Keywords: corporate sustainability, green information systems, institutional theory, practice adoption, social movements.

Introduction

A core insight of institutional theory is that external pressures emanating from the social, political, and cultural environments in which firms are embedded influence the adoption of new practices. This insight has served as the foundation for a sophisticated theoretical framework to explain the adoption and diffusion of new practices, beginning with the two stage model of Tolbert and Zucker (1983) to more recent expansions that take seriously the agency of organizational actors (Maguire et al., 2004; Pache and Santos, 2010; Patriotta et al., 2011), and the contestation and heterogeneity of organizational fields (Fiss et al., 2012; Greenwood et al., 2011; Schneiberg and Lounsbury, 2008). An important and often implicit assumption of the institutional literature on practice adoption is that managers perceive regulative, normative, and cultural-cognitive pressures (Scott, 2013) within organizational fields to actually be important. If managers do not perceive specific external pressures to be salient, however, it is difficult to see why they would react to them by adopting new practices (Bundy et al., 2013). Although the importance of managerial perceptions in shaping how firms respond to external pressures finds broader theoretical grounding in the sensemaking perspective (Weick, 1995) the attention-based view of the firm (Ocasio, 1997), work on cognition and strategy (Kaplan, 2011), and stakeholder theory (Bundy et al., 2013;

Mitchell et al., 1997), there is remarkably little empirical research on how managers actually perceive different types of field-level pressures (Carberry, 2012) and whether these perceptions are associated with practice adoption (for an exception, see Kennedy & Fiss, 2009). In other words, to explain new practice adoption, institutional research has focused most of its attention on the characteristics of organizational fields rather than on organizational-level phenomena (Greenwood et al., 2014).

This gap is particularly noticeable in the context of social movement activism and new practice adoption. Despite a significant literature examining how movement activism can foster institutional change around issues relating to the natural environment (Elsbach and Sutton, 1992; Hoffman, 2001), labor issues and working conditions (Bartley, 2007; Locke et al., 2007), human rights (Proffitt, 2006; Soule, 2009), and economic democracy (Haveman et al., 2007), our understanding of how corporate managers view activism and the effects of these views on managerial action remains underdeveloped. Although Waldron et al. (2012), in their sociocognitive approach, have theorized the key role that managerial perceptions play in shaping firm responses to activism and the conditions under which we would expect managers to vary in their assessments of and reactions to it, empirical evidence of how managerial perceptions of activism are related to practice adoption have been rare (Delmas & Toffel, 2008). Similarly, work in stakeholder theory has increasingly acknowledged the diverse range of stakeholder demands facing contemporary corporations and the sociocognitive processes that shape firm reactions to these demands (Barnett, 2014; Bundy et al., 2013), but we lack empirical insight into how managers perceive the salience of activist pressures relative to the types of regulative, normative, and cultural-cognitive pressures that have been at the center of institutional studies of practice adoption. Gaining such insight is particularly important as organizational fields become more contested and heterogeneous (Greenwood et al., 2011). Although (Kennedy and Fiss, 2009) demonstrated that how managers perceive opportunities and threats in their environments influences the timing of TQM adoption activism was not a relevant factor in the context of this relatively uncontested practice

In addition, beyond managerial perceptions, our general understanding of whether and how movement activism influences new practice adoption, such as green IS, remains underdeveloped. Existing research has demonstrated that activism can negatively impact stock prices (King and Soule, 2007), sales, and ratings by third party evaluators (Bartley and Child, 2012), but studies of how activism influences the adoption of new practices have focused primarily on the role of internal activists in shaping adoption and the conditions under which this occurs (Briscoe and Safford, 2008; Lounsbury, 2001; Meyerson and Scully, 1995). Developing a richer understanding of the influence of activism outside the firm on new practice adoption is especially important when we consider that activism likely works on multiple levels, by both placing direct pressure on specific firms and by reshaping organizational fields, which can in turn create direct pressures on specific firms. We know, for example, that social movements can alter field-level norms, regulations, and cultural-cognitive frames (Soule, 2012), and pave the way for the emergence of new industries (Sine and Lee, 2009; Weber et al., 2008), products (Hiatt et al., 2009; Rao et al., 2003), and organizational forms (Rao et al., 2000; Schneiberg, 2013). We have little understanding, however, of the potential for social movements to indirectly influence the adoption of new organizational practices in existing organizations by creating normative, regulative, and cultural-cognitive pressures within organizational fields.

In this paper, we address these gaps by analyzing how managerial perceptions of both activist and broader field-level pressures on corporations to reduce their impact on climate change are related to the adoption of green information systems (hereafter “green IS”). Green IS encompasses a variety of practices that allow firms to monitor and manage the environmental impact of their production and distribution systems. These practices emerged in the last decade as a way for firms to become more transparent about and reduce the environmental impact of their operations, particularly their greenhouse gas (GHG) emissions, two goals that the environmental movement advocated during the same period. We examine how managerial perceptions are related to both their commitment to adopt green IS and to actual adoption. In developing our hypotheses, we describe how the environmental movement’s sustained activism around climate change produced direct pressures on firms to adopt practices such as green IS as a way to monitor, disclose, and manage their GHG emissions. We also show how environmental activism helped to foster the emergence of regulative, normative, and cultural-cognitive pressures on firms to adopt these types of practices. Using structural equation modeling, we then analyze the relationship between managerial perceptions of these different pressures and the adoption of green IS, using survey data collected in a sample of over 425 managers from a diverse group of industries.

The Environmental Movement, Institutions, and Green IS

In the last four decades, the environmental movement has helped to generate widespread public concern for the natural environment, in part by focusing on corporations as the societal sector inflicting the most severe damage on the environment. In reaction, corporations have had to devote an increasing amount of attention and resources to addressing these external pressures, often by developing environmental management practices and policies geared toward mitigating their negative environmental impact (Kock et al., 2012), even if only symbolically. In examining the history of corporate environmentalism, or "the process by which firms address environmental issues and develop environmental management strategies" (Bannerjee, 2008: 489-490) over the last four decades, (Hoffman, 2001) has identified three distinct stages. In the 1960s, the primary response of corporations was to resist addressing environmental issues. As more federal regulations were implemented in the 1960s and 1970s, resistance gave way to a focus on regulatory compliance in the 1980s and 1990s. As pressure and public awareness continued to grow, the current focus has shifted to sustainability (Hart, 2000), in which an increasing number of firms "move beyond the objectives of regulatory requirements and set environmental objectives based more on internal management processes" (Hoffman, 2001: 151).

A significant driver of these changes in corporate environmentalism has been the intensification and diversification of social movement activism around environmental issues. The expansion in the number and type of environmental movement organizations (EMOs) has meant that activism has ranged from the cooperative efforts of the Sierra Club and the National Resource Defense Council, who often work directly with corporate leaders, to the more confrontational approaches of organizations like Earth First! and the Earth Liberation Front (Coglianese, 2001). In practical terms, this diversity has meant that environmental activists employ a range of tactics including direct attacks on specific corporations; lobbying for new regulations; collaborating with business to develop new practices, standards, and strategies; and engaging in cultural politics to alter public opinion, norms, and cultural frames (Soule, 2009). Ultimately, to maintain organizational legitimacy and resist being the targets of activists, corporate leaders must now actively engage with environmental issues, and be aware of the complex dynamics of the contemporary environmental movement and how it impacts the institutional environments in which their firms are embedded.

The current period of corporate environmentalism has been defined by broad concerns about climate change (Haigh and Griffiths, 2009). Through a variety of tactics, the environmental movement has been central to making climate change an issue of significant public concern. Not only have activists placed direct pressure on corporations to take steps to mitigate their GHG emissions, but they have also forced governments, institutional investors, consumers, and industry and professional associations to take climate change seriously (Levy and Spicer, 2013). How have firms responded to both direct targeting by activists and to the new regulative, normative, and cultural emphases on mitigating climate change? In general, research on new practice adoption within institutional theory has demonstrated that although field-level actors sometimes push for the adoption of very specific practices, it is more common for them to frame a broader set of issues as problematic while providing little specific guidance for how corporate managers might address these issues. For example, in response to general pressures to mitigate climate change, corporations have taken a variety of specific actions, including the symbolic, such as publishing sustainability reports, and the substantive, such as overhauling production and distribution processes to reduce GHG emissions (Kolk and Pinkse, 2005; Newell and Paterson, 2010).

In the last 10 years, however, the use of information technology (IT) and software has become an increasingly important way for firms to monitor and reduce GHG emissions, and to support different organizational innovations aimed at mitigating climate change (Jenkin et al., 2011). We categorize all such efforts as "green IS," in line with (Watson et al., 2010), who define it as "the design and implementation of information systems that contribute to sustainable business processes." The term green IS does not refer to a standard set of practices, but generally means using information technology to monitor and manage the impact of production, manufacturing, service, and distribution processes on the environment (Seidel et al., 2013). The most common green IS practices include using information technology and software to monitor energy and resource usage, monitor GHG emissions, and help optimize supply chains to increase efficiency in the transportation and distribution of inputs and outputs (Hoffman, 2005; Jenkin et al., 2011). Green IS also encompasses information systems that help firms design more environmentally

sustainable products, services, and packaging, or to reduce travel through virtual meetings and telecommuting.

It is important to note that green IS differs from "green IT," which refers to reducing the environmental impact of information technology through the use of more energy efficient and environmentally sustainable hardware, reducing IT usage, and obtaining energy for IT from renewable sources. However, in some industries, the lines between green IS and green IT are starting to blur. For firms in the IT, software, and financial services industries, for example, as well as any other that relies heavily on cloud computing and storage, the large datacenters that house the servers on which the cloud lives are part of their core production processes. Any efforts to reduce the GHG emissions of these datacenters, therefore, are similar to efforts by other industries to reduce the GHG emissions of their production systems.

The flexibility and potential of green IS to assist in corporate efforts to reduce GHG emissions have led influential field level actors such as the OECD and the Global e-Sustainability Initiative (GeSI), a coalition of the largest IT manufacturers, to argue that the "direct and enabling effects of Green IS could help achieve significant reductions in GHG emissions across all industry sectors" (Butler, 2012: 383). Green IS not only supports organizational-level efforts to reduce GHG emissions, but can also enable broader supply chains to take coordinated action to reduce emissions, particularly in high emissions industries such as automobiles, chemicals, mining, and electronics (Hoffman, 1999; Kolk and Pinkse, 2008). Therefore, the emergence of green IS as a way to reduce GHG emissions across a diverse group of industries is a useful context for exploring questions about the role of social movement activism in the adoption of new practices. We now turn to addressing two of these questions in more depth. First, how do managers view these pressures and how are these perceptions related to adoption? Second, are firms adopting green IS in direct response to environmental activism, to broader-field level pressures, or to both?

Institutional Pressures and Adoption of Green IS

In this section, we draw upon the literature on social movements and organizations, stakeholder theory, and institutional theory to develop hypotheses about how managerial perceptions of activist and broader field-level pressures are related to the adoption of green IS. Our fundamental assumption is that, ceteris paribus, when managers perceive external pressure relating to the adoption of a new practice to be strong, whether it is exerted by activists or broader field-level forces, they will view this pressure as potentially damaging to the firm's reputation or as signaling new norms of appropriateness (King, 2008; Waldron et al., 2012). They will therefore, in order to maintain their firm's legitimacy (Suchman, 1995), become more committed to adopting the new practice and more likely to adopt. In focusing on the relationship between managerial perceptions of their environments and practice adoption, we build upon Kennedy & Fiss (2009), who emphasize the role of managerial cognition in the process of adoption. In addition, Waldron et al. (2013) have theorized the key role that managerial perceptions of activism play in the development of corporate responses to that activism. Moreover, both the attention-based view of the firm (Hoffman and Ocasio, 2001; Ocasio, 1997) and stakeholder theory (Barnett, 2014; Bundy et al., 2013; Mitchell et al., 1997; Waldron et al., 2012) have demonstrated that due to cognitive limitations, managers cannot attend to all environmental stimuli, and organizational action is shaped by the issues on which managers focus their attention.

Hence, we argue that the process of new practice adoption begins with managerial perceptions of external pressures, and although eventual adoption decisions are influenced by a range of other organizational-level factors (Greenwood et al., 2011; Pache and Santos, 2010), we focus on the relationship between the perceived strength of external pressures and adoption. Do managers view different types of pressures as important and how are their perceptions related to practice adoption? In addition, we focus attention on the role of activism in fomenting field-level pressures, describing how environmental activism influenced a number of field-level actors to take climate change seriously, which created field-level pressures on firms to reduce their GHG emissions generally, with some actors pushing specifically for the adoption of green IS. However, even absent direct pressure to adopt green IS specifically, we view any pressures on corporations to reduce GHG emissions to be relevant for the adoption of green IS because the practice has become a key element of strategies to reduce GHG emissions.

Managerial Perceptions of Activist Pressures

Social movements often target specific corporations that they judge to be operating in ways that are unacceptable in terms of social, economic, or environmental justice. Activists use a range of persuasive and disruptive tactics (King and Pearce, 2010) including boycotts, protests, media campaigns, shareholder activism, and pressure from employee-activists, to draw attention to specific behaviors and practices, and to mobilize broader support for their goals (Soule, 2009). Although different activist groups often have diverse objectives, a common goal is to motivate corporations to alter specific practices that activists deem as illegitimate or to adopt new practices they deem as legitimate. One primary mechanism through which movements accomplish this is by damaging a firm's economic performance or reputation. To the extent that such damage, or even the threat of such damage, is severe (Waldron et al., 2013), organizations will be more likely to take some type of action, either substantive or symbolic, to demonstrate that they are taking movement demands seriously. Empirical evidence has revealed that direct targeting by social movements inflicts economic costs, such as lower stock prices (King and Soule, 2007) and sales (Bartley and Child, 2012) as well as social costs, such as public capitulation to social movement demands (King, 2008) and lower social ratings by third party evaluators (Bartley and Child, 2012). There remains little evidence, however, that firms alter existing practices or adopt new ones in reaction to the economic and social threats posed by direct activist tactics. When firms face legitimacy challenges from the media and shareholders, for example, one line of defense is the adoption of existing, legitimate practices (Carberry and King, 2012). Such defensive adoption is also a possible defense against targeting by social movement organizations. Alternatively, organizations that are directly targeted might also adopt new practices proactively to demonstrate alignment with the norms and values espoused by activists (Briscoe and Safford, 2008; Waldron et al., 2012).

In terms of climate change, environmental activists have used different tactics to pressure firms to be more transparent about, and to implement strategies to reduce, their GHG emissions. For example, the number of shareholder resolutions calling on firms to report and reduce their GHG emissions submitted by social movement groups, such as the Interfaith Center on Corporate Responsibility, has grown dramatically since 2000 (Newell, 2008; Reid and Toffel, 2009). Environmental activists have also engaged in extra-institutional tactics, such as demonstrations and media campaigns, aimed at industries that contribute the most to climate change or that have engaged in lobbying and public relations campaigns against climate regulation, such as oil and gas (Newell, 2008). In addition, environmental groups have actively pushed disclosure of carbon emissions by framing environmental reporting as analogous and complementary to financial reporting systems (Etzion and Ferraro, 2010; Levy et al., 2009). Finally, some environmental NGOs have used less confrontational tactics, such as engaging in partnerships with firms to address energy efficiency, sustainable product development, and the greening of the supply chain (Kong and Salzmann, 2002).

Since green IS has become an important way for companies to monitor and report their carbon emissions, adopting is a logical way for firms to respond to activist pressures for firms to deal with climate change. More recently, however, environmental activists have started to push directly for the more rapid development and adoption of green IS as a way to reduce GHG emissions. For example, in 2011, the Sierra Club, 350.org, Friends of the Earth, and 1% for the Planet publicly challenged energy companies and some state level governments to be more proactive in pushing for the faster development and implementation of smart-grid technology, which uses large-scale real-time data about energy production and usage, including both corporate and residential facilities, to manage energy and emissions flows in regional systems. Also, in a high profile effort in 2011, Greenpeace released a report that highlighted the environmental impacts of the internet and cloud computing by analyzing the energy usage and sources of the most prominent cloud-based companies, including Amazon, Facebook, Apple, Google, Twitter, Microsoft, IBM, Hewlett-Packard, and Yahoo (Cook and Horn, 2011).

As activism relating to specific issues intensifies, managers are more likely to view such pressure as potentially damaging to a firm's reputation or as signaling new norms of appropriateness, or both (Waldron et al., 2013). They will therefore be more likely to adopt practices in response to these pressures. This leads to our first hypothesis:

H1: Managerial perceptions of activist pressures relating to green IS are positively associated with the adoption of green IS practices.

Although we predict a direct relationship between managerial perceptions of activist pressures and practice adoption, the specific response of a corporation to any external pressures likely emerges out of a more complex decision-making process through which managers make sense of their environments and assess a variety of factors that could influence implementation (Carberry, 2012; Ocasio, 1997). In other words, external pressures "do not just 'enter' an organization – they are interpreted, given meaning, and 'represented' by occupants of structural positions" (Greenwood et al., 2011, p. 342). For example, new practices are often championed by specific actors, and top managers are usually the most influential. Indeed, research within the information systems literature has emphasized that managerial commitment to new technology practices is a key factor influencing their adoption, including in the cases of Web-based technology for e-commerce (Chatterjee et al., 2002) and enterprise resource planning systems (Liang et al., 2007).

Since social movement activism can "impact organizations not only by contributing to changing the costs and benefits of pursuing certain policies and practices, but also by changing the orientation and attitudes of organizational members" (Zald et al., 2005, p. 255), we argue that activist pressures can enter an organization by first intensifying managerial commitment to adopting a practice. This commitment, in turn, will make adoption more likely. This suggests a more complex pathway through which activists influence adoption, leading to our next two hypotheses:

H2: Managerial perceptions of activist pressures relating to green IS are positively associated with management commitment to adopting green IS.

H3: Management commitment to adopting green IS positively associated with the adoption of green IS.

The Effects of Activism on Organizational Fields

In addition to directly pressuring firms, social movement activism can transform the regulative, normative, and cultural-cognitive characteristics of organizational fields (King and Pearce, 2010). In fact, this is often a key long-term goal of social movement activism (Den Hond and De Bakker, 2007). Activists can transform fields in a number of ways, but perhaps the most obvious is by employing some of the same tactics discussed above to target public and private regulatory bodies rather than corporations. Such activism can, for example, be aimed at pressuring federal, state, and local legislatures and agencies to adopt and implement new laws and regulations (Soule, 2009; Zald et al., 2005). In the case of climate change, activists have focused significant attention on "lobbying governments to establish binding constraints on greenhouse gas emissions" (Reid and Toffel, 2009: 1158). A number of environmental organizations, for example, have been actively involved in the direct crafting of UN climate treaties and have employed a variety of extra-institutional tactics, such as protests and demonstrations, at UN Climate Conferences. In addition, in the United States, environmental movement organizations such as the Environmental Defense Fund (EDF) have engaged in legal activism in which they file court cases to force governments to uphold their legal obligations to take steps to mitigate climate change (Newell, 2008). EDF even pioneered the development of the cap-and-trade system for emissions trading, and then worked with other environmental groups to advocate for this market-based system. Legal activism has also targeted the environmental impact of the development work funded by national governments and carried out by multilateral banks (Newell, 2008).

Another movement tactic involves mobilizing support for the creation of private regulatory bodies involved with certification (Bartley, 2007; Lee, 2009; Mena and Waeger, 2014). Environmental organizations have successfully initiated and popularized private regulatory governance focused on information disclosure mechanisms, such as the Global Reporting Initiative (GRI), which focuses on environmental, social, and labor issues, and the Carbon Disclosure Project (CDP), which focuses specifically on GHG emissions. These activist efforts began with framing environmental issues and corporate GHG emissions as a financial risk and creating pressure on large institutional investors to pay attention to these risks (Kolk et al., 2008). The goal of these efforts was "to leverage the influence of institutional investors to create a demand for carbon disclosure as an adjunct to conventional financial systems with implications for asset valuation" (Kolk et al., 2008: 724). These efforts helped create both

the CDP and the GRI. The CDP is an NGO founded in 2000 which mobilized a group of institutional investors to promote the disclosure of financial risks posed to companies by climate change and to inform corporations about investor concerns (Knox-Hayes & Levy, 2011). In 2012, 767 institutional investors with over $92 trillion in assets were part of the CDP (Johnson, 2013). The GRI was founded by CERES (Coalition for Environmentally Responsible Economies) and the Tellus Institute in 1989. One of its primary efforts at promoting corporate sustainability has been the development of a system of voluntary sustainability reporting, based on specific metrics relating to environmental, labor, and social issues. The organization is governed as a multi-stakeholder initiative, with its board of directors and stakeholder council composed of representatives from corporations, environmental and other types of NGOS, institutional investors, consulting firms, labor organizations, and government agencies.

In addition to influencing public and private regulation, social movements can also contest and reshape behavioral norms and cultural-cognitive meanings both within organizational fields and broader society about economic production, distribution, and consumption, and generate new models of economic organization (Bartley and Child, 2012; Schneiberg and Lounsbury, 2008; Soule, 2009). Such cultural work includes theorizing new organizational forms (Schneiberg, 2013), altering field-frames relating to new industries (Lounsbury et al., 2003), and advancing new models of market exchange and production (Weber et al., 2008). When new theorizations and framings resonate with the interests and values of a broad range of field-level and societal actors, new cultural beliefs emerge, which can achieve taken-for-granted status over time (Hoffman, 2001; Scott, 2013).

Strong environmental activism over the last two decades, for example, has created new public attitudes, norms, and cultural understandings about the reality and significance of climate change. Most of the major US-based environmental NGOs, for example, have devoted substantial resources to increasing awareness of climate change through large scale media campaigns and education, lobbying, and building coalitions with a diverse set of groups. As momentum gathered pace in the mid-2000s for action on cap-and-trade legislation in the US, environmentally oriented foundations committed more than $1 billion to support lobbying and media efforts, which were channeled through Climate Works, the Energy Foundation, and the Sea Change Foundation (Skocpol, 2013). The coordinated messaging directly linked climate change action to the potential for 'green jobs' and technological innovation. According to (Moser, 2010: 165), these media efforts translated into a high level of public awareness of climate change. Gallup polls have indicated that the percentage of people who said that the "greenhouse effect" or "global warming" worried them a great deal increased from 26% in 2004, to 36% in 2006 and a peak of 41% in 2007. By 2006, 90% of Americans said they had heard of the greenhouse effect or global warming. The same is true outside the US, and (Brewer's (2006) review of opinion surveys has found that awareness and concern have increased quite dramatically in some instances during the early 2000s by 15-20 percentage points over just 3-5 years. These attitudes and norms are also expressed in changing consumer preferences for firms to reduce GHGs (Butler and McGovern, 2009; Butler, 2012). It should be noted, however, that the public discourse around climate change remains contested (Levy and Spicer 2013; Skocpol 2013) and that public concern for the issue is volatile. Although corporate managers are often more concerned with immediate field-level pressures, public debate as well as shifting public norms and cultural meanings are likely to influence how field-level actors view climate change.

In the last two decades, therefore, environmental activism has not only placed direct pressure on firms to take climate change and GHG emissions seriously, but has also fostered the development of new field-level regulations, norms, and cultural-cognitive meanings that emphasize the importance of climate change and the key role that corporations play in contributing to GHG emissions. Hence:

H4: Activist pressures relating to green IS are positively associated with regulative (4a), normative (4b), and cultural-cognitive (4c) pressures for adopting green IS within organizational fields.

Managerial Perceptions of Field-Level Pressures

A central tenet of institutional theory is that the stronger the regulative, normative, and cultural-cognitive pressures within organizational fields, the greater the likelihood that firms will adopt practices relating to these pressures in order to demonstrate their legitimacy within their institutional environments (Scott, 2013; Suchman, 1995). Regulations passed by local, state, or federal governments mandating the adoption of specific practices, for example, create coercive pressures for adoption (Edelman, 1992), as do private

regulatory initiatives (Mena and Waeger, 2014). In addition, when key field-level actors, including suppliers, customers, professionals, and investors, view specific practices as normatively appropriate, managers will believe that is in the interest of their firms to adopt these practices (Deephouse and Suchman, 2008). Finally, as issues like climate change become infused with deeper cultural meaning within organizational fields and broader society, and more organizations adopt practices to demonstrate their legitimacy in response to cultural, normative, and regulative pressures, these practices will begin to acquire a taken-for-granted status. Other firms, therefore, will perceive the need to adopt to simply maintain their legitimacy within changing fields (DiMaggio and Powell, 1983; Haveman, 1993).

As argued above, sustained environmental activism around the issue of climate change helped to motivate government bodies to implement new regulations and support programs to mitigate climate change through the reduction of GHG emissions. In 2005, for example, the EU implemented an emissions cap and trade system for energy-intensive industries (Kolk and Pinkse, 2005). In the US, the EPA implemented mandatory GHG reporting requirements for specific industries in 2009 (Reid and Toffel, 2009). At the state level, legislatures in New England banded together to develop strategies for reducing GHG, as did California, Arizona, New Mexico, Oregon, Washington, Montana, and Utah, with California imposing specific targets (Kolk and Pinkse, 2005). In addition, various government initiatives have promoted the use of information technology to address climate change (Reimsbach-Kounatze, 2009). In the US, for example, the Department of Energy provides software tools to help industrial facilities diagnose and improve their energy usage. Furthermore, Reid & Toffel (2009) demonstrated that the presence of state-level regulation made firms more likely to participate in private regulatory initiatives, such as CDP's surveys, which collect data directly from firms about carbon emissions, the risks posed by it, and their strategies for reducing emissions, which it then disseminates this information to investors

Private regulatory initiatives themselves, however, can also place coercive pressures on firms (Bartley, 2007; Mena and Waeger, 2014). CDP's first reports were published in 2003, with 229 companies responding to CDP's survey. By 2013, the number of firms had increased dramatically to 2,316 (Johnson, 2013). The CDP also publishes a "wall of shame" and engages in direct discussions with some of the largest emitters of GHG to pressure them directly to reduce their carbon footprint. In addition, the CDP has recently started a reporting program that focuses on global supply chains. Similarly, the number of firms participating in the GRI reporting process has grown steadily over the last decade, to the point where it has become the "preeminent framework for voluntary corporate reporting of environmental and social performance worldwide" (Levy et al., 2009: 88). Currently, over 6,000 organizations have submitted reports to the GRI at some point. Although complying with the reporting requirements of the CDP and GRI has always been voluntary, as corporations have recognized the strength of various pressures relating to climate change, taking action to become more transparent about GHG emissions has become close to mandatory, even if it is only done symbolically, for most firms to maintain their legitimacy (Whiteman et al., 2013). Since the generation and analysis of information to prepare these reports constitutes a set of green IS practices, advocacy for corporate participation in these initiatives can be seen as a pressure to adopt green IS.

In addition to these coercive pressures, other field-level actors have articulated normative expectations about mitigating GHG emissions generally and adopting green IS specifically. For example, the Global e-Sustainability Initiative (GeSI), which is now part of the UN Environment Programme, an organization composed of some of the largest IT companies and a group of international NGOs working on environmental issues. It was founded with the goal of "creating and promoting technologies and practices that foster economic, environmental, and social sustainability, and drive economic growth and productivity" (Webb, 2008). In 2008, GeSI published a report that reviewed the state of the IT industry and the use of IT more generally to make non-IT industries more carbon neutral. The report notes the significant role that "the ICT sector could play in mitigating climate change" and that "it is now up to policy makers, industry leaders and the sector itself to make sure this potential is realized. The stakes couldn't be higher" (Webb, 2008: 11). The report also notes that "the largest contribution to man-made GHG emissions comes from power generation and fuel used for transportation. It is therefore not surprising that the biggest role ICTs could play is in helping to improve energy efficiency in power transmission and distribution (T&D), in buildings and factories that demand power and in the use of transportation to deliver goods" (Webb, 2008: 11). Similarly, the Organization for Economic Co-Development (OECD), released a report in 2009 which assessed the use of green IT and IS in reducing the

GHG emissions of corporations. The report noted that "ICT applications have very large potential to enhance performance across the economy and society" (Reimsbach-Kounatze, 2009: 5).

Furthermore, Waddock (2008) highlights the growth in the number of consulting firms advising corporations about how to meet the new reporting standards relating to sustainability, as well as the growth of a number of business associations relating to sustainability, such as Business for Social Responsibility, the Global Environmental Management Initiative, and the World Business Council for Sustainable Development. Finally, Butler (2012) has pointed to a number of additional field-level actors who emphasize the importance of green IS, such as practitioner publications for IT professionals, consulting groups who advise on the implementation of green IS, and social networking sites, which "provide platforms for diffusion of news, ideas and innovations to IT and business professionals. Groups on LinkedIn include, for example the Green Data Center Alliance, Green Professionals, CleanTechies Around the World, etc." (Butler, 2012: 395).

In the last decade, therefore, a number of public and private regulatory forces have emerged to pressure firms to disclose and reduce their carbon emissions, and green IS has become a logical way for firms to respond to these pressures. In addition, a broader range of field-level actors, including business associations, consulting firms, and professional groups have intensified normative pressures on corporations to address their GHG emissions by implementing new practices such as green IS. Furthermore, as dealing with climate change has become more deeply institutionalized as culturally important both within society and organizational fields, and as more firms adopt practices to address climate change, cultural-cognitive pressures on nonadopters have likely intensified as well. We therefore predict that:

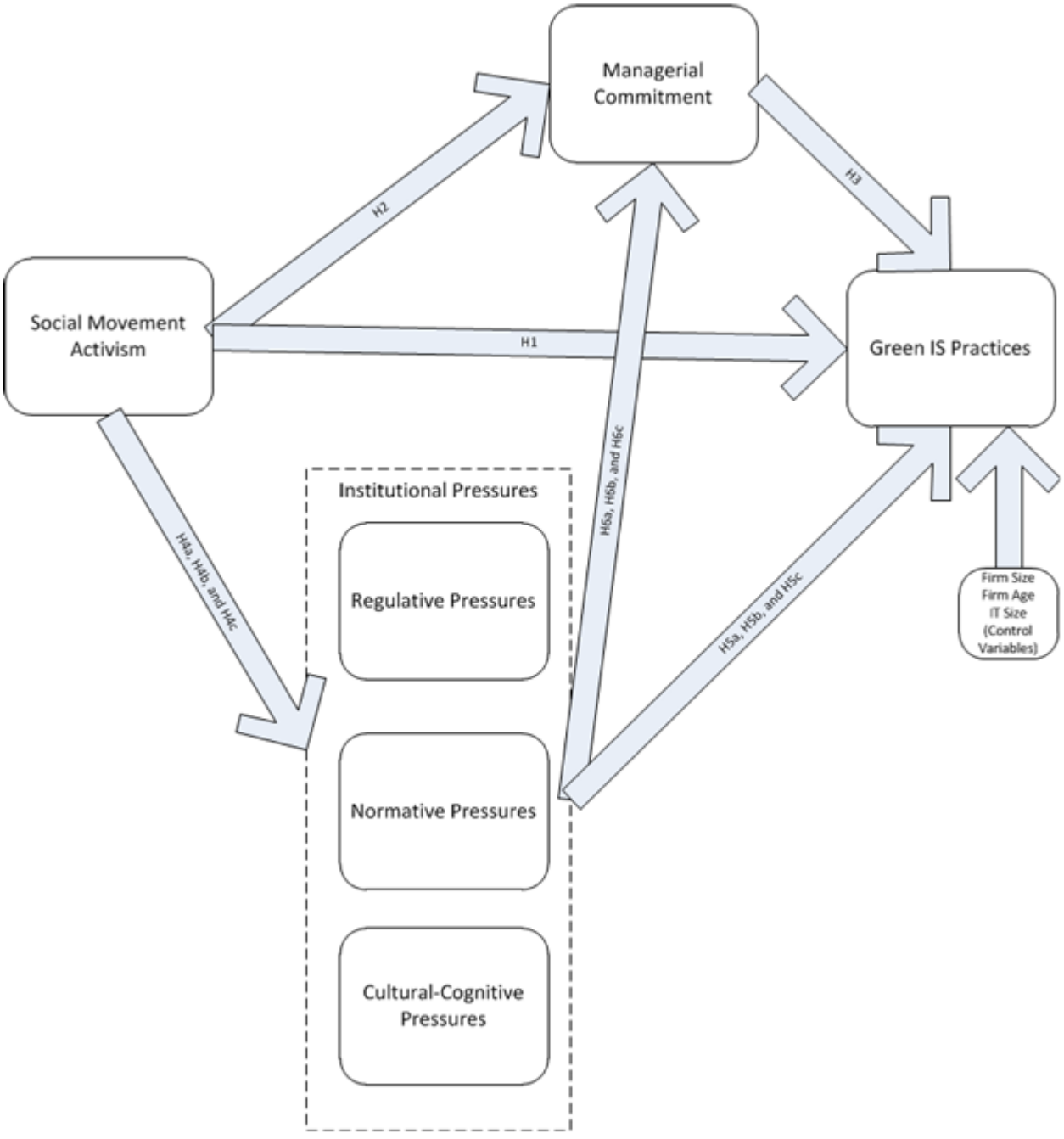
H5: Managerial perceptions of regulative (5a), normative (5b), and cultural-cognitive (5c) pressures for adopting green IS are positively associated with the adoption of green IS practices.

In motivating Hypotheses 2 and 3, we hypothesized that direct movement activism influences adoption through a more complex pathway by first influencing managerial commitment to green IS. We predict a similar pathway for field-level pressures: when managers perceive field-level pressures for green IS to be stronger, they will become more committed to adoption, which in turn will increase the likelihood that they adopt green IS (already hypothesized by H3). Hence:

H6: Managerial perceptions of regulative (6a), normative (6b), and cultural-cognitive (6c) pressures for adopting green IS are positively associated with management commitment to adopting green IS.

Figure 1 summarizes the multiple pathways of influence that we have hypothesized in this section between managerial perceptions of activist pressures, managerial perceptions of field-level pressures, managerial commitment to the adoption of green IS, and the adoption of green IS. We now turn to describing our data and methodology.

Figure 1 (Research Model): Pathways of Influence between Managerial Perceptions of Activism/Field-Level Pressures and Managerial Commitment to and Adoption of Green IS



Data Collection and Methodology

We collected the data to test our hypotheses through a survey of managers. The appropriateness of the survey method for measuring processes relating to practice adoption has been demonstrated in previous work by Kennedy & Fiss (2009) and Kostova (2002). The proposed research model and resulting

hypotheses shown in Figure 1 were tested through structural equation modeling. We hired a professional research firm to obtain the sample and conduct a Web-based survey questionnaire, which was administered to executives, senior managers, and managers.

Survey Measures

We developed the survey instrument after conducting a thorough literature review for appropriate measurement items. The survey contained questions about social movement activism, institutional pressures relating to green IS, the adoption of green IS, and management commitment to adoption. The potential measurement items, comprising the constructs in the proposed model, were taken from existing scales. All items except for those measuring the control variables of firm size, IT size, and firm age were measured using seven-point Likert scales.

We operationalized regulative, normative, and cultural-cognitive pressures as reflective constructs. In a reflective construct, the observed measures are affected by an underlying latent, unobservable construct (MacCallum and Browne, 1993). The construct for regulative institutional pressure was adapted from studies where the items measured perceptions of regulations and regulatory organizations (Kostova and Roth, 2002), and pressure from industry associations (Liang et al., 2007). The normative institutional pressure construct was adapted from studies where the items measured perceptions of obligations towards society (Kostova and Roth, 2002), and pressure from suppliers (Liang et al., 2007; Teo et al., 2003), customers (Liang et al., 2007; Teo et al., 2003) and vendors (Teo et al., 2003). The construct for cultural-cognitive institutional pressure was adapted from studies where the items measured perceptions about successful companies in the industry (Kostova & Roth 2002), main competitors (Liang et al., 2007), and regional culture (Scott, 2013). Management commitment was operationalized as a reflective construct and adapted from research on the adoption of information systems. The items measured perceptions of whether senior management articulated a vision, formulated a strategy and actively established goals and standards for new practices (Chatterjee et al., 2002; Liang et al., 2007).

We operationalized social movement activism as a formative construct. In a formative construct, changes in the observed measures change the underlying construct (Jarvis et al., 2003). We developed an original construct to measure activism based on King and Soule (2007). The items in our construct measured perceptions of the extent to which environmental groups and non-profit activist social organizations are encouraging sustainable and ecological IS practices (King and Soule, 2007).

The green IS construct was operationalized as a formative construct and was adapted from studies where the items measured perceptions of software to make upstream supply chain management (material sourcing and acquisition) and downstream supply chain management (product distribution and delivery) more sustainable (Chen et al., 2011). The third item was developed for this study and measured perceptions of information systems whose major purpose is to reduce the carbon footprint of the firm's production system. Figure 1 shows the proposed research model.

In addition to the constructs above, we also included three key control variables for firm size, IT size, and firm age. The diffusion literature has found that firm size is often a proxy for resource slack and infrastructure that promotes innovative new practices (Rogers, 1983; Utterback, 1974). We measured firm size as the total number of full-time employees. IT size is a measure of greater professionalism and expertise in the IT field that promotes assimilation of new technologies (Fichman, 2001). We measured IT size as the total number of people (full-time equivalents) employed in the information systems department in the firm. Since older firms, in contrast to younger firms, have shown an ability to adapt and survive (Thornhill and Amit, 2003) we also included a control for firm age, measured in number of years.

Data Collection

We collected the data through a Web-based survey questionnaire. A professional research firm sent an e-mail invitation to their US business panel members, who are practicing managers, to create a diverse sample population. This data collection method is increasingly being employed in organizational research (Bulgurcu et al., 2010; Thau et al., 2009). The population selected from the panel consisted of executives, senior managers, and managers in the two functional areas of information systems or environmental

management, all of whom likely had knowledge of their firm's green IS initiatives and practices. The research firm sent an email invitation with a link to the online survey, which started with a set of screening questions relating to their knowledge of the firms' green IS practices. If the interested population passed the screening questions, they were invited to complete the survey. The participants were never informed that we would be employing these initial questions as exclusion criteria. The identities of participants were kept confidential, and participants were given a points-based incentive redeemable for prizes in return for their participation. The final sample consisted of 425 respondents.

The respondents represented firms which were mostly medium to large firms. A majority of the respondents were senior-level managers or IT managers.

Preliminary Conclusion

The final results will be presented at SIGGreen workshop and the preliminary conclusions are discussed in this section. As institutional environments have become more heterogeneous and contested (Greenwood et al., 2011; Schneiberg and Lounsbury, 2008), scholars have developed more sophisticated approaches for examining the adoption of new practices such as green IS. However, since this work continues to focus little attention on the relationship between managerial perceptions of their environments and the actions they take in response to these pressures, our understanding of green IS adoption within more complex institutional environments remains incomplete. By drawing upon recent theoretical work in stakeholder theory that has emphasized the central role that managerial cognition and sensemaking play in shaping corporate reactions to external pressures, this paper has broadened the range of phenomena on which studies of new practice adoption should focus. In the context of new environmental practices, we have found that managers react more strongly to broader field-level pressures to address climate change than to environmental activism, but that activism helps to create these field-level pressures. We hope that our approach and findings will inform future research that further disentangles the complex pathways of influence through which social movement activism can alter corporate behavior and the effects of this behavior on pressing societal problems such as climate change.

References

References available upon request. Not included because of page limit.