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Social Movements as Catalysts for Corporate Social Innovation: Environmental Activism and Adoption of Green Information Systems

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ABSTRACT

Although the literature on social innovation has focused primarily on social enterprises, social innovation has long occurred within mainstream corporations. Drawing upon recent scholarship on social movements and institutional complexity, we analyze how movements foster corporate social innovation. Our context is the adoption of green information systems ("green IS"), which are information systems employed to transform organizations and society into more sustainable entities. We trace the historical emergence of green IS as a corporate response to increasing demands for sustainability reporting, a key social innovation that environmental activists helped to create. Drawing upon extensive survey data from over 400 US firms, we then examine how managers perceived environmental activism in relation to broader-field pressures for change and how their perceptions of both were related to green IS adoption. The results reveal that activists were more effective at influencing adoption indirectly by transforming organizational fields than by directly influencing corporate managers. Combined with the historical analysis, these findings suggest that corporate social innovation emerged out of ongoing interactions between activists, corporate managers, and other influential actors within a broader social innovation system. Activists helped to create conditions for social innovation, but corporations took the lead in developing new practices.

In what types of organizations does social innovation occur, and which factors explain its emergence and success? Although the literature on social innovation has focused primarily on smaller social enterprises (Phillips, Lee, Ghobadian, O'Regan, & James, 2015), the common definition of social innovation as a "novel solution to a social problem that is more effective, efficient, sustainable, or just than existing solutions" (Phils et al., 2008 p. 36), does not restrict it to such enterprises. In addition to the pull of entrepreneurial opportunity, social innovation has long occurred within larger, more established nonprofit organizations (Eikenberry & Kluver, 2004; Nickel & Eikenberry, 2009; van Broek, Ehrenhard, Langley, & Groen, 2012) as well as for-profit corporations through practices associated with corporate social responsibility (CSR) that aim to address large-scale social problems such as climate change (Okereke, Wittneben, & Bowen, 2011). To understand social innovation, therefore, it is important to be "agnostic about the sources of social value" and to see the "processes through which social innovation emerges and diffuses ...as distinct and not … conflated with social enterprise, or social entrepreneurship" (Phills et al., 2008).

Corporations whose primary missions are market-oriented are not usually labeled social enterprises, but they increasingly seek economic value through innovative approaches to CSR (Kanter, 1998). The related practices that firms develop and implement can be considered "corporate social innovations" when they represent not merely the passive adoption of existing practices, but more active initiatives to translate, adapt, and evolve pressures for improved social performance (Herrera, 2015). The term corporate social innovation (CSI) thus recasts such practices in terms of their ability to address social problems in novel ways, shifting attention away from CSR's more narrow focus on stakeholder management. Since corporations are the source of many large-scale social problems, it is essential to focus more attention on social innovation within them.

Why would corporations engage in social innovation? Research on social enterprise provides a starting point. Recently, this literature has moved away from seeing social innovation as primarily a product of heroic social entrepreneurs towards seeing social entrepreneurship as a "collective and collaborative" (Montgomery, Dacin, & Dacin, 2012) process, emerging out of "social innovation systems" (Phillips et al., 2015), i.e., the broader communities in which social entrepreneurs are embedded that include governmental officials, nongovernmental organizations (NGOs), consumers, and other stakeholders. Since social enterprises seek to address large scale social problems, social movements often play a key role in fostering their emergence and supporting their success (Mair & Martí, 2006), by highlighting social issues and helping entrepreneurs access resources, customers, legitimacy, knowledge, and government support (Akemu, Whiteman, & Kennedy, 2016; Bloom & Chatterji, 2009; Dacin, Dacin, & Tracey, 2011). Social enterprises can also help to create and sustain social movements when employees and consumers identify with the goals of the enterprise (M. Lee & Jay, 2015). Social entrepreneurs and social movements, therefore, often have a coevolutionary relationship.

Although corporations have a more contentious relationship with social movements, the latter are often in the vanguard of solving large-scale social problems and are well positioned to play a role in fostering CSI. Social movements can accomplish this in two primary ways. First, activists can directly impact a firm's economic performance and reputation through a number of tactics, such as protests, boycotts, and media campaigns (Bartley & Child, 2012; King & Soule, 2007). Second, as the call for papers for this special issue emphasizes, social innovation is an interactive process which often involv[es] re-negotiations of settled institutions among diverse actors with conflicting logics." This highlights a more indirect route through which social movements can influence CSI when activists often work as "institutional innovators" (Zietsma & Lawrence, 2010) to disrupt the stability of fields and institutionalize new field-frames, norms,

practices, and values (Lounsbury, Ventresca, & Hirsch, 2003; van Wijk, Stam, Elfring, Zietsma, & den Hond, 2012). These actions, in turn, can produce new regulatory, normative, and cognitive-cultural pressures on firms to engage in social innovation (Den Hond & De Bakker, 2007).

How do these different types of interactions between social movements and corporations influence the emergence and diffusion of CSI? In this article, we examine this question in the context of the development and adoption of green information systems ("green IS") by corporations, which are information systems employed to transform organizations and society into more sustainable entities (Seidel et al., Forthcoming; Watson, Boudreau, & Chen, 2010)). Most often, green II refers to the use of software and information technology to monitor, report, and manage data relating to corporate sustainability activities, such as energy efficiency and greenhouse gas emissions (Seidel, Recker, & Vom Brocke, 2013). Green IS is a social innovation because it involves developing and implementing new technologies to track, manage, and reduce environmental impacts, particularly regarding climate change, one of the most pressing challenges facing human society.

We draw upon two recent strands of institutional theory to better understand the influence of the environmental movement on the emergence and adoption of green IS by corporations. First, recent efforts to bridge institutional theory and research on social movements have developed a view of organizational fields as contested spaces in which a range of different actors negotiate social order (Fligstein & McAdam, 2012; King & Pearce, 2010; Schneiberg & Lounsbury, 2008). This perspective focuses our attention on how activists engage in social innovation to create novel solutions to social problems at the field level. We use this approach to first situate the emergence of green IS within its broader historical context as a way to meet increasing demands for sustainability reporting, a key social innovation that environmental activists helped to create. As sustainability reporting has become more legitimate and necessary, corporations have responded

by creating green IS innovations such as carbon accounting systems and more extensive environmental enterprise resource planning (ERP) packages.

Second, institutional theory has increasingly emphasized the complexity and heterogeneity of institutional environments (Greenwood, Raynard, Kodeih, Micelotta, & Lounsbury, 2011; Raaijmakers, Vermeulen, Meeus, & Zietsma, 2014), and the importance of attending to the organizational contexts in which the adoption of new practices occurs (Briscoe & Murphy, 2012; Carberry, 2012; Fiss, Kennedy, & Davis, 2012). Since field-level pressures "do not just 'enter' an organization – they are interpreted, given meaning, and 'represented' by occupants of structural positions" (Greenwood, et al., p. 342), it is important to understand how managers perceive different types of activist influence and how these perceptions are related to the adoption of socially innovative practices. Although Waldron, Navis, and Fisher (2013) theorized the conditions under which managers vary in their assessments and reactions to activism, we lack empirical evidence of how organizational actors perceive social movement activism, and how these perceptions are related to the development and implementation of social innovations by corporations. Activists face challenges gaining access to corporate decision-makers (Vasi & King, 2012) and seldom have the power to coerce firms into adopting practices that address social problems, which often negatively impact the bottom line. They are also usually unfamiliar with specific corporate functions and therefore often lack the ability to push for specific practices that address their social concerns while also meeting corporate objectives.

The effectiveness of activism in influencing the adoption of new practices, therefore, depends on the extent to which managers perceive the different pressures originating from activists as important (Waldron et al., 2013). This is particularly true within the context of heterogeneous field-level pressures. Which pathways of movement activism are most salient to managers and lead to corporate social innovation? To address this question, the second part of our analysis

hypothesizes and tests the effects of direct and indirect activist influence on green IS adoption using survey data from executives, technology managers, and sustainability managers in a sample of over 400 organizations in a broad group of industries.

Our framework and findings make three primary contributions. In addition to extending the lens of the social innovation literature beyond social enterprises to more conventional, for-profit corporations, we also bring social movements more directly and explicitly into the study of social innovation. Scholars have focused surprisingly little explicit empirical and theoretical attention on this relationship. We find that activists are more effective at fostering CSI by acting as catalysts, i.e., by creating new social innovations and fomenting other pressures at the field level, than by directly influencing corporations. We also demonstrate how recent work connecting organizational theory and research on social movements (Briscoe & Safford, 2008; Den Hond & De Bakker, 2007; Fligstein & McAdam, 2012; King & Pearce, 2010; Schneiberg & Lounsbury, 2008) provide a logical framework for understanding CSI. This framework allows us to see CSI not as an outcome driven solely by powerful activists, enlightened corporate leaders, or passive corporate responses to external demands, but rather one that emerges out of interactions, both conflictual and collaborative, within a broader "social innovation system" (Phillips et al., 2015) that includes activists, corporate managers, other field level actors, and the wider social, political, and cultural context in which all are embedded. Although activists helped to create the conditions for sustainability reporting to move from the field into corporations in the form of green IS, corporations also shaped sustainability reporting through their participation in various multi-stakeholder initiatives. In addition, corporate managers have played a leading role in translating and adapting field-level pressures for sustainability reporting that activists help to create (Levy, Reinecke, & Manning, 2015), and in developing the specific mechanisms of green IS, now an integral part of sustainability reporting systems.

We now turn to analyzing the emergence of green IS as a response to the institutionalization of sustainability reporting before turning to our analysis of how managerial perceptions of activism are related to the adoption of green IS.

Environmental Activism, Sustainability Reporting, 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 examining the history of corporate environmentalism, Hoffman (2001) has identified three distinct stages. In the 1960s, the primary response of corporations was to resist addressing environmental issues. Federal regulations were implemented in the 1960s and 1970s, with initial resistance giving way to a focus on regulatory compliance in the 1980s and 1990s. In the current period, which is defined by broad concerns about climate change (Haigh & Griffiths, 2012) and sustainability more broadly (Hart, 2000), corporations are playing a more central role in developing solutions. The environmental movement, however, through a range tactics, strategies, and innovative actions, remains a central force in influencing how corporations address climate change.

In its attention to the contested nature of organizational fields, institutional theory has highlighted the key roles that activists play in promoting social change in corporations by disrupting organizational fields and promoting new norms, practices, and organizational forms (Schneiberg & Lounsbury, 2008). One of the environmental movement's most consequential actions has been helping to create the institution of sustainability reporting, which has established both the norms for disclosure and the practices that provide the means through which firms track and report the environmental impacts of their operations, especially carbon emissions. This institution represents a significant social innovation that aims to mitigate the impact of

corporations on climate change by creating increased corporate accountability and transparency. In this section, we examine the emergence of green IS and the role of activists in creating sustainability reporting. Our descriptive historical analysis is based primarily on existing published research, which has relied on interviews with key activists, field-level actors, and corporate managers as well as archival data from a range of sources (Etzion & Ferraro, 2010; Johnson, 2013; Knox-Hayes & Levy, 2011; Kolk, Levy, & Pinkse, 2008; Levy, Szejnwald Brown, & de Jong, 2009; Melville, 2010)

Firms can engage in sustainability reporting to meet three primary objectives: regulatory compliance, participation in carbon trading and management, and conforming to standards developed by private regulatory organizations such as the Global Reporting Initiative (GRI) and the Carbon Disclosure Project (CDP). In response to different demands for sustainability reporting, information technology and software have become increasingly important tools that firms use to monitor and manage their environmental impacts, and the associated financial and reputational risks and benefits (Jenkin, Webster, & McShane, 2011). We categorize all such efforts as green IS in line with Boudreau, Chen, & Huber (2008, p. 2) who define green IS 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 and software to monitor and manage the impact of production, manufacturing, service, and distribution processes on the environment (Seidel et al., 2013). Technologies employed in green IS enable organizations to sustainably manage their core operations, supply chains, and other activities by supporting the collection and storage of structured data and information from the organization (Watts, 2016). The most common green IS practices monitor energy usage and emissions, and help optimize supply chains to increase efficiency in the transportation and

distribution of inputs and outputs (Hoffman, 2005; Jenkin et al., 2011). In addition, green IS now is being integrated with other major information systems such as ERP systems.

Corporations are not required to use formal IS to meet any of the different objectives associated with sustainability reporting. Indeed, the sustainability function has traditionally been located within public relations or government affairs departments, and information has been gathered in an ad hoc manner. As firms integrate sustainability into core operations and seek to address multiple reporting and management requirements, the importance of utilizing the capabilities of information technology has become increasingly evident, especially as firms try to realize economic benefits from sustainability (Melville, 2010). The flexibility and potential of green IS to assist in corporate efforts to report and reduce their environmental impacts has led to its increased promotion as a key tool for fighting climate change. As Davidson, Vaast, and Wang (2011, p 24) have observed, green IS has become:

> "…part of the broad social movement focused on environmental sustainability. In this movement, technology developments (so-called "green technologies") are often promoted as solutions to environmental constraints. [It] may be characterized as a computerization movement, which advocates widespread investments in IT to address sustainability."

This potential of green IS has led the Global e-Sustainability Initiative (GeSI), a UN organization composed of some of the largest IT companies and international NGOs working on environmental issues, to argue that "between now and 2020 the direct and enabling effects of Green IS could help achieve significant reductions in GHG emissions across all industry sectors" (Butler, 2012, p. 383). Similarly, in a report about the role of technology in mitigating climate change, the Organization for Economic Co-Development (OECD) noted that "ICT applications have very large potential to enhance performance across the economy and society" (Reimsbach-Kounatze, 2009, p. 5). Green IS, therefore, fits the definition of a social innovation as "a novel solution to a social problem" (Phills et al. 2008, p. 36). Green IS is novel because it involves corporations

adapting the capabilities of the latest information technology to promote sustainability. It is social because it attempts to reduce corporate emissions and mitigate climate change, a fundamental societal challenge.

Social movement organizations have played a key role in creating the regulatory requirements, carbon markets, and private regulatory standards that have institutionalized sustainability reporting and spurred the development of green IS. Since 1986, for example, the US EPA's Toxic Release Inventory (TRI) program has required that facilities meeting certain thresholds report on releases to air, ground, or water of listed chemicals. The Natural Resources Defense Council has played a leading role in advocating for the extension of TRI to new substances such as dioxin, and in 2015 it led a group of nine organizations in suing the EPA to extend TRI reporting requirements to the oil and gas industry. In addition, Environmental Defense has been an important intellectual architect and advocate for carbon markets, coordinating a loose coalition of environmental groups supporting carbon trading (Melville, 2010). To facilitate participation in both regulatory and voluntary carbon markets, carbon accounting systems have emerged as sophisticated, highly technical forms of non-financial reporting (Knox-Hayes & Levy, 2011). Many firms are implementing carbon and energy reporting and management systems in order to improve internal efficiencies and reduce energy costs (Hoffman, 2005; Jenkin et al., 2011). Increasingly, firms are extending across the value chain and pushing their suppliers (and sometimes downstream buyers) to engage in carbon accounting for product labeling, reporting and cost control purposes (Hoffman & Ventresca, 1999; Kolk & Pinkse, 2008). These initiatives require more sophisticated information systems than those needed for basic compliance, and are prompting the development of green IS linked to corporate systems for supply chain management and product-level management accounting.

Finally, the growing importance of standardized reporting systems, such as the GRI and CDP, has facilitated the development of commercial software packages to gather and report the required information. An increasing number of private sector firms, such as Bloomberg and MSCI is gathering and processing ESG (Environment, Social, Governance) data on a wide variety of attributes from environmental impacts to workforce satisfaction. The data is marketed to investors on the basis that it is relevant to financial performance. Environmental movement organizations have played an important role in the development of these standards. The GRI, for example, was founded in 1997 by Ceres (Coalition for Environmentally Responsible Economies), an NGO that worked with a range of activist organizations and investment professionals to create and institutionalize standard ways for firms to report their environmental impacts. Ceres pioneered sustainability reporting, engaging in various field-disruptive tactics to achieve its goals, such as framing sustainability reporting as a valuable tool to understand the market, legal, and reputational risks of environmental exposure, as well as highlighting the economic benefits to firms of reducing these risks. Ceres also mobilized investors to pressure firms to improve their sustainability performance. To attain more autonomy and distance from its activist roots, GRI was spun out from Ceres as an independent organization and has since been governed as a multi-stakeholder initiative (MSI), with its board of directors and stakeholder council composed of representatives from activist organizations, corporations, NGOs, institutional investors, consulting firms, labor organizations, and government agencies. GRI's primary goal has been the development and promotion of a standardized system of voluntary sustainability reporting, based on specific metrics relating to environmental, labor, and social issues. These evolving reporting standards, therefore, represent a negotiated settlement between the conflicting logics of activists and corporations (Knox-Hayes & Levy, 2011).

Ceres also created the Investor Network on Climate Risk (INCR) in 2003, initially composed of ten large institutional investors, but now with a diverse group of more than 120 institutional investors representing more than $14 trillion in assets (Ceres, 2016). The INCR's primary goal is to "encourage financial analysts, ratings agencies, and investment banks to address climate risks and opportunities." (Kolk et al. 2008, p. 725). Similarly, the CDP is an NGO founded in 2000 by institutional investors who were concerned about the investment risks imposed by climate change. The CDP has tried 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, Levy, & Pinkse, 2008, p. 724). In 2012, CDP's membership included 767 institutional investors with over $92 trillion in assets (Johnson, 2013). Companies voluntarily chose to disclose their carbon emissions data to the CDP. Although the CDP did not emerge directly out of social movement activism, it followed in the activist-led footsteps of the GRI.

The institutionalization of the new norms and practices of sustainability reporting represents a social innovation fostered by different activist groups and these private regulatory initiatives. Although the latter are all MSIs, the core idea was pioneered by environmental activists such as Ceres with the goal of developing sustainability reporting standards that leverage information disclosure to provide corporate accountability and transparency. In addition, all of these groups engaged in social movement tactics such as framing and mobilization to institutionalize sustainability reporting (Kolk et al., 2008). Indeed, a key tactic to build corporate support for GRI was to frame environmental reporting as analogous and complementary to financial reporting (Etzion & Ferraro, 2010; Levy et al., 2009). The MSI governance structure developed by these initiatives brings companies, accounting firms, and other actors to the table, in an effort to construct a broader coalition of support, negotiate standards and reporting requirements that are valuable to the various parties, and thus to accelerate adoption. In particular, prospective

reporting companies and accounting firms typically provide input to ensure the business value of the data and the viability of implementation, through alignment with existing accounting and information systems.

The rise of sustainability reporting created incentives for firms to develop internal systems such as green IS in order to track and report their environmental impacts. We therefore see the development of green IS as primarily a response to – indeed, an integral part of - this social innovation. Social movements have not been calling on firms to adopt green IS per se, but in helping to create sustainability reporting, opened up the space and motivation for such social innovation inside the firm. Over time, therefore, sustainability reporting standards and green IS have co-evolved in a dynamic process of social innovation, as activists have strived for broader adoption and impact, and companies have participated in MSIs that construct the standards and then have developed green IS systems to meet them. This has enabled firms to accommodate demands for disclosure and legitimacy, while also meeting business objectives such as lowering energy costs and risk and reputation management (Levy et al., 2015).

We now turn to examining how pressures from the broad community of environmental activists entered corporations. Although many companies faced pressures to adopt sustainability reporting, implementing green IS requires investment in infrastructure and poses potentially significant challenges to core operational practices (Jenkin et al., 2011). Which firms were more likely to implement green IS and what role did activists play in spurring this social innovation in specific firms?

Environmental Activism and Green IS Adoption

In this section, we develop our hypotheses about two distinct pathways through which movements can influence CSI. Before doing so, it is important to clarify some of the concepts about activism

that are central to our analysis. Social movements are made up of social movement organizations (SMOs), as well as citizens who share common concerns and can be mobilized to action. An SMO is a formal organization that engages in activities to push for social change around a specific set of issues. Most social movements are comprised of a diverse range of SMOs, each of which has different tactics, goals, and ideologies. In the framework of Den Hond and De Bakker (2007), on one end of the ideological spectrum are SMOs with radical ideologies, which want to fundamentally transform existing social and political structures. At the other end are those with more reformist ideologies that work within existing structures. SMOs can also vary in their goals, such as changing public opinion and raising awareness, passing new legislation, pressuring corporations to stop illegitimate behaviors and engage in behaviors to promote the social good. The environmental movement, for example, is made up of a diverse range of organizations that include the reformative efforts of the Sierra Club and the National Resource Defense Council, who work directly with corporate leaders, and the more radical approaches of organizations like Earth First! and the Earth Liberation Front (Coglianese, 2001). Since the 1980s, major environmental SMOs, especially those based in the US, have moved from more activist and conflictual stances toward more collaborative approaches with business, through MSIs and market-based programs (Cashore, Auld, & Newsom, 2004; Hoffman, 2001). Often, however, most SMOs have a similar goal to promote long-term, societal change (Den Hond & De Bakker, 2007).

SMOs have a number of tactics at their disposal including media campaigns, direct dialogue, protests, boycotts, legal actions, shareholder activism, and sabotage (Soule, 2009). These tactics can be directed at a range of targets including corporations, legislators, regulators, investors, lenders, consultants and other professionals, the media, and civil society. The tactics and targets that SMOs use at a given time depend on a number of conditions, including the ideology of the SMO, the political opportunity structure of the field, and the SMO's resource availability

(McAdam & Scott, 2005). We propose that social movement activism can have direct and indirect influence on corporations. Direct influence occurs when a corporation responds to activism, either in reaction to being intentionally targeted or due to their own awareness of the activist's goals and potential to target them. Indirect influence occurs when activists target field-level change, such as the development of a new sustainability standards or the dissemination of new scientific knowledge about climate change, to which corporations then react. Through these actions, activists seeking changes in corporations attempt to shift the scale of contention (Soule, 2009; Tarrow, 2011) from the firm to other levels, such as the field or broader societal norms and values. Activists can also exert indirect influence by targeting a few highly prominent firms who are instrumental in setting sector-wide norms. This can induce change among a larger group of less prominent firms who want to avoid being targeted themselves. Indirect activism, therefore, can have both vertical and horizontal dimensions: activists can vertically shift the scale of contention and horizontally influence change by targeting highly visible peers.[i]

In the hypotheses that follow, we focus on how managers perceived activist activity generally within their firms' institutional environments, and how these perceptions are associated with green IS adoption. Since these environments are increasingly characterized by complexity (Greenwood et al., 2011), focusing on the extent to which activism is salient to managers alongside other field-level pressures provides a logical way to assess activist influence.

Direct Influence of Activism on the Adoption of Green IS

The first pathway through which activists can influence CSI is direct. The range of tactics include persuasive tactics, such as media campaigns and shareholder resolutions, and disruptive tactics, such as protests, boycotts, and collective legal action (Soule, 2009). Activists have most often used these tactics to try to damage a firm's economic performance or reputation to motivate the

corporation to reform illegitimate behavior (Bartley & Child, 2012; King & Soule, 2007). Activists can also function as monitors who can threaten to employ different tactics if firms engage in illegitimate behavior (Campbell, 2006). Empirical evidence has revealed that direct targeting of corporations can inflict economic (King and Soule, 2007) and reputational damage (Bartley and Child, 2012). To the extent that such damage or the threat of damage is severe (Waldron et al., 2013), organizations will be more likely to take action to demonstrate that they are taking movement demands seriously.

Corporate responses can include publicly capitulating to activist demands (King, 2008), abandoning illegitimate practices (Bartley, 2007; Soule, 2009; Weber, Rao, & Thomas, 2009), or engaging in impression management (Carberry & King, 2012; McDonnell & King, 2013). Firms can also implement practices that address the broader social problems at the center of activist demands, i.e., by engaging in social innovation. Organizations might do this to demonstrate alignment with the norms and values espoused by activists (Briscoe and Safford, 2008; Waldron et al., 2012) or because activists have altered the views of internal adoption coalitions regarding the normative value of the practice (Zald et al., 2005). Our understanding of whether firms adopt new practices in reaction to direct targeting by activists remains underdeveloped, with studies focusing primarily on the role of *internal* activists in shaping adoption (Briscoe & Safford, 2008; Lounsbury, 2001; Meyerson & Scully, 1995), rather than external activist pressures.

In terms of pressures to adopt green IS, environmental activists have used different tactics to try to force firms to reduce their GHG emissions and to be more transparent about their efforts to do so. 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 & 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). 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 (Bulkeley et al., 2012; Kong & Salzmann, 2002; van Wijk et al., 2012). Environmental Defense, for example, has collaborated with BP to develop an internal emissions trading system and has had a strong influence on the evolution of Walmart's sustainability strategy.

More recently, environmental activists have started to focus on the links between climate change and information technology. 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 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 & Horn, 2011). Although activists did not specifically push corporations to adopt green IS with these actions, they drew attention to the ways that technology can produce and reduce GHG emissions.

Through a range of tactics, environmental activists have sought to directly influence firms to address climate change by tracking, reporting, and reducing their GHG emissions. The adoption of green IS is an increasingly logical way to address these demands. When managers perceive

these pressures to be strong, we predict that their firms will be more likely to adopt green IS. Therefore:

> **H1: Managerial perceptions of activism relating to green IS are positively associated with green IS adoption.**

Indirect Influence of Activism and the Adoption of Green IS

The second pathway through which activists can promote CSI is an indirect one in which the goal of activists is to transform the regulative, normative, and cultural conditions of organizational fields (Den Hond and De Bakker, 2007). Such action can produce new regulative, normative, and cognitive-cultural pressures on corporations to adopt practices to address social problems. In this section, we trace both parts of this indirect pathway. We first hypothesize the ways in which activists target and transform organizational fields, and then the influence of new field-level pressures on adoption. We use both theory and historical evidence about the environmental movement to motivate our hypotheses.

Activism targeting field-level change. Activists can transform organizational fields in a number of ways, but perhaps the most obvious is by using 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, Morrill, & Rao, 2005). Activists can also mobilize other field-level actors, and engage in theorization to challenge existing field-frames and reconstitute new ones (Den Hond & De Bakker, 2007; Lounsbury et al., 2003). As new field-frames develop, they can redefine what is morally appropriate behavior, foster new norms, and lead activists, regulators, professionals, and others to define new practices. By engaging in this type of institutional change to address social problems, environmental movement organizations are important social innovators.

The first way in which activists can transform fields is by targeting 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 & Toffel, 2009). A number of environmental organizations, for example, have been directly involved crafting UN climate treaties and have employed a variety of extra-institutional tactics, such as protests and demonstrations, at UN Climate Conferences (Boykoff, 2010). In the US, SMOs such as Environmental Defense 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. Legal activism has also targeted the environmental impact of the development work funded by national governments and carried out by multilateral banks (Newell, 2008).

Activists also helped to create private governance bodies involved with information disclosure, standards, and certification (Bartley, 2007; B. H. Lee, 2009; Mena & Waeger, 2014). As discussed earlier, SMOs played a key role in creating and popularizing private governance initiatives like the GRI and CDP that provide a way for firms to disclose information about their impact on the natural environment, including carbon and other greenhouse gas emission. Although these disclosure-based initiatives were initiated by activists with the intention of pressuring business for change, they have moved toward multi-stakeholder governance mechanisms as they attempted to enlist accountancy firms and investors, along with the target businesses, in their effort to gain legitimacy and institutionalize disclosure (Levy et al., 2009). In conjunction with these initiatives, activists have also attempted to shift the risk perceptions of investors around environmental issues (Vasi & King, 2012).

In addition to public and private regulator regimes, environmental activism over the last two decades has created new public attitudes, norms, and cultural understandings about the reality

and significance of environmental concerns, and climate change in particular (Burstein & Linton, 2002). 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 (Burstein & Linton, 2002). 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), these media efforts translated into a high level of public awareness of climate change. A recent example of the public importance of the issue are the hundreds of thousands of people who marched in climate change rallies in over 2000 locations around the world leading up to the UNFCCC climate change Conference of the Parties in Paris in November 2015, organized by the global grassroots climate movement 350.org and globalclimatemarch.org.

Beginning in the 1990s, therefore, the environmental movement has been successful in fomenting broad institutional change around global warming and corporate GHG emissions. More specifically, a diverse community of SMOs pushed for the implementation of new regulations, institutionalized sustainability reporting, and created broader norms and cultural attitudes that emphasized the importance of climate change. If activists are effective at creating new field-level pressures on firms, we argue that managers will perceive this connection. We therefore predict the first part of the indirect pathway through which activism influenced CSI as:

> **H2: Managerial perceptions of activist pressures relating to green IS are positively associated with their perceptions of regulative (2a), normative (2b), and cultural-cognitive (2c) pressures for adopting green IS.**

Field-level pressures and green IS adoption. These activist tactics of disrupting and transforming field-frames, regulations, norms, and values likely created field-level pressures on firms to address climate change through organizational innovations such as green IS. 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 & 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 & 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 & Powell, 1983; Haveman, 1993).

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. The EPA, for example, implemented mandatory GHG reporting requirements for large emitters industries in 2009 (Reid and Toffel, 2009). In early 2010, SEC issued new guidance recommending comprehensive disclosure of 'material risks', listing considerations such as the impact of climate change regulation and international accords, the consequences of legal, technical, political and scientific developments, and the physical impacts

of climate change. In addition, companies subject to mandatory cap-and-trade programs need to measure and report their carbon emissions in order to ensure compliance. At the state level, legislatures in New England banded together to develop market-based strategies for reducing GHG, as did California, Arizona, New Mexico, Oregon, Washington, Montana, and Utah, with California imposing specific targets (Kolk and Pinkse, 2005). Reid & Toffel (2009) demonstrated that the presence of such state-level regulation made firms more likely to participate in private governance initiatives. In addition to implementing reporting requirements and developing broader strategies, government initiatives have also directly promoted the use of information technology to address climate change (Reimsbach-Kounatze, 2009). In addition to government regulation, private regulatory initiatives can also place regulative pressures on firms. Although complying with the reporting requirements of the CDP and GRI has always been voluntary, corporations have experienced increasing pressures to conform from industry associations, investors, environmental groups, and agencies such as the Securities and Exchange Commission (Whiteman, Walker, & Perego, 2013).

Once environmental activists had helped to create and institutionalize sustainability reporting, 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 generally and adopt green IS specifically. Waddock (2008), for example, has highlighted 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, p. 395). The number of consulting groups who advise on the implementation of green IS and the number of professional groups relating to green IS on social networking sites has also increased in recent years (Butler, 2012). Hence, green IS emerged as a logical and legitimate way for firms to meet demands for sustainability reporting.

In addition to the normative pressures from professionals, activists have also helped to create broader normative pressures by institutionalizing broad concern about climate change. A comparison of polls conducted by the Center for Clean Air Policy indicates that approximately two-thirds of Americans believe that global warming is happening and that 72% of these people believe it is caused by human activity (Klima & Winkelman, 2012). These attitudes and norms are also expressed in changing consumer preferences for firms to reduce GHG emissions (Butler, 2012; Butler & McGovern, 2009). 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.

Finally, as regulative and normative pressures on corporations have intensified and more firms attempt to address climate change, adopting practices like green IS has likely become more taken-for-granted as something that firms should just do. For example, when 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). 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, pp. 88). Currently, over 6,000 organizations have submitted reports to the GRI at some point.

In the last decade, therefore, a number of field-level pressures on firms to disclose and reduce their carbon emissions have emerged as a result of the environmental activism discussed in the previous section. Green IS has become a logical way for firms to respond to these pressures, which have included public and private regulation, as well as normative pressures emanating from business associations, consulting firms, professional groups, and consumers. 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 the second part of the indirect pathway from activism to green IS adoption:

> **H3: Managerial perceptions of regulative (3a), normative (3b), and cultural-cognitive (3c) pressures for adopting green IS are positively associated with the adoption of green IS practices.**

Activism and Alternative Adoption Trajectories

Our hypotheses have focused on predicting the relationship between managerial perceptions of different types of activist influences and the adoption of green IS. These hypotheses assumed that managers who perceive these pressures as strong will react uniformly by implementing green IS. Although the institutional literature has often viewed practice adoption as an either/or outcome, more recent work has illuminated how decisions to adopt and implement a new practice are influenced by a complex set of strategic, political, and cultural factors at the organizational level (Carberry, 2012; Greenwood et al., 2011; Marano & Kostova, 2016). Practices, therefore, often "vary as they diffuse" (Ansari, Fiss, & Zajac, 2010), and practices that address large-scale social problems are no different. Green IS is, in and of itself, not a standard set of practices, but can

include a range of different types of software and IT systems focused on different areas of organizational operations (Seidel et al., 2013). Managers therefore have the ability to develop new and adapt existing information systems within their specific organizational contexts to respond to external pressures.

Although an in-depth analysis of how internal organizational factors affected variation in the types of green IS practices that firms adopted is beyond the scope of this article, a core finding in the IS literature is that the successful adoption of new information systems, such as Web-based technology for e-commerce (Chatterjee, Grewal, & Sambamurthy, 2002) and enterprise resource planning systems (Liang, Saraf, Hu, & Xue, 2007), depends on management first articulating a vision, formulating a strategy, and establishing goals and standards for these new systems. The IS literature views such activities as indicators of management commitment to new information systems. Not all firms will necessarily exhibit such commitment, nor is such demonstrated commitment a necessary condition for adoption. However, this research illuminates another possible way that activism and field-level pressures can influence how practices are adopted, i.e., by influencing managerial commitment, which can then lead to adoption. We therefore predict:

H4: Managerial perceptions of environmental activism relating to green IS are positively associated with management commitment to green IS.

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

H6: Management commitment to green IS is positively associated with the adoption of green IS.

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

INSERT FIGURE 1 HERE

Data 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 research (Kennedy & Fiss, 2009; Kostova, 1999). Survey data has also been employed in previous research on management and sustainability (Delmas, Hoffmann, & Kuss, 2011; Delmas & Toffel, 2008; Sharma, 2000). The proposed research model and resulting hypotheses shown in Figure 1 were tested through structural equation modeling, using the indicators presented in Table 1. 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.

INSERT TABLE 1 HERE

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, management commitment to adoption, and the adoption of green IS. The potential measurement items, comprising the constructs in the proposed model, were taken from existing scales and relevant studies. We reworded the items to fit the context of this study, and the final measures are listed in Table 1. Graduate students working in information systems and other related fields were employed to pre-test the survey. Several IS researchers working at one university assessed the content validity of the survey. All items except for those measuring the

control variables of industry, 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 & Browne, 1993). The construct for regulative institutional pressure was adapted from studies where the items measured perceptions of regulations and regulatory organizations (Kostova & 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 & 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, MacKenzie, & Podsakoff, 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 & 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, Watson, Boudreau, & Karahanna, 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. Table 1 shows the construct operationalization and Figure 1 the proposed research model.

In addition to the constructs above, we also included control variables for industry, firm size, IT size, and firm age. The industry control variables consisted of information technology (IT), high carbon emitters (HE), and low carbon emitters (LE). The categories of low carbon emitters and high carbon emitters were adapted from ESA (2010) and Reid and Toffel (2009). High carbon emitters are firms in the manufacturing, transportation and utilities industry. As these industries have a high carbon footprint they are likely to be more susceptible to external pressures. Low carbon emitters are firms in banking, education, finance and insurance, government, health care, professional and other services, retail and wholesale trade and other industries. This category serves as the reference category. We also controlled for whether a firm's industry was information technology or telecommunications because they are more likely to adopt green IS because they are more knowledgeable about IS innovations. In addition, 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. We also included a measure of firm-level IT size, which is an indicator of greater professionalism and expertise in the IT field that promotes assimilation of new technologies (Fichman, 2001), which would increase the likelihood of green IS adoption. We measured IT size as the total number of people (full-time equivalents) employed in the information systems department in the firm. Finally, since older firms, in contrast to younger firms, have shown an

ability to adapt and survive (Thornhill & 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 its US business panel members, who are practicing managers, to create a diverse sample population. Their US business panel consists of more than 1.25 million members. This data collection method is increasingly being employed in organizational research (Bulgurcu, Cavusoglu, & Benbasat, 2010; Thau, Bennett, Mitchell, & Marrs, 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. The Web server hosting the online survey showed that 744 individuals were interested in participating. In order to ensure that respondents had significant knowledge about the green IS practices at their firms, we started the survey with a set of screening questions. If the individual 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. We used SPSS software to conduct missing data analysis using multiple imputation (McKnight, McKnight, Sidani, & Figueredo, 2007). The final sample consisted of 425 respondents. Table 2 provides sample demographics and indicates that the sample covered a broad range of industries. The respondents represented firms which were mostly medium to large firms. A majority of the respondents were senior-level managers or IT managers.

INSERT TABLES 2 AND 3 HERE

Assessment of Measurement Model

We used structural equation modeling (SEM) to analyze the survey data and test our hypotheses. SEM simultaneously tests and estimates causal relationships among multiple independent and dependent constructs (Gefen, Straub, & Boudreau, 2000). SEM has unique advantages over standard multiple regression approaches because it allows for estimation of models with multiple dependent variables and their interconnections simultaneously (Chin, 2010; Gefen et al., 2000; Gooderham, Minbaeva, & Pedersen, 2011). Partial least squares (PLS), a component-based SEM technique, is appropriate for our research as PLS is best suited for theory development (Chin, 1998a; Chin & Newsted, 1999; Henseler, Ringle, & Sinkovics, 2009). Partial least squares (PLS) path modeling has been employed not just by management scholars, ranging from strategic management to management information systems, but also virtually all social sciences disciplines (Henseler et al., 2009). We used PLS to evaluate the psychometric properties of the measurement model, and to analyze the strength and direction of relationships of the structural model (Chin, 1998b). We used the SmartPLS software (version 2.0.M3) to compute the estimations (Ringle, Wende, & Will, 2005). The PLS algorithm and the bootstrapping re-sampling method with 425 cases and 1000 re-samples were used to estimate the structural model. Bootstrap was selected over Jacknife resampling because even though Jacknife requires less computation, in most cases, Jackknife performs less satisfactorily (Dijkstra, 1983).

Assessment of the measurement model includes the evaluation of convergent validity, individual item reliability, composite reliability, and discriminant validity of the measurement model (Barclay, Higgins, & Thompson, 1995). Formative and reflective constructs are treated

differently because different dimensions of formative constructs are not expected to demonstrate internal consistency and correlations (Chin, 1998b). The mean, median, and standard deviation values for each questionnaire item are shown in Table 3. The last column of this table ("Loading") displays the level of each item's contribution to the overall factor. We examined the factor loadings of each indicator on their respective underlying constructs and the average variance extracted (AVE) to assess the individual item reliability and convergent validity of reflective constructs. All the item loadings on their respective reflective constructs exceeded the recommended minimum value of 0.71, which indicates that a minimum 50 percent of the variance was shared with the construct (Gefen et al., 2000). The reliability of the reflective constructs was satisfied as composite reliability (CR) was also above the recommended values of 0.70 (Chin, 1998a). The convergent validity was satisfied as the AVE values for all reflective constructs were greater than the minimum recommended value of 0.50 (See Table 3).

We assessed the discriminant validity of reflective constructs by comparing the correlation scores in the correlation matrix with the square root of the average variance extracted (AVE) for each construct. As shown in Table 4, the square root of the AVE for each construct in the model was greater than the corresponding non-diagonal correlations of the reflective constructs to their own latent variables. We concluded that the discriminant validity of all the reflective constructs was adequate (Fornell & Larcker, 1981). We assessed the cross loadings of the items on other constructs, and the results show that each indicator's loading is higher for its designated construct than for any of the other constructs, and each of the constructs loads highest with its assigned items (Urbach & Ahlemann, 2010). All the measurement item loadings on other constructs were at least 0.1 less than on their own (See Table 5). This further confirms the discriminant validity of constructs in the research model.

INSERT TABLES 4 AND 5 HERE

We tested for common method bias by employing the Harman's one-factor test that states that the threat of common method bias is high if one factor accounts for more than 50 percent of the variance (Harmon, 1960). The emergence of a single factor that explains the majority of the variance indicates an issue with common method bias (Podsakoff & Organ, 1986). The indicators were entered into an un-rotated principal component factor analysis, and the results show that no single factor accounts for majority of the variance. We therefore concluded that common method bias was unlikely. The absolute item weights constituting each formative construct were examined to determine the relative contribution of items (Gefen et al., 2000). The item weights were significant for the formative constructs (Table 3). The degree of multicollinearity among the formative indicators was also assessed using the variance inflation factor (VIF), which indicates how much of an indicator's variance is explained by the other indicators of the same construct (Diamantopoulos & Siguaw, 2006). The VIF statistic for formative measures was less than 3.3, thus, not indicating any serious problem with multicollinearity (Petter, Straub, & Rai, 2007).

Taken together, our assessments demonstrate the individual item reliability, composite reliability, convergent validity, and discriminant validity of our measurement model. Based on these tests, we also concluded that common method bias and collinearity among the indicators were not likely to be serious concerns.

Results

In Figure 2 and Tables 6 and 7, we present the results of the structural model estimation, including standardized path coefficients, significance of the paths based on a two-tailed t-test, and the amount

of variance explained (R^2). Table 6 shows that all hypotheses were supported at the 0.05 significance level except for H1 (activist pressures are positively associated with the adoption of green IS) and H4 (activist pressures are positively associated with management commitment). The model explains 65% of the variance in the adoption of green IS and 46% of the variance in management commitment. As Table 7 shows, the results remain almost exactly the same when we include the control variables. Among these, only IT size was significant. The change in variance explained in the model with the control variables vs. the model without was negligible.

INSERT TABLES 6 AND 7, FIGURE 2 HERE

Our results reveal that managerial perceptions of the strength of regulative, normative, and cognitive cultural field-level pressures are positively related to green IS adoption and managerial commitment to green IS adoption. Managerial perceptions of the strength of activism, however, are not positively related to either adoption or commitment to adoption. We also find that managerial perceptions of the strength of activism are positively related to their perceptions of the strength of field-level pressures, thus providing support for the historical evidence that activists played a key role in creating field-level pressures. Overall, therefore, our findings offer strong evidence that activists are more effective at fostering corporate social innovation by exerting indirect influence, i.e., by disrupting field-frames and creating new regulative, normative, and cultural pressures on firms, than through direct influence.

Discussion and Conclusion

In this article, we have analyzed how social movements influence corporate social innovation in the context of the environmental movement and the diffusion of green IS. We first provided the

historical context in which green IS emerged as an innovation that corporations developed to track and report their environmental impacts in response to demands from civil society organizations for sustainability reporting. We then used extensive survey data to analyze how managers perceived different types of activist influence and how these perceptions were associated with green IS adoption. Since social movements are diverse communities, a core challenge for researchers has been disentangling the effects of the multiple pathways through which social movements can exert their influence. The results of our quantitative analysis revealed that environmental activists have been more effective at influencing green IS adoption by creating field-level pressures than through more direct influence. When we consider these findings together with the role that environmental activists played in creating the broader social innovation of sustainability reporting, we have strong evidence that social movements are most powerful wielding influence indirectly, as instigators of field-level social innovation, catalyzing responses by corporations.

Why have activists not been more effective at directly influencing firms to adopt social innovations like green IS? One possible explanation is that corporate managers are more likely to resist direct activism than other field-level pressures. Research on social movements, for example, has found that activism is only effective under certain conditions, such as when movement tactics and targets receive significant media coverage (King, 2008), and that firms will engage in impression management and counter-movement tactics to dilute the threat of direct activist threats (McDonnell, King, & Soule, 2015). Another explanation is that managers may be unwilling to admit that activists are driving their actions and more willing to present themselves as reacting to more "legitimate" field-level pressures, such as regulation, new norms of sustainability reporting, and societal concerns about climate change. An important focus for future research, therefore, should be more in-depth qualitative research on how corporate managers make sense of activism.

A related explanation lies in the processes through which corporate managers make decisions about adopting contested practices within complex institutional fields. In these contexts, it may be unrealistic to expect that managers will respond easily to activist pressures. Contested practices often only diffuse after the pioneering efforts of early adopters (Sanders & Tuschke, 2007), which strengthen the legitimacy of the practice and make adoption by more companies more likely. Some of the earlier adopters of green IS, for example, may have been responding to direct activist pressures, but larger numbers of later adopters may have been more responsive to other field-level pressures once the practice attained some legitimacy. In addition, recent research on responses to institutional complexity reveals that decision-makers will often wait to comply with external demands until complexity is reduced by field-level actors or through their own sensemaking activities (Raaijmakers et al., 2014). In our context, although activists have placed pressure on firms to address climate change for many years, it may only have been when sustainability reporting emerged as a legitimate and specific response to these pressures, and one promoted by multi-stakeholder initiatives with a strong business case, that firms began to develop and implement ways to comply, such as green IS. Activists, therefore, may be able to promote CSI by reducing institutional complexity in the same way that activists within Ceres did by developing and promoting GRI standards. More broadly, this suggests that movements may need to focus on shifting the scale of contention (Tarrow, 2011), and creating opportunities and pressures for social innovation at the field-level rather than directly challenging firms. Clearly, this should be a key focus for future research.

Theoretically, our approach has taken seriously the new focus in the institutional literature on the contested nature of organizational fields. In line with other work that has identified the powerful impacts that movements can have by transforming fields (Lounsbury et al., 2003; van Wijk et al., 2012; Zietsma & Lawrence, 2010), we find a new context in which movements create

the "political conditions for diffusion" (Schneiberg, 2013). Although corporations are most responsible for climate change and are in a strong position to engage in social innovation to mitigate it, activism at the field-level may be necessary to stimulate such efforts. In addition, by measuring and analyzing managerial perceptions of activism and field-level pressures, we extend recent developments within institutional theory that focus on the role that managers play in translating these pressures into practice. Despite recent attention to understanding the organizational contexts within which adoption decisions take place (Greenwood et al., 2011; Raaijmakers et al., 2014), there have been few empirical investigations like ours that use survey data from managers (for an exception, see Kennedy & Fiss, 2009). Our findings provide deeper insight into managerial views of complex field-dynamics and the relationship of these views to practice adoption.

The perspective that emerges from our application of these two strands of institutional theory is consistent with the recent emphasis in literature on "social innovation systems" (Phillips et al., 2015), in which social innovation does not simply emerge from heroic social entrepreneurs, but rather from a "collective and dynamic interplay" (Phillips et al., 2015, p. 442) of a broader community of entrepreneurs, activists, stakeholders, policy-makers, regulators, and civil society. Similarly, in the context of sustainability reporting and green IS, social innovation can be seen not as the singular outcome of enlightened corporate leaders or field-level institutional entrepreneurs, but rather emerges out of ongoing interactions among activists, managers, various field level actors, and the broader social, political, and cultural context in which all are embedded. Although we have shown how the social innovation of sustainability reporting moved from the field into corporations in the form of green IS, corporations have also shaped sustainability reporting through their participation in MSIs and, more directly, by developing specific green IS practices. Indeed, green IS is now an integral part of the sustainability reporting system. Activists and corporations,

therefore, are in a dynamic and reciprocal relationship, such that social innovation systems resemble relational spaces (Kellogg, 2009) in which institutions are contested and renegotiated.

Sustainability reporting also represented an institutional settlement of the ongoing conflict between activists and corporations over addressing climate change. This settlement was similar to the types of transnational private governance mechanisms identified and analyzed by Bartley (2007) in the forestry and apparel industries. In our case, corporations were less involved in creating the structure of the new institution, but played a key role in developing firm-level innovations to comply with sustainability reporting in the form of green IS. However, our example is similar to the case of the global certification programs identified by Bartley (2007) in that it was primarily a market-based solution to a large-scale social problem. This raises important questions about whether such solutions will dominate in an era when public regulation faces significant challenges to its legitimacy. These questions have important consequences for both our theoretical understanding of private governance and for activists interested in placing pressure on corporations.

The concept of a "social innovation system" also has implications for work on CSR. We have not proposed the term CSI as a replacement for the term CSR or to argue that all CSR can be classified as corporate social innovation. We believe that there is an important conceptual distinction between the two, especially if we view CSR as firms passively adopting specific practices in order to appease stakeholder demands. We propose that the term CSI opens up space to categorize different types of CSR efforts, from the symbolic to those that produce genuine social innovation. In addition, by using recent insights from institutional theory to focus attention on how CSI emerges out of a more complex set of interactions between actors within a broader social innovation system, we have responded to calls for a deeper application of institutional theory to

the study of CSR (Brammer, Jackson, & Matten, 2012; Campbell, 2007; Wang, Tong, Takeuchi, & George, 2016).

It is important, however, to highlight the limitations of our analysis. First, since we wanted to maximize our response rate by guaranteeing our respondents full anonymity, we did not require them to disclose their or their firm's name and could therefore not collect archival data about activist pressures on specific firms. Our data, therefore, likely miss important activist activity and may not reflect the reality of some activists. Second, due to similar confidentiality issues, we were not able to collect data on organizational-level variables that may shape how firms respond to external pressures, such as corporate reputation (King, 2008), organizational identity (Bundy, Shropshire, & Buchholtz, 2013), and corporate governance structures (Kock, Santaló, & Diestre, 2012). Finally, since our survey data was cross-sectional, claims about causality should be made with caution. In order to further assess the causal relationships, future research should collect time-series data of managerial perceptions. Such data would permit deeper insight into how perceptions vary over time to influence adoption. Another limitation of the survey method is that respondents often provide a favorable evaluation of their own organization, which can bias the responses. We tried to limit bias by ensuring that the managers who completed the survey were experienced and knowledgeable enough to answer specific questions about green IS.

Despite these limitations, this article has highlighted the necessity of studying social innovation in and around corporations, a key sector that continues to create “wicked” social problems (Churchman, 1967; Dorado & Ventresca, 2013), but can also mitigate them, particularly with respect to climate change (Okereke et al., 2011). A singular focus on social enterprises restricts our understanding of processes through which important forms of social innovation can emerge and be sustained. Our analysis has also demonstrated that theories of corporate social innovation not only require insights from institutional theory, but also attention to the important

indirect role that movements play in fostering social innovation. Do social movements promote social innovation by social entrepreneurs in similar ways, and if so, under what conditions? Can movements and field-level pressures also spark the diffusion of new organizational practices within social enterprises? These are only a few questions raised by our analysis, but they highlight how our theoretical and practical understanding of social innovation could benefit greatly from increased dialogue between research on corporate social innovation, social enterprises, social movements, and CSR. Such dialogue could foster a deeper understanding of the more general social processes "through which social innovations emerge, diffuse, and succeed (or fail)." (Phills, et al., 2008, pp. 42).

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References

Akemu, O., Whiteman, G., & Kennedy, S. (2016). Social enterprise emergence from social movement activism: The fairphone case. *Journal of Management Studies, 53*(5), 846-877.

Ansari, S., Fiss, P., & Zajac, E. (2010). Made to fit: How practices vary as they diffuse. *Academy of Management Review, 35*(1), 67-92.

Barclay, D., Higgins, C., & Thompson, R. (1995). The partial least squares (pls) approach to causal modeling: Personal computer adoption and use as an illustration. *Technology Studies, 2*(2), 285-309.

Bartley, T. (2007). Institutional emergence in an era of globalization: The rise of transnational private regulation of labor and environmental conditions. *American Journal of Sociology, 113*(2), 297-351.

Bartley, T., & Child, C. (2012). Movements, markets and fields: The effects of anti-sweatshop campaigns on u.S. Firms, 1993-2000. *Social Forces, 90*(2), 425-451.

Bloom, P. N., & Chatterji, A. K. (2009). Scaling social entrepreneurial impact. *California Management Review, 51*(3), 114-133.

Boudreau, M.-C., Chen, A., & Huber, M. (2008). Green is: Building sustainable business practices. *Information Systems: A Global Text*, 1-17.

Boykoff, M. T. (2010). *The politics of climate change: A survey*: Routledge.

Brammer, S., Jackson, G., & Matten, D. (2012). Corporate social responsibility and institutional theory: New perspectives on private governance. *Socio-Economic Review, 10*(1), 3-28.

Briscoe, F., & Murphy, C. (2012). Sleight of hand? Practice opacity, third-party responses, and the interorganizational diffusion of controversial practices. *Administrative Science Quarterly, 57*(4), 553-584.

Briscoe, F., & Safford, S. (2008). The nixon-in-china effect: Activism, imitation, and the institutionalization of contentious practices. *Administrative Science Quarterly, 53*, 460-491.

Bulgurcu, B., Cavusoglu, H., & Benbasat, I. (2010). Information security policy compliance: An empirical study of rationality-based beliefs and information security awareness. *MIS Quarterly, 34*(3), 523-548.

Bulkeley, H., Andonova, L., Bäckstrand, K., Betsill, M., Compagnon, D., Duffy, R., Kolk, A., Hoffmann, M., Levy, D., & Newell, P. (2012). Governing climate change transnationally: Assessing the evidence from a database of sixty initiatives. *Environment and Planning C: Government and Policy, 30*(4), 591-612.

Bundy, J., Shropshire, C., & Buchholtz, A. K. (2013). Strategic cognition and issue salience: Toward an explanation of firm responsiveness to stakeholder concerns. *Academy of Management Review, 38*(3), 352-376.

Burstein, P., & Linton, A. (2002). The impact of political parties, interest groups, and social movement organizations on public policy: Some recent evidence and theoretical concerns. *Social Forces, 81*(2), 380-408.

Butler, T. (2012). Institutional change and green is: Towards problem-driven, mechanism-based explanations. *Information Systems Theory, 28*, 383-407.

Butler, T., & McGovern, D. (2009). A conceptual model and is framework for the design and adoption of environmental compliance management systems. *Information Systems Frontiers, 14*(2), 221-235.

Campbell, J. L. (2006). Institutional analysis and the paradox of corporate social responsibility. *American Behavioral Scientist, 49*(7), 925-938.

Campbell, J. L. (2007). Why would corporations behave in socially responsible ways? An institutional theory of corporate social responsibility. *Academy of Management Review, 32*(3), 946-967.

Carberry, E. J. (2012). Making sense of organizational environments: The adoption of employee stock options in the indian technology sector. *International Journal of Human Resource Management, 23*(March), 37-41.

Carberry, E. J., & King, B. G. (2012). Defensive practice adoption in the face of organizational stigma: Impression management and the diffusion of stock option expensing. *Journal of Management Studies, 49*(7), 1137-1167.

Cashore, B. W., Auld, G., & Newsom, D. (2004). *Governing through markets: Forest certification and the emergence of non-state authority*: Yale University Press.

Ceres. (2016). "Investor network on climate risk". Retrieved August 14, 2016, from https://www.ceres.org/investor-network/incr

Chatterjee, D., Grewal, R., & Sambamurthy, V. (2002). Shaping up for e-commerce: Institutional enablers of the organizational assimilation of web technologies. *MIS Quarterly, 26*(2), 65-89.

Chen, A., Watson, R., Boudreau, M. C., & Karahanna, E. (2011). An institutional perspective on the adoption of green is & it. *Australiasian Journal of Information Systems, 1*, 5-27.

Chin, W. W. (1998a). Issues and opinion on structural equation modeling clear reporting. *MIS Quarterly, 22*(1), vii-xvi.

Chin, W. W. (1998b). The partial least squares approach to structural equation modeling. *Modern methods for business research, 295*(2), 295-336.

Chin, W. W. (2010). How to write up and report pls analyses. In V. E. Vinzi, W. W. Chin, J. Henseler & H. Wang (Eds.), *Hanbook of partial least squares* (pp. 655-690). Berlin: Spinger.

Chin, W. W., & Newsted, P. R. (1999). Structural equation modeling analysis with small samples using partial least squares. *Statistical strategies for small sample research, 2*, 307-342.

Churchman, C. W. (1967). Wicked problems. *Management Science, 4*(14), 141-142.

Coglianese, C. (2001). Social movements, law, and society: The institutionalization of the environmental movement. *University of Pennsylvania Law Review, 150*(1), 85-118.

Cook, G., & Horn, J. V. (2011). How dirty is your data: A look at the energy choices that power cloud computing. *Greenpeace International*.

Dacin, M. T., Dacin, P. A., & Tracey, P. (2011). Social entrepreneurship: A critique and future directions. *Organization Science, 22*(5), 1203-1213.

Davidson, E., Vaast, E., & Wang, P. (2011). The greening of it: How discourse informs it sustainability innovation. *2011 IEEE 13th Conference on Commerce and Enterprise Computing*, 421-427.

Deephouse, D. L., & Suchman, M. (2008). Legitimacy in organizational institutionalism. In R. Greenwood, C. Oliver, K. Sahlin & R. Suddaby (Eds.), *Handbook of organizational institutionalism* (pp. 49-77). London: Sage.

Delmas, M., Hoffmann, V. H., & Kuss, M. (2011). Under the tip of the iceberg: Absorptive capacity, environmental strategy, and competitive advantage. *Business & Society, 50*(1), 116-154.

Delmas, M., & Toffel, M. (2008). Organizational responses to envrionmental demands: Opening the black box. *Strategic Management Journal, 29*(10), 1027-1055.

Den Hond, F., & De Bakker, F. (2007). Ideologically motivated activism: How activist groups influence corporate social change activities. *Academy of Management Review, 32*(3), 901-924.

Diamantopoulos, A., & Siguaw, J. (2006). Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration. *British Journal of Management, 17*(4), 263-282.

Dijkstra, T. (1983). Some comments on maximum likelihood and partial least squares methods. *Journal of Econometrics, 22*, 67-90.

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited institutional isomorphism and collective rationality in organizational fields. *American Sociological Review, 48*(2), 147-160.

Dorado, S., & Ventresca, M. J. (2013). Crescive entrepreneurship in complex social problems: Institutional conditions for entrepreneurial engagement. *Journal of Business Venturing, 28*(1), 69-82.

Edelman, L. (1992). Legal ambiguity and symbolic structures: Organizational mediation of civil rights law. *American Journal of Sociology, 97*, 1531-1576.

Eikenberry, A. M., & Kluver, J. D. (2004). The marketization of the nonprofit sector: Civil society at risk? *Public Administration Review, 64*(2), 132-140.

Etzion, D., & Ferraro, F. (2010). The role of analogy in the institutionalization of sustainability reporting. *Organization Science, 21*(5), 1092-1107.

Fichman, R. G. (2001). The role of aggregation in the measurement of it-related organizational innovation. *MIS Quarterly, 25*(4), 427-455.

Fiss, P. C., Kennedy, M. T., & Davis, G. F. (2012). How golden parachutes unfolded: Diffusion and variation of a controversial practice. *Organization Science, 23*(4), 1077-1099.

Fligstein, N., & McAdam, D. (2012). *A theory of fields*: Oxford University Press.

Fornell, C., & Larcker, D. F. (1981). Evaluation structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(February), 39-50.

Gefen, D., Straub, D., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the Association of Information Systems*.

Gooderham, P., Minbaeva, D. B., & Pedersen, T. (2011). Governance mechanisms for the promotion of social capital for knowledge transfer in multinational corporations. *Journal of Management Studies, 48*(1), 123-150.

Greenwood, R., Raynard, M., Kodeih, F., Micelotta, E. R., & Lounsbury, M. (2011). Institutional complexity and organizational responses. *The Academy of Management Annals, 5*(1), 317-371.

Haigh, N., & Griffiths, A. (2012). Surprise as a catalyst for including climatic change in the strategic environment. *Business & Society, 51*(1), 89-120.

Harmon, H. H. (1960). *Modern factor analysis*. Chicago: University of Chicago Press.

Hart, S. (2000). Beyond greening: Strategies for a sustainable world. *Harvard Business Review, Jan-Feb*, 66-76.

Haveman, H. (1993). Follow the leader: Mimetic isomorphism and entry into new markets. *Administrative Science Quarterly, 38*(4), 593-593.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. *Advances in international marketing, 20*(1), 277-319.

Herrera, M. E. B. (2015). Creating competitive advantage by institutionalizing corporate social innovation. *Journal of Business Research, 68*(7), 1468-1474.

Hoffman, A. (2001). *From heresy to dogma: An institutional history of corporate environmentalism*. Stanford: Stanford University Press.

Hoffman, A. (2005). Climate change strategy: The business logic behind voluntary greenhouse gas reductions. *California Management Review, 47*(3), 21-46.

Hoffman, A., & Ventresca, M. (1999). The institutional framing of policy debates: Economics versus the environment. *American Behavioral Scientist, 42*(8), 1368-1392.

Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research, 30*(September), 199-218.

Jenkin, T. A., Webster, J., & McShane, L. (2011). An agenda for 'green' information technology and systems research. *Information and Organization, 21*(1), 17-40.

Johnson, S. C. (2013). *Collaborative action on climate risk supply chain report 2013 – 14*: Carbon Disclosure Project.

Kanter, R. M. (1998). From spare change to real change. The social sector as beta site for business innovation. *Harvard Business Review, 77*(3), 122-132.

Kellogg, K. C. (2009). Operating room: Relational spaces and microinstitutional change in surgery1. *American Journal of Sociology, 115*(3), 657-711.

Kennedy, M. T., & Fiss, P. C. (2009). Institutionalization, framing, and diffusion: The logic of tqm adoption and implementation decisions among us hospitals. *Academy of Management Journal, 52*(5), 897-918.

King, B. G. (2008). A political mediation model of corporate response to social movement activism. *Administrative Science Quarterly, 53*(3), 395-421.

King, B. G., & Pearce, N. (2010). The contentiousness of markets: Politics, social movements, and institutional change in markets. *Annual Review of Sociology, 36*(1), 249-267.

King, B. G., & Soule, S. (2007). Social movements as extra-institutional entrepreneurs: The effect of protests on stock price returns. *Administrative Science Quarterly, 52*, 413-422.

Klima, K., & Winkelman, S. (2012). Extreme weather trends, climate science, and public opinion. Retrieved Novemer 29, 2015, from ccap.org/extreme-weather-trends-climate-science-and-public-opinion

Knox-Hayes, J., & Levy, D. L. (2011). The politics of carbon disclosure as climate governance. *Strategic Organization, 9*, 1-9.

Kock, C. J., Santaló, J., & Diestre, L. (2012). Corporate governance and the environment: What type of governance creates greener companies? *Journal of Management Studies, 49*(3), 492-514.

Kolk, A., Levy, D. L., & Pinkse, J. (2008). Corporate responses in an emerging climate regime: The institutionalization and commensuration of carbon disclosure. *European Accounting Review, 17*(4), 719-745.

Kolk, A., & Pinkse, J. (2008). A perspective on multinational enterprises and climate change: Learning from "an inconvenient truth"? *Journal of International Business Studies, 39*(8), 1359-1378.

Kong, N., & Salzmann, O. (2002). Moving business/industry towards sustainable consumption: The role of ngos. *European Management Journal, 20*(2), 109-127.

Kostova, T. (1999). Transnational transfer of strategic organizational practices: A contextual perspective. *The Academy of Management Review, 24*(2), 308-308.

Kostova, T., & Roth, K. (2002). Adoption of an organizational practice by subsidiaries of multinational corporations: Institutional and relational effects. *Academy of Management Journal, 45*(1), 215-234.

Lee, B. H. (2009). The infrastructure of collective action and policy content diffusion in the organic food industry. *Academy of Management Journal, 52*(6), 1247-1269.

Lee, M., & Jay, J. (2015). Strategic responses to hybrid social ventures. *California Management Review, 57*(3), 126-148.

Levy, D. L., Reinecke, J., & Manning, S. (2015). The political dynamics of sustainable coffee: Contested value regimes and the transformation of sustainability. *Journal of Management Studies, 53*(3), 364-401.

Levy, D. L., Szejnwald Brown, H., & de Jong, M. (2009). The contested politics of corporate governance: The case of the global reporting initiative. *Business & Society, 49*(1), 88-115.

Liang, H., Saraf, N., Hu, Q., & Xue, Y. (2007). Assimiliation of enterprise systems: The effect of institutional rressures and the mediating role of top management. *MIS Quarterly, 31*(1), 59-87.

Lounsbury, M. (2001). Institutional sources of practice variation: Staffing college and university recycling programs. *Administrative Science Quarterly, 46*(1), 29-56.

Lounsbury, M., Ventresca, M., & Hirsch, P. M. (2003). Social movements, field frames and industry emergence: A cultural-political perspective on us recycling. *Socio-Economic Review, 1*, 71-104.

MacCallum, R. C., & Browne, M. W. (1993). The use of causal indicators in covariance structure models: Some practical issues. *Psychological Bulletin, 114*(3), 533-541.

Mair, J., & Martí, I. (2006). Social entrepreneurship research: A source of explanation, prediction, and delight. *Journal of World Business, 41*(1), 36-44.

Marano, V., & Kostova, T. (2016). Unpacking the institutional complexity in adoption of csr practices in multinational enterprises. *Journal of Management Studies, 53*(1), 28-54.

McAdam, D., & Scott, W. R. (2005). *Organizations and movements*. New York: Cambridge University Press.

McDonnell, M. H., & King, B. (2013). Keeping up appearances: Reputational threat and impression management after social movement boycotts. *Administrative Science Quarterly, 58*(3), 387-419.

McDonnell, M. H., King, B. G., & Soule, S. A. (2015). A dynamic process model of private politics: Activist targeting and corporate receptivity to social challenges. *American Sociological Review, 80*(3), 654-678.

McKnight, P. E., McKnight, K. M., Sidani, S., & Figueredo, A. J. (2007). *Missing data: A gentle introduction*: Guilford Press.

Melville, N. P. (2010). Information systems innovation for environmental sustainability. *MIS Quarterly, 34*(1), 1-21.

Mena, S., & Waeger, D. (2014). Activism for corporate responsibility: Conceptualizing private regulation opportunity structures. *Journal of Management Studies, 51*, 1091-1117.

Meyerson, D., & Scully, M. (1995). Tempered radicalism and the politics of ambivalence and change. *Organization Science, 6*, 585-600.

Montgomery, A. W., Dacin, P. A., & Dacin, M. T. (2012). Collective social entrepreneurship: Collaboratively shaping social good. *Journal of Business Ethics, 111*(3), 375-388.

Moser, S. (2010). Costly knowledge-unaffordable denial: The politics of public understanding and engagement on climate change. In M. T. Boykoff (Ed.). New York: Routeledge.

Newell, P. (2008). Civil society, corporate accountability and the politics of climate change. *Global Environmental Politics, 8*, 122-153.

Nickel, P. M., & Eikenberry, A. M. (2009). A critique of the discourse of marketized philanthropy. *American Behavioral Scientist, 52*(7), 974-989.

Okereke, C., Wittneben, B., & Bowen, F. (2011). Climate change: Challenging business, transforming politics. *Business & Society, 51*(1), 7-30.

Petter, S., Straub, D., & Rai, A. (2007). Specifying formative constructs in information systems research. *MIS Quarterly, 31*(4), 623-656.

Phillips, W., Lee, H., Ghobadian, A., O'Regan, N., & James, P. (2015). Social innovation and social entrepreneurship: A systematic review. *Group & Organization Management, 40*(3), 428-461.

Phills, J. A., Deiglmeier, K., & Miller, D. T. (2008). Rediscovering social innovation. *Stanford Social Innovation Review, 6*(4), 34-43.

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. *Journal of Management, 12*(4), 531-544.

Raaijmakers, A. G. M., Vermeulen, P. A. M., Meeus, M. T. H., & Zietsma, C. (2014). I need time! Exploring pathways to compliance under institutional complexity. *Academy of Management Journal, 58*(1), 85-110.

Reid, E., & Toffel, M. (2009). Responding to public and private politics: Corporate disclosure of climate change strategies. *Strategic Management Journal, 1178*(June), 1157-1178.

Reimsbach-Kounatze, C. (2009). *Towards green ict strategies: Assessing policies and programmes on ict and the environment*: Organisation for Economic Co-operation and Development (OECD).

Ringle, C. M., Wende, S., & Will, A. (2005). Smartpls (release 2.0 m3). Hamburg, Germany: University of Hamburg.

Rogers, E. M. (1983). *Diffusion of innovations*. New York: Free Press.

Sanders, W. G., & Tuschke, A. (2007). The adoption of institutionally contested organizational practices: The emergence of stock option pay in germany. *Academy of Management Journal, 50*(1), 33-56.

Schneiberg, M. (2013). Movements as political conditions for diffusion: Anti-corporate movements and the spread of cooperative forms in american capitalism. *Organization Studies, 34*(5-6), 653-682.

Schneiberg, M., & Lounsbury, M. (2008). Social movements and institutional analysis. In R. Greenwood, C. Oliver, K. Sahlin & R. Suddaby (Eds.), *Sage handbook of organizational institutionalism* (pp. 648-670). London: Sage.

Scott, W. R. (2013). *Institutions and organizations: Ideas, interests, and identities*. Thousand Oaks: Sage.

Seidel, S., Bharati, P., Fridgen, G., Watson, R. T., Albizri, A., Boudreau, M., Butler, T., Kruse, L. C., Guzman, I., Karsten, H., Lee, H., Melville, N., Rush, D., Toland, J., & Watts, S. (Forthcoming). The sustainability imperative in information systems research. *Communications of the Association for Information Systems*.

Seidel, S., Recker, J., & Vom Brocke, J. (2013). Sensemaking and sustainable oracticing: Functional affordances of information systems in green transformations. *MIS Quarterly, 37*(4), 1275-1299.

Sharma, S. (2000). Managerial interpretations and organizational context as predictors of corporate choice of environmental strategy. *Academy of Management journal, 43*(4), 681-697.

Soule, S. (2009). *Contention and corporate social responsibility*. New York, NY: Cambridge University Press.

Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of Management Review, 20*(3), 571-610.

Tarrow, S. G. (2011). *Power in movement: Social movements and contentious politics*: Cambridge University Press.

Thau, S., Bennett, R. J., Mitchell, M. S., & Marrs, M. B. (2009). How management style moderates the relationship between abusive supervision and workplace deviance: An uncertainty management theory perspective. *Organizational Behavior and Human Decision Processes, 108*(1), 79-92.

Thornhill, S., & Amit, R. (2003). Learning about failure: Bankruptcy, firm age, and the resource-based view. *Organization Science, 14*(5), 497-509.

Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research: Using partial least squares. *Journal of Information Technology Theory and Application, 11*(2), 5-40.

Utterback, J. M. (1974). Innovation in industry and the diffusion of technology. *Science, 183*, 620-626.

van Broek, T. A., Ehrenhard, M. L., Langley, D. J., & Groen, A. J. (2012). Dotcauses for sustainability: Combining activism and entrepreneurship. *Journal of public affairs, 12*(3), 214-223.

van Wijk, J., Stam, W., Elfring, T., Zietsma, C., & den Hond, F. (2012). Activists and incumbents structuring change: The interplay of agency, culture, and networks in field evolution. *Academy of Management Journal, 56*(2), 358-386.

Vasi, I. B., & King, B. G. (2012). Social movements, risk perceptions, and economic outcomes: The effect of primary and secondary stakeholder activism on firms' perceived environmental risk and financial performance. *American Sociological Review, 77*(4), 573-596.

Waddock, S. (2008). Building a new institutional infrastructure for corporate responsibility. *Academy of Management Perspectives, 22*, 87-108.

Waldron, T. L., Navis, C., & Fisher, G. (2013). Explaining differences in firms' responses to activism. *Academy of Management Review, 38*(3), 397-417.

Wang, H., Tong, L., Takeuchi, R., & George, G. (2016). Corporate social responsibility: An overview and new research directions: Thematic issue on corporate social responsibility. *Academy of Management Journal, 59*(2), 534-544.

Watson, R. T., Boudreau, M. C., & Chen, A. J. (2010). Information systems and environmentally sustainable development: Energy informatics and new directions for the is community. *Information Systems Quarterly, 34*(1), 23-38.

Watts, S. (2016). Electronic integration of csr reporting systems for stakeholder responsiveness.

Weber, K., Rao, H., & Thomas, L. G. (2009). From streets to suites: How the anti-biotech movement affected german pharmaceutical firms. *American Sociological Review, 74*(1), 106-127.

Whiteman, G., Walker, B., & Perego, P. (2013). Planetary boundaries: Ecological foundations for corporate sustainability. *Journal of Management Studies, 50*(2), 307-336.

Zald, M., Morrill, C., & Rao, H. (2005). The impact of social movements on organizations: Environments and responses. In G. F. Davis, D. McAdam, W. R. Scott & M. Zald (Eds.), *Social movements and organizational theory* (pp. 253-279). New York, NY: Cambridge University Press.

Zietsma, C., & Lawrence, T. B. (2010). Institutional work in the transformation of an organizational field: The work and practice work. *Administrative Science Quarterly, 55*, 189-221.

Table 1: Construct Operationalization

Construct	Items	Sources
Regulative Institutional Pressure	IR1: Large number of regulatory organizations in the country promote and enforce sustainable and ecological IS practices. IR2: Current and foreseeable regulations are pressuring us to adopt sustainable and ecological IS practices. IR3: The industry association mandates us to use sustainable and ecological IS practices.	-IR1 and IR2 adapted from Kostova and Roth (2002) - IR3 adapted from Liang et al (2007)
Normative Institutional Pressure	IN1: Ensuring and adopting sustainable and ecological IS practices is an obligation in the present society. IN2: Our suppliers are adopting sustainable and ecological IS practices. IN3: Our customers are adopting sustainable and ecological IS practices. IN4: Vendors are promoting sustainable and ecological IS that is influencing us to adopt sustainable and ecological IS practices.	-IN1 adapted from Kostova and Roth (2002) -IN2 and IN3 adapted from Liang et al (2007) and Teo et al (2003) - IN4 developed based on Teo et al (2003)
Cognitive-Cultural Institutional Pressure	IC1: Most successful companies in our industry are implementing sustainable and ecological IS. IC2: There is a very strong message in companies that you cannot stay in business nowadays if you do not adopt sustainable and ecological IS practices. IC3: Our main competitors who have adopted sustainable and ecological IS practices have greatly benefited. IC4: Regional culture is influencing us to adopt sustainable and ecological IS practices.	- IC1 and IC2 adapted from Kostova and Roth (2002). - IC3 developed based on Liang et al (2007) -IC4 developed based on Scott (2008)
Social Movement Activism	SG1: Environmental groups (e.g. Sierra Club) with their advocacy are encouraging sustainable and ecological IS practices. SG2: Non-profit activist social organizations are encouraging sustainable and ecological IS practices.	-SG 1 and SG2 are adapted from King and Soule (2007).
Management Commitment	TM1: Senior management of our firm actively articulates a vision for the organizational use of sustainable and ecological IS. TM2: Senior management of our firm actively formulated a strategy for organizational use of sustainable and ecological IS. TM3: Senior management of our firm actively established goals and standards to encourage sustainable and ecological IS initiatives.	-TM1, TM2 and TM3 adapted from Chatterjee et al. (2002) and Liang et al. (2007).
Green supply chain and production IS Practices (Green IS Practices for brevity)	EIS1: My firm has policies that encourage installing software to make upstream supply chain management (material sourcing and acquisition) more environmentally friendly. EIS2: My firm has policies that encourage installing software to make downstream supply chain management (product distribution and delivery) more environmentally friendly. EIS3: My firm has policies that encourage the use of information systems whose major purpose is to reduce the carbon footprint of the firm's production system.	-EIS1 and EIS2 adapted from Chen et al. (2009). -EIS3 developed for this study

Table 2: Sample Demographics

	Frequency	Percentage
Industry*		
Manufacturing	73	15.2
Finance and insurance	53	11.0
Banking	34	7.1
Health Care	41	8.5
Education	21	4.4
Government	21	4.4
Professional and other services	88	18.3
Transportation	15	3.1
Information technology and telecommunications	71	14.8
Utilities	12	2.5
Retail and wholesale trade	32	6.7
Other	28	5.8
Number of Employees		
Fewer than 99	106	24.9
100-499	91	21.4
500–999	45	10.6
1,000–4,999	89	20.9
5,000–9,999	25	5.9
More than 10,000	69	16.2
Position		
CEO	50	11.8
Senior Manager	241	56.7
IT Manager	117	27.5
Middle Manager	17	4.0

** Some firms are in multiple industries*

Table 3: Psychometric Properties of Formative and Reflective Constructs*

Construct	CR**	AVE**	Indicator	Mean	Median	SD	Weight (Formative)	Loading (Reflective)
Regulative Pressure (Reflective)	0.90	0.74	IRG1	4.29	5	1.54	-	0.84
			IRG2	4.46	5	1.57	-	0.88
			IRG3	4.10	4	1.65	-	0.87
Normative Pressure (Reflective)	0.90	0.70	INR1	5.12	5	1.48	-	0.73
			INR2	4.77	5	1.33	-	0.84
			INR3	4.68	5	1.45	-	0.88
			INR4	4.64	5	1.43	-	0.88
Cognitive-Cultural Pressure (Reflective)	0.92	0.73	ICC1	4.52	5	1.46	-	0.86
			ICC2	4.11	4	1.62	-	0.88
			ICC3	4.24	4	1.52	-	0.88
			ICC4	4.72	5	1.5	-	0.80
Movement Activism (Formative)	-	-	SMA1	5.25	6	1.5	0.28	-
			SMA2	5.08	6	1.46	0.76	-
Managerial Commitment (Reflective)	0.97	0.91	MCT1	4.90	5	1.55	-	0.94
			MCT2	4.74	5	1.59	-	0.97
			MCT3	4.73	5	1.59	-	0.95
Green IS Adpotion (Formative)	-	-	GIS1	4.73	5	1.53	0.23	-
			GIS2	4.78	5	1.54	0.30	-
			GIS3	4.62	5	1.67	0.57	-

**IRG = Regulative Institutional Pressure; INR = Normative Institutional Pressure; ICC = Cognitive-Cultural Institutional Pressure; SMA = Social Movement Activism; MCT = Managerial Commitment; GIS = Green IS Practices.*

***CR = Composite Reliability; AVE = Average Variance Extracted; SD = Standard Deviation. All loadings are significant at $p < 0.001$ level.*

Table 4: Square Root of Average Variance Extracted and Latent Variable Correlation

	IRG*	INR	ICC	SMA	MCT	GIS
Regulative Pressure	**0.86**					
Normative Pressure	0.63	**0.84**				
Cognitive-Cultural Pressure	0.67	0.78	**0.85**			
Movement Activism	0.39	0.51	0.48	-		
Managerial Commitment	0.54	0.61	0.64	0.38	**0.95**	
Green IS Adoption	0.57	0.63	0.66	0.37	0.77	-

Diagonal shows the square root of the AVE for each reflective construct.

**IRG = Regulative Institutional Pressure; INR = Normative Institutional Pressure; ICC = Cognitive-Cultural Institutional Pressure; SMA = Social Movement Activism; MCT = Managerial Commitment; GIS = Green IS Practices.*

Table 5: Loadings and Cross Loadings

	IRG	INR	ICC	SMA	MCT	GIS
IRG1	**0.84**	**0.53**	**0.59**	**0.35**	**0.48**	**0.52**
IRG2	**0.88**	0.54	0.53	0.34	0.47	0.45
IRG3	**0.87**	0.57	0.62	0.33	0.44	0.51
INR1	0.44	**0.73**	0.57	0.47	0.49	0.47
INR2	0.51	**0.84**	0.61	0.37	0.49	0.54
INR3	0.55	**0.88**	0.70	0.45	0.55	0.56
INR4	0.60	**0.88**	0.70	0.41	0.50	0.55
ICC1	0.55	0.71	**0.86**	0.43	0.54	0.53
ICC2	0.61	0.64	**0.88**	0.42	0.54	0.59
ICC3	0.61	0.68	**0.88**	0.38	0.58	0.61
ICC4	0.52	0.63	**0.80**	0.42	0.53	0.54
SMA1	0.34	0.47	0.42	**0.89**	0.34	0.32
SMA2	0.39	0.50	0.47	**0.99**	0.37	0.37
MCT1	0.48	0.57	0.62	0.39	**0.94**	0.70
MCT2	0.53	0.58	0.62	0.34	**0.97**	0.74
MCT3	0.53	0.59	0.59	0.35	**0.95**	0.75
GIS1	0.50	0.56	0.62	0.34	0.67	**0.88**
GIS2	0.51	0.60	0.59	0.35	0.67	**0.89**
GIS3	0.55	0.58	0.61	0.34	0.74	**0.95**

Note: IRG = Regulative Institutional Pressure; INR = Normative Institutional Pressure; ICC = Cognitive-Cultural Institutional Pressure; SMA = Social Movement Activism; MCT = Managerial Commitment; GIS = Green IS Practices.

Table 6: Test of Hypotheses without Control Variables

Constructs	Path Coefficient	T Value	Result*
H1: Activism > Adoption	- 0.01	0.36	Not Significant
H2a: Activism > Regulative Institutional Pressure	0.40***	8.18	H2a Supported
H2b: Activism > Normative Institutional Pressure	0.51***	11.53	H2b Supported
H2c: Activism > Cognitive Institutional Pressure	0.48***	10.23	H2c Supported
H3a: Regulative Institutional Pressure > Adoption	0.11**	2.53	H3a Supported
H3b: Normative Institutional Pressure > Adoption	0.12*	2.01	H3b Supported
H3c: Cognitive Institutional Pressure > Adoption	0.16**	2.91	H3c Supported
H4: Activism > Managerial Commitment	0.03	0.67	Not Significant
H5a: Regulative Institutional Pressure > Managerial Commitment	0.15**	2.43	H5a Supported
H5b: Normative Institutional Pressure > Managerial Commitment	0.23**	2.88	H5b Supported
H5c: Cognitive Institutional Pressure > Managerial Commitment	0.35***	4.45	H5c Supported
H6: Managerial Commitment > Adoption	0.54***	11.62	H6 Supported

** $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$*

R^2 for Adoption of Green IS = 0.65; R^2 for Managerial Commitment = 0.46

Table 7: Test of Hypotheses with Control Variables

Constructs	Path Coefficient	T Value	Result*
H1: Activism > Adoption	- 0.01	0.12	Not Significant
H2a: Activism > Regulative Institutional Pressure	0.40***	8.29	H2a Supported
H2b: Activism > Normative Institutional Pressure	0.51***	11.87	H2b Supported
H2c: Activism > Cognitive Institutional Pressure	0.48***	10.7	H2c Supported
H3a: Regulative Institutional Pressure > Adoption	0.10**	2.45	H3a Supported
H3b: Normative Institutional Pressure > Adoption	0.11*	2.0	H3b Supported
H3c: Cognitive Institutional Pressure > Adoption	0.16**	2.76	H3c Supported
H4: Activism > Managerial Commitment	0.03	0.68	Not Significant
H5a: Regulative Institutional Pressure > Managerial Commitment	0.15**	2.32	H5a Supported
H5b: Normative Institutional Pressure > Managerial Commitment	0.23**	2.87	H5b Supported
H5c: Cognitive Institutional Pressure > Managerial Commitment	0.35***	4.47	H5c Supported
H6: Managerial Commitment > Adoption	0.53***	11.27	H6 Supported
Control Variables			
Industry - Information Technology and Telecommunications	0.02	0.49	Not Significant
Industry - Low Carbon Emitters	0.07	1.5	Not Significant
Industry - High Carbon Emitters	0.06	1.38	Not Significant
Firm Size	-0.04	1.28	Not Significant
Firm Age	- 0.05	1.59	Not Significant
IT Size	0.07***	3.33	Significant

** p < 0.05; ** p < 0.01; *** p < 0.001*

R^2 for Adoption of Green IS = 0.66; R^2 for Managerial Commitment = 0.46;

i: Industry – Low Carbon Emitters: Banking, Education, Finance and insurance, Government, Health Care, Professional and other services, Retail and wholesale trade and Other.
ii: Industry – High Carbon Emitters: Manufacturing, Transportation and Utilities.

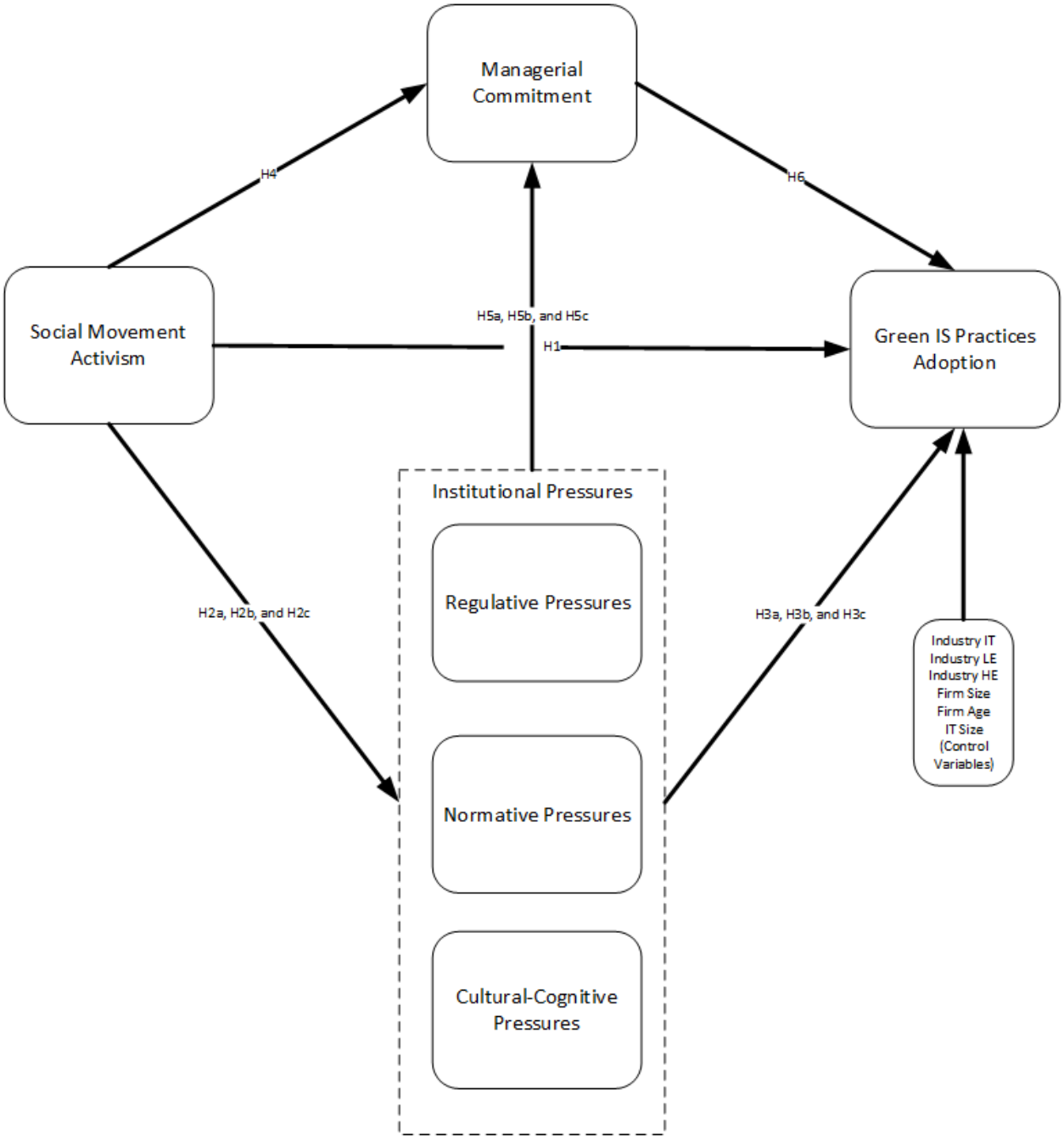

Figure 1: Research Model

Note: Industry IT: Information Technology and Telecommunications; Industry LE: Low Carbon Emitters, namely, Banking, Education, Finance and insurance, Government, Health Care, Professional and other services, Retail and wholesale trade and Other; Industry HE: High Carbon Emitters, namely, Manufacturing, Transportation and Utilities.

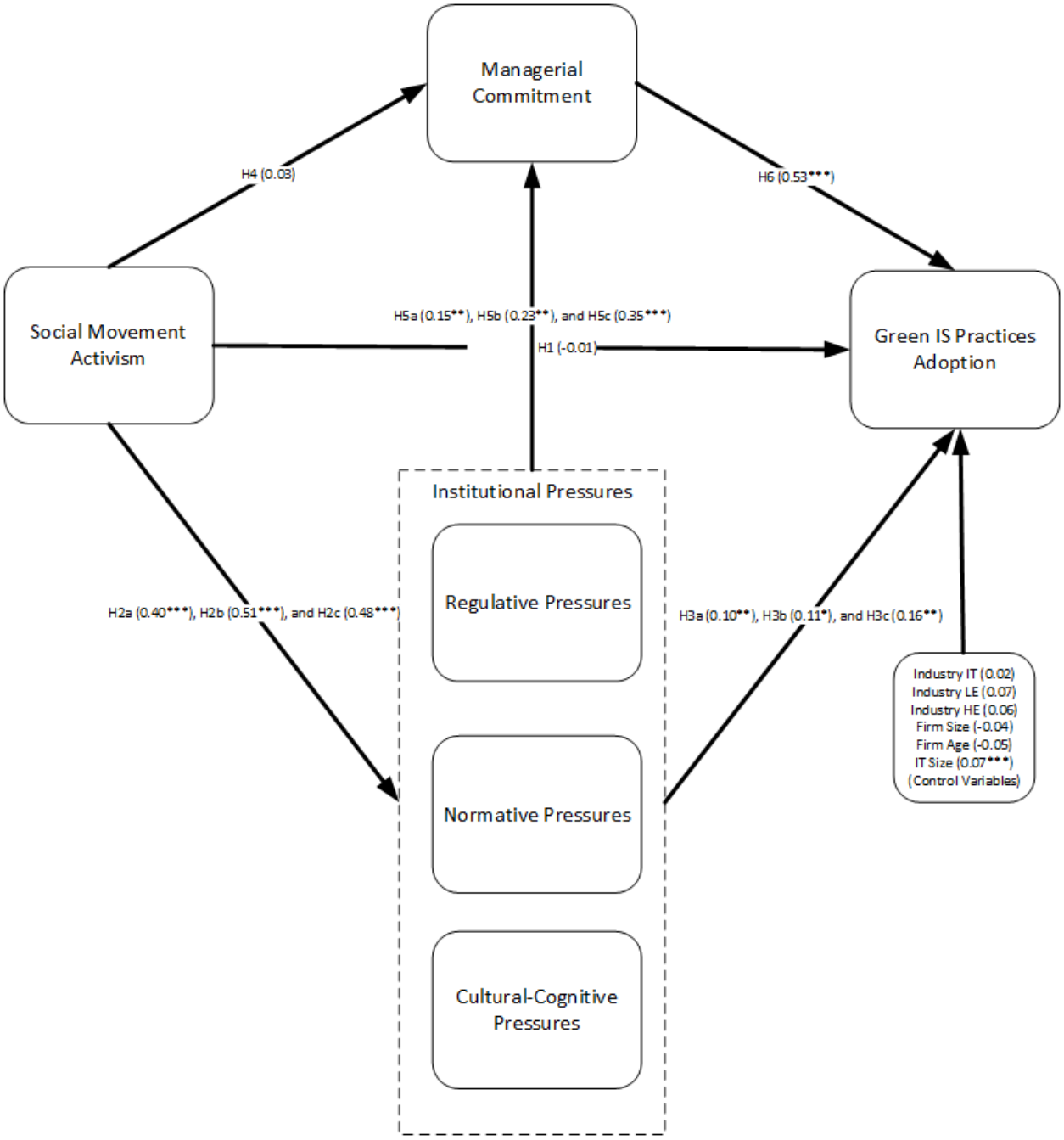

Figure 2: Research Model with Results

* p < 0.05; ** p < 0.01; *** p < 0.001

Note: Industry IT: Information Technology and Telecommunications; Industry LE: Low Carbon Emitters, namely, Banking, Education, Finance and insurance, Government, Health Care, Professional and other services, Retail and wholesale trade and Other; Industry HE: High Carbon Emitters, namely, Manufacturing, Transportation and Utilities.

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[i] We thank an anonymous reviewer for these insights about scale shift and the dimensions of indirect activism.