

**GREEN INFORMATION TECHNOLOGIES AND SYSTEMS IN ORGANIZATIONS:
EMPLOYEES' PERCEPTIONS OF THE STATE OF PRACTICE**

ABSTRACT

In this study, we examine the extent to which employees recognize the importance of information technologies and systems (IT/S) in developing and implementing environmental initiatives. To address this question, we first review past research on this topic and draw on a framework for examining environmental motivating forces, strategies, and employee perceptions. We then analyze qualitative data based on in-depth interviews with employees in financial services organizations. Our aim was to develop a richer understanding of how employees currently view IT/S issues in relation to environmental sustainability and if similarities exist between different types of financial institutions. Our findings suggest that organizations are still in the infancy stage of awareness and adoption of 'Green' IT/S. We conclude by suggesting that future research should draw on organizational learning and social marketing theories to help align employees' attitudes, cognitions, and behaviors and to drive environmental changes.

INTRODUCTION

There has been a recent surge across many sectors of society to take issues of environmental responsibility seriously. Governments are negotiating environmental policies. Consumer advocates are lobbying for ethical consumerism. Media outlets have brought critical issues to the forefront, oftentimes helping to advance the corporate responsibility agenda. In light of this transition, organizations are facing increasing stakeholder demands to focus on issues of corporate social responsibility (CSR), where CSR refers to “company activities -- voluntary by definition -- demonstrating the inclusion of social and environmental concerns in business operations and in interactions with stakeholders” (van Marrewijk, 2003, p. 102). These CSR actions, as captured by this broad definition, may relate to a diverse array of issues such as environmental preservation and sustainability, labour practices, product safety or diversity (Sen & Bhattacharya, 2001), but they focus on activities that achieve a level of responsibility beyond that of basic legal compliance (McWilliams & Siegel, 2001). Of particular interest for the current research is the CSR domain of environmental sustainability and, more specifically, the role of information technology and systems (IT/S) in this domain.

Although organizations are facing increasing pressure to take environmental issues into consideration both in their business strategies and operations (Henriques & Sadorsky, 1999; Ramus & Steger, 2000; Stead & Stead, 1995), and are attempting to respond to increasingly stringent demands for environmentally responsible business practices, many have overlooked the critical role played by IT/S, both in how it contributes to current environmental concerns as well as its potential to advance sustainable practices (Huang, 2008; Siegler & Gaughan, 2008). Nevertheless, it is critical for organizations to consider IT/S, as its use is often the most significant power expense in a company (Dembo, 2008). According to the Environmental Protection Agency, computers and computer monitors “are responsible for the unnecessary production of millions of tons of Greenhouse gases every year” (Arnold, 2004). Even though IT/S contributes significantly to organizations’ overall environmental footprints (Siegler & Gaughan, 2008), there are increasing opportunities for organizations to capitalize on ‘Green’ IT/S initiatives (i.e. initiatives that efficiently use information technology and systems to either directly or

indirectly reduce environmental impacts: Boudreau, Chen, & Huber, 2008). Primarily focused on energy efficiency and equipment utilization, Green IT initiatives tend to directly influence and reduce an organization's environmental footprint (Boudreau et al., 2008). In contrast to Green IT, Green IS initiatives tend to have an indirect impact, with a primary focus on designing and implementing systems to support environmental management processes (Boudreau et al., 2008).

Even though research to date suggests that organizations often neglect to incorporate the IT/S function into their environmental assessments (Huang, 2008) and fail to allocate personnel to address issues of Green IT/S (Siegler & Gaughan, 2008), few empirical studies have examined whether organizations are incorporating IT/S into their environmental management practices. Therefore, given the substantial and growing importance of Green IT/S in advancing environmental sustainability and business efficiency, this study examines employees' perceptions of Green IT/S practices. This employee focus contrasts with much of the previous literature. Existing research on environmental responsibility in organizations has predominantly examined issues at the strategic or entrepreneurial levels of analysis (e.g., Berchicci & King, 2007; Menon & Menon, 1997; York & Venkataraman, 2007). While some management research has examined the influence of leaders (e.g., Branzei, Vertinsky, & Zietsma, 2000), most has focused on the organizational level of analysis, not on employees themselves.

Although setting the strategic direction for environmental responsibility is crucial, implementing leaders' visions at the employee level and motivating employees to fully engage in these activities challenges leaders most (Berger, Cunningham, & Drumwright, 2007). In practice, motivating and predicting pro-environmental behaviors has been very difficult because individuals' environmental attitudes often contrast sharply with their behaviors (Ohtomo & Hirose, 2007). Individuals may have very positive attitudes, yet self-interest predominates in the moment (Meyer, 2001). Consequently, it is important for organizations to implement initiatives that encourage employee behaviors to be congruent with organizations' policies for environmental responsibility (Peloza & Hassay, 2006).

In this study, we examine whether employees perceive that their organizations have started to recognize the importance of Green IT/S in developing and implementing environmental initiatives. In

order to address this question, we analyzed qualitative data in the form of in-depth interviews with employees in financial services organizations. The aim was to determine the extent to which employees associate IT/S-related issues with their organization's environmental practices and, more generally, with their CSR program. In doing so, we take initial steps towards developing a richer understanding of how organizations and, more specifically, their employees, currently view IT/S in relation to their organization's CSR programs for environmental sustainability.

The following section provides an overview of broader environmental issues within organizations as well as articles directly related to the concept of Green IT/S. Following this, we describe the methodology used to examine the extent to which employees associate IT/S issues in their assessment of their organizations' environmental initiatives. Next, the results are presented both within and across cases. From our findings, we then suggest theoretical perspectives to help guide future research. This is followed by a discussion of the current state of practice with regard to the role of Green IT/S in pursuing sustainable practices.

LITERATURE REVIEW

In the past, environmental issues were seen to be in conflict with profitable operations, thus creating a platform whereby an organization could only pursue environmentally responsible initiatives at the expense of profitable economic growth (Friedman, 1970; Menon & Menon, 1997). However, recent research has linked strong environmental management practices to more positive perceptions of future financial performance and, more concretely, to a number of tangible economic advantages (Berchicci & King, 2007; Hart, 1995; Klassen & McLaughlin, 1996; Shrivastava, 1995). These economic gains, in large part, have been attributed to a wide variety of process-oriented initiatives such as improved pollution prevention measures, more efficient production processes and effective energy conservation policies (Hart, 1995). Also contributing to the organization's economic gains is the notion that strong environmental performance tends to help attract, motivate and retain skilled employees (Fernandez, Junquera, & Ordiz, 2003). Given the potential direct and indirect benefits, many corporations now view environmental initiatives as a viable way to create a sustainable competitive advantage (Franklin, 2008;

Sharma & Vredenburg, 1998). The potential benefits associated with pursuing environmental practices have also resulted in multifaceted research examining how organizations can effectively implement sustainability strategies (e.g., Shrivastava, 1995; Starik & Rands, 1995). Largely absent from this research on corporate environmental practices is the topic of IT/S.

Green IT/S Research

Despite reports suggesting that it is critical for organizations to address IT/S issues in order to progress towards sustainable practices (e.g., Siegler & Gaughan, 2008), relatively little attention has been dedicated to enriching our understanding of how these issues influence an organization's environmental footprint (Huang, 2008; Siegler & Gaughan, 2008). Perhaps best capturing this gap in the literature is Elliot and Binney's (2008) study, which notes that the concept of Green IT/S is absent from all leading management information systems (MIS) journals. Despite the prevalence of research that addresses environmental issues and growing IT/S industry participation in environmental initiatives, there exist only a limited number of articles that have examined the concept of Green IT/S and its role in advancing the environmental agendas of organizations.

These select articles, many of which are conceptual and focused at the organizational level of analysis, acknowledge IT/S issues as central to sustainable development (Elliot, 2007; Elliot & Binney, 2008) and environmental conservation (Huang, 2008). At a broad level, they identify an opportunity for organizations to capitalize on IT/S as a means to enhance corporate capabilities (Elliot & Binney, 2008; Shaft, Sharman, & Swahn, 2001) and as a critical consideration in the formulation and implementation of environmental strategies (Setterstrom, 2008). At a more targeted level, other articles have examined more specific applications for IT/S functions. These applications include capitalizing on IT/S capabilities to (1) help raise awareness about environmental initiatives by diffusing information through the organization (Manning, 2007), (2) improve environmental reporting activities (Brown, Dillard, & Marshall, 2007; Goodman, 2000; Isenman, Bey, & Welter, 2007), (3) minimize efficiency gaps in system use (Haigh, 2008), (4) modify the technology lifecycle to enhance sustainability (Huang, 2008; Yang, Moore, Wong, Pu, & Chong, 2007), and (5) incorporate environmental considerations into product design and logistics

(Lenox, King, & Ehrenfeld, 2000; Pearce, Johnson, & Grant, 2007).

Evident in these diverse papers is the cross-functional nature of IT/S in contributing to environmental sustainability. For example, although IT/S functions can be used to reduce the organization's environmental impact (e.g., through email, electronic documents, telecommuting), IT/S can also be used by management and human resources to enhance employee commitment to environmentally friendly practices by diffusing environment-related information through the company (Boudreau et al., 2001; Manning, 2007; Setterstrom, 2008). Operations and manufacturing functions recognize the environmental and economic issues associated with incorporating Green IT into the manufacturing process to minimize the organization's environmental impact (Chen, Boudreau, & Watson, 2008; Setterstrom, 2008). This may include IT manufacturing (e.g., designing energy efficient IT, using non-hazardous materials when designing IT components, modifying the software development lifecycle to enhance environmental sustainability) or the manufacturing process more generally (e.g., designing products with less environmental impact, incorporating a design for the environment orientation) (Huang, 2008; Lenox et al., 2000; Setterstrom, 2008). Further, some research suggests that IT/S can be used to develop environmentally conscious accounting information systems (Brown et al., 2005) and to track, measure, and report on environmental business practices (Rikhardsson, 1998; Shaft et al., 2001).

Although little empirical research has examined the relationship between IT/S use and organizations' sustainability practices, lucrative opportunities in Green IT/S have not been overlooked by the IT industry. With leading companies such as IBM, Dell, Microsoft and HP joining forces as part of Green Grid, an organization "dedicated to advancing energy efficiency in data centers and business computing ecosystems" (www.theGreengrid.org), it appears that many of the big players in the IT industry are capitalizing on consulting and product development opportunities presented by Green IT/S. The IT industry seems to have acknowledged and reacted to the role of IT in pursuing environmental sustainability; however, it remains unclear how, or if, organizations are also embracing Green IT/S as a component of their environmental programs. Therefore, our first research question is:

RQ1: To what extent do employees report IT/S-related practices as part of their organizations'

environmental practices?

What motivates organizations to adopt Green IT/S practices? What strategies do organizations use? How do these strategies translate into employee cognitions, behaviors, and attitudes? To address these questions, we now turn to a framework for studying Green IT/S initiatives.

A Framework for Green IT/S Research

We draw on a framework that brings together sustainability research from both management and IT/S and provides an encompassing platform by which to synthesize the extant literature. This framework (by Jenkin, Webster, & McShane, 2009) provides a mechanism to examine Green IT/S as a critical, yet often overlooked, component of CSR programs, specifically in relation to corporate environmental initiatives. It can be applied at multiple levels of analysis (e.g., technological, societal) and outlines (1) the motivating forces driving corporate environmental practices (2) the environmental sustainable strategies that organizations develop in response to the drivers, and (3) employees' environmental attitudes, cognitions, and behaviors. Insofar as it provides guidelines for assessing Green IT/S issues in relation to the extant research on sustainability, we draw on this framework to inform our research (see Figure 1).

 Insert Figure 1 about here

Based on a review of the relevant literature, the framework for Green IT/S research identifies a number of motivating forces driving corporate environmental practices including ecological, technological, organizational, regulatory-market and socio-cultural factors (Starik & Rands, 1995). Specifically, ecological forces relate to the rate and levels of environmental degradation and technological forces refer to the technology available to organizations that enables them to behave in a more environmentally sustainable manner. The remaining forces (i.e., organizational, regulatory, socio-cultural) refer to the external and internal factors influencing the organization's actions. Organizational forces represent internal factors, including issues related to leadership, policies and financial considerations. Regulatory-market forces include factors such as external standards, laws, and market pressures and

socio-cultural forces reflect the environmental values, beliefs and trends in society. Any number of these forces can combine in varying degrees to drive or motivate an organization to adopt particular environmental initiatives and strategies (Starik and Rands 1995).

The environmental strategies adopted by organizations, in part due to the intensity of the motivating forces, vary in the degree to which their business strategy and operations incorporate environmental initiatives and, more specifically, Green IT/S functions. For example, Chen et al. (2008) suggest that the degree to which organizations integrate Green IT/S into their environmental strategies may vary depending on the institutional pressures they face. In a sense, these forces will influence whether organizations opt to simply use IT/S functions to pursue economic-centered eco-initiatives that are driven by commercial viability and efficiency motivations (e.g., investing in eco-efficient servers to conserve energy, upgrading components to minimize waste and reducing paper usage: Boudreau et al., 2008; Setterstrom, 2008) or, instead, to engage in environment-centered eco-initiatives that focus on long-term prosperity (e.g., open source software, videoconferencing: Chen et al., 2008). These diverse strategic approaches to Green IT/S are classified by Jenkin et al. (2009) into four types of environmental strategies, ranging from Type 0¹ (i.e., organizations that publicly indicate their commitment to the environment with little follow-through) to Type 3 (i.e., organizations that embed environmental sustainability considerations into all corporate activities). Depending on the motivational forces and resultant strategic approach, organizations will rely on different Green IT/S functions in order to execute that strategy.

While setting the organization's strategic direction is important, the strategies' environmental impact truly depends on their implementation, the success of which is often largely determined by the environmental attitudes, cognitions, and behaviors of employees in support of the strategic initiatives. The critical role of employees in implementing environmental initiatives shown in the Green IT/S research framework is consistent with previous management studies, which note the importance of soliciting employee buy-in (Buysse & Verbeke, 2002; del Brio, Fernandez & Junquera, 2007; Ramus 2002; Starik

¹ Type 0 differentiates between organizations with good intentions – a desire to change but an inability to change due to lack of resources - from those with poor intentions – no intention of changing, only portraying the image of changing.

& Rands, 1995) and supporting employee eco-innovations (Daily & Huang, 1994; Enander & Pannullo, 1990; Ramus, 2002; Starik & Rands, 1995). Similarly, though focused specifically on Green IT/S, Haigh and Griffiths (2008) and Smart, Armstrong and Vanclay (2007) underscore the importance of employee cognitions and behaviors (during systems analysis and design and adoption of Green IS, respectively). Complementing this management and IT/S research, there is a literature in environmental psychology that provides rich insights as to the complex relationship between environmental attitudes, cognitions, and behaviors at the individual level (Bamberg & Moser, 2007; Fransson & Garling, 1999; Schultz & Zelezny, 1999). However, while helpful in highlighting the disconnect that often exists between pro-environmental attitudes and behaviors (Ohtomo & Hirose, 2007; Meyer 2001), the environmental psychology research has largely been conducted with consumers, and has rarely been applied to employees in the workplace (Andersson et al., 2005)

In light of the paucity of empirical research examining the role of Green IT/S in organizations, and environmental research on employees more generally, Figure 1 can provide a comprehensive means to empirically examine employees' perceptions of environmentally-oriented CSR activities and, more specifically, their views pertaining to Green IT/S. As such, we draw on the first three components of this research framework to guide our empirical examination of whether employees are starting to recognize the importance of IT/S as a critical component of environmental sustainability. Consequently, our second research question asks:

RQ2: How do reported environmental (and IT/S-related) practices relate to environmental motivating forces, organizational strategies, and employees' attitudes, cognitions, and behaviors?

In our study, we focus on the financial services industry in North America. By examining an industry with high IT/S penetration, the findings should shed light on employees' perceptions of current Green IT/S initiatives in organizations in which information technologies and systems have been widely diffused. Within this industry, we contrast two types of financial service organizations, banks and credit unions. Banks generally have higher capitalization and market coverage than credit unions; further, they distinguish between customers and shareholders, whereas the customers are the owners in credit unions

(Binhammer & Sephton, 2001). Credit unions are service-oriented cooperatives in competition with banks, but have unique motivational and institutional features (Smith, 1984). For instance, credit unions often view themselves as very socially responsible, focusing on their local customer-owners. It is important for them to support community projects (e.g., Chamberlain, 2008) such as environmental initiatives (e.g., Bethpage, 2009). Therefore, we expect that employees of credit unions will perceive more environmental initiatives in their organizations than will employees in banks:

RQ3: Will credit union employees perceive more environmental (and IT/S) practices than banking employees?

METHODOLOGY

To examine these research questions, we draw on data collected as part of a larger interview study conducted in the summer of 2008. This study concerned employee perceptions of their organizations' CSR programs, with a specific focus on employee perceptions of CSR authenticity (McShane & Cunningham, 2008). Each of the participants was an employee at one of four North American financial services institutions, two credit unions and two banks. All four organizations were recruited through personal contacts and networks or by contacting the CSR department of the selected financial institution.

Using a combination of purposive sampling and snowballing, a pool of participants was assembled from the four organizations: six employees from Company A, six employees from Company B, four employees from Company C, and eight employees from Company D. Twenty-four in-depth interviews were conducted, including 16 person-to-person interviews and eight phone interviews. This group included a variety of employees such as senior management and front-line staff across multiple departments ranging from accounting to communications to risk management. Further, employee tenure with the organizations ranged from only a few months to approximately thirty years.

The interviews, while guided by a general interview protocol, remained largely unstructured (see Appendix A). As demonstrated in the interview protocol, we did not probe for Green IT/S issues but asked general questions about CSR programs. Environmental issues emerged as part of CSR programs as

anticipated, which enabled an assessment of the extent to which employees associate elements of Green IT/S with their organization's environmental management practices.

To analyze the data, it was critical to first identify all the portions of the transcripts that referred to environmental issues as a core component of CSR. Subsequently, in order to evaluate the prevalence of IT/S-related issues within employee evaluations of corporate environmental initiatives, we used NVIVO software (<http://www.qsrinternational.com/>) to code and analyze these environment-related segments of the transcripts according to the Green IT/S research framework presented in Figure 1. The coding structure and code definitions used during the analysis are reported in Appendix B. The coding was performed by one of the researchers. In addition, we randomly selected 10% of the transcripts and had a second rater (blind to the research questions) code these transcripts in order to assess inter-rater reliability. After a training transcript, in which the codes were refined and clarified, the rater coded the 10% sample; the coding between the two raters agreed 74%.

Adopting a Miles and Huberman (1984) approach for analyzing the qualitative data, we used data displays to facilitate the process of drawing valid conclusions from the reduced data. In doing so, we sought to better understand the environmental initiatives mentioned by employees during the interviews in terms of Figure 1, that is, (1) the primary motivation for engaging in environmental initiatives, (2) the level of strategic commitment demonstrated by the environmental initiatives, and (3) whether the employees' environmental attitudes, cognitions, and behaviors were aligned with these initiatives. We also performed a cross-case (by type of financial institution) analysis to identify patterns in the data.

The following section presents the results of this analysis by presenting the classifications according to the Green IT/S research framework as well as cross-case results that were uncovered during this process. In doing so, we take first steps towards understanding the extent to which employees incorporate issues of IT/S into their assessments of environmental management practices and, more broadly, CSR programs.

RESULTS

Across the 24 interview transcripts, there were a total of 290 pages in which the broad topic of

CSR was discussed. During our analysis, we coded quotes to the environmental themes identified in the research framework (Figure 1), resulting in a total of 30 pages of quotes. Therefore, only 10% of the quotes relating to CSR concerned the environment, suggesting that employees focus more on other (social) issues when thinking of CSR practices.

Our first research question concerns the extent to which employees report IT/S-related practices as part of their organizations' environmental practices. The 30 pages of environmental quotes were made up of 165 individual quotes across 21 participants (see Table 1). Within these quotes, 15 participants discussed IT/S and its relationship to environmental issues and initiatives for a total of 10 pages of IT/S-related quotes and 58 individual quotes. Thus, IT/S quotes made up about one third of the overall environmental quotes. The fact that one third of the environmental quotes were related to issues of Green IT/S suggests that employees are starting to recognize the importance of IT/S as a critical component of their organizations' environmental programs.

 Insert Table 1 about here

During the interviews, participants discussed what employees and their organizations as a whole were doing with regards to the environment and Green IT/S. However, they also described gaps – areas in which employees or the organization as a whole were performing poorly or ignoring environmental issues altogether. Of the 165 environmental quotes, 45 described gaps in environmental practices (see Table 2). Similarly, of the 58 IT/S quotes, ten described gaps related to IT/S and environmental practices. Employees' focus on gaps demonstrates that they see opportunities to address environmental issues in their organizations. These employees appear to represent untapped potential for environmental ideas that organizations are overlooking.

 Insert Table 2 about here

In addition to these broad themes, the transcripts were coded to the specific concepts outlined in the research framework (Figure 1) in order to address our second research question. That is, this question

investigates how reported environmental (and IT/S-related) practices relate to environmental motivating forces, organizational strategies, and employees' attitudes, cognitions, and behaviors. Table 3 reports the high-level results of a comparison between the overall environment themes and the IT/S-specific ones for all practices as well as gaps. The number of gap-specific quotes in each area are highlighted to help provide an overview of where employees reported gaps in both environmental and Green IT/S initiatives. Quotes were distributed across participants, with the average number of quotes per participant in the 1 to 4 range. However, there were some exceptions in which the variance in the number of quotes per participant was high for certain themes (standard deviation greater than 2.5). The detailed results of our analysis are discussed next.

 Insert Tables 3 about here

Motivating Forces

In terms of the forces that influence environmental strategies and activities, most participants described organizational forces, and some described regulatory-market and socio-cultural forces (see Table 3). The most common organizational force referenced in both overall environment and IT/S-specific quotes was the influence of top management and cost factors. Regulatory-market forces referenced in both overall environment and IT/S-specific quotes tended to focus on customer demands. Some quotes for the overall environment referenced regulatory forces such as standards, regulations and laws, as well as market forces such as competitors. Most of the quotes that referred to socio-cultural forces were associated with the environment in general rather than Green IT/S. However, one participant did discuss the public image associated with the company's website and community initiatives on the environment. There was very limited mention of ecological forces – some in the overall environment and none that were IT/S-specific – and no mention of technological forces (see Table 4 for illustrative quotes).

 Insert Table 4 about here

In terms of gaps, most of the gaps were associated with the organizational and regulatory-market

forces for both the overall environment and IT/S-specific quotes. The gaps noted by participants tended to relate to the negative pressures that were driving the organization's environmental initiatives, for example:

Oh, well all the pressure. So, this is the thing. So, when you talk about shareholders, it's not really stakeholders – right, so it's the employees that are getting mad, it's the clients that are getting mad, it's the loan insurers that are getting mad, it's other competitors, it's media pressure, it's government, it's, like there's 35 stakeholders that I could name that are putting the pressure on them. (Participant B6)

Other gaps focused on the tendency to view environmental initiatives as too expensive, for example:

Oh, well why is it important – who cares – well obviously the bank doesn't. I think that is, there's a stigma too about being in the financial world because it's true the last thing we think about – I mean the first thing we think about is money, the last thing we think about is anything but. (Participant B6)

However, these gaps may, in turn, put pressure on organizations to act in environmentally responsible ways.

Strategy

For environmental strategies, instances of positive activities in all four strategy types were reported for the environment overall. However, most activities fell into Type 1 strategy – prevent and control – and a few in Type 2 – product stewardship (see Appendix B for definitions). Illustrative quotes for each strategy type are provided in Table 5. Again, for Green IT/S, most activities fell into Type 1 strategies. To help us understand the different kinds of Green IT/S strategies being employed, we created additional codes to distinguish the different types of activities² (see Table 6).

 Insert Tables 5 & 6 about here

These results indicate that, of the Type 1 strategies, most fall into the category of indirect strategies – IT/S applications that support initiatives to reduce the impact on the environment. Further, of these indirect strategies, the two most commonly cited activities for Green IT/S were reducing printing

² Subtypes for Type 2 strategies are not reported here due to the lack of quotes in the transcripts.

and paper use, and sharing environmental knowledge and collecting feedback (see Table 7 for illustrative quotes). Using IT/S, specifically email and the corporate website, to share environmental knowledge and collect feedback were particularly dominant IT/S activities in the transcripts. As Table 6 shows, there were very few gaps identified by employees in this area. Thus, for the organizations examined in this study, employees perceived the primary Green IT/S strategies as using IT/S to communicate, raise awareness, and share knowledge about the environment.

 Insert Table 7 about here

For both the overall environment and IT/S specifically, gaps were identified in the activities associated with the four strategy types, predominantly in the Type 0, 1 and 2 activities. For example, one participant stated:

In terms of the environmental side of things, I think that we could do a better job. 'Cause we've talked a bit about it in the market and the website etc. about what we're doing but I think we could really integrate that better into our business. So if we're serious about reducing paper usage as well as just recycling the paper that we're already using, then do we start to say that we're going to install projectors in all of our meeting rooms so you don't have to hand out things? Do we actively bring our computers to the meeting, most of us have laptops, bring our computers to the meeting with the file instead of paper and whatnot. Do we set targets for divisions? My division should be using 10% less? Yeah, we should be using 10% less this year. And those types of things would, I think, go far to line up what we're talking about to what we're doing internally. (Participant A2)

Since Type 0 strategies inherently reflect a lack of activity, the gaps identified are to be expected.

However, for Type 1 strategies, the implication is that the organizations in this study are not successfully implementing the most basic environmental initiatives. Further, most discussion of Type 2 strategies revolved around the fact that the company was not pursuing them.

We now turn to employee cognitions, behaviors, and attitudes identified in the interview transcripts and how these influence environmental and Green IT/S initiatives in the organization.

Cognitions, Behaviors, and Attitudes

Within the broad topic of employee perceptions, three themes were coded and analyzed: 1) employee cognitions, which include employee knowledge and understanding of the issues regarding the

environment, 2) employee participation, which describes employee behaviors regarding the environment, and 3) employee attitudes, which refers to employee values as well as positive or negative affect regarding environmental issues. All three themes are related and could affect one another. For example, employee attitudes could influence either participation or cognitions.

All three themes had a substantial number of quotes for both overall environment and Green IT/S (see Table 8). Further, for both attitudes and cognitions, there were some participants who contributed a particularly high number of quotes. This suggests that some employees are very engaged in the topic of environmental sustainability. However, the Green IT/S comments in each of the three themes focused on a narrow range of activities in each organization.

 Insert Table 8 about here

Interestingly, employees noted the highest number of gaps in the areas of employee behaviors, cognitions, and attitudes. For example, one participant remarked:

Say we want to reduce paper use but, you know, I'm sitting at my desk over here and I see nothing about the intention of doing other than the recycling bin that we've had for years now. What are we doing to reduce paper usage? (Participant A2)

In general, there were more quotes related to employee cognitions and attitudes than behaviors. In fact, there were half as many participation-related than cognition or attitude quotes. Some of the participation quotes describe individual employees taking the lead to start grass roots activities. However, in these cases, the participants also describe employee resistance and non-compliance with new environmental initiatives. Although there are a high number of attitude-related quotes, suggesting that employees do indeed value the environment, these values are not being translated into behaviors. This is consistent with conclusions in the environmental psychology area described earlier (e.g., Ohtomo & Hirose, 2007), a finding that we will revisit in our future research directions below.

Cross-Case Results

Turning to research question 3, where we proposed that employees of credit unions would focus

more than banks on environmental issues, we found the opposite to be the case (see Table 9). In fact, bank employees provided a total of: 72 quotes related to environmental strategies (49 for credit unions), 43 quotes relating to motivating forces (19 for credit unions), and 109 quotes related to employee cognitions, behaviors, and attitudes (49 for credit unions). Interestingly, though, credit union employees focused more (proportionately) on behaviors, than on cognitions and attitudes (i.e., 14/49, compared with 15/109 for banks). Looking more specifically at IT/S quotes (Table 10), we again see that bank employees mentioned environmental issues more frequently, but that on a proportionate basis, credit union employees mentioned more behaviors (8/20, compared with 7/30 for banks). Also of interest is the discrepancy between banks and credit unions in terms of the ratio of comments pertaining to environmental gaps. Overall, 17.9% of the environment-oriented quotes by bank employees pertained to gaps, compared to only 9.4% of the environment-related quotes by credit union employees. Thus, whereas the bank employees noted environmental issues in their discussions of their organizations' CSR programs far more frequently than credit union employees, the nature of the credit union quotes seems indicative of a more positive, behavior-oriented focus on environmental issues than at the banks.

Insert Tables 9 & 10 about here

DISCUSSION AND CONCLUSIONS

The results from this empirical examination of Green IT/S raise some interesting questions as to employees' perceptions of the current state of practice. Employees are starting to recognize the importance of IT/S as a critical component of their organization's CSR programs in its capacity to contribute to environmental sustainability initiatives. However, a more in-depth look at the nature of the quotes suggests that the current view of Green IT/S held by employees is quite restricted. Specifically, rather than incorporating a broad array of IT/S-related issues into the discussions of their organizations' environmental practices, employees noted only a narrow range of IT/S activities. These activities, related primarily to the areas of communication and knowledge sharing, suggest that many employees simply view Green IT/S in terms of its ability to inform employees about corporate environmental initiatives in a

timely and convenient manner, rather than a diverse group of applications that have numerous cross-functional benefits. These results lend support to Fuchs' (2008) suggestion that facilitating communication, collaboration and increasing awareness may be the areas in which IT/S has the most substantial impact on the environment. In contrast, this narrow focus may also be indicative of a knowledge gap with regards to employees' understanding of the widespread and significant benefits offered by Green IT/S applications. Specifically, the focus on a narrow subset of IT/S initiatives, as described above, suggests that employees may not be aware of the wider array of possible applications of Green IT/S or that the organization, as a whole, lacks a focus on or awareness of Green IT/S practices. Given that Green IT/S applications have the potential to significantly reduce an organization's environmental footprint and enhance environmental strategies, additional research is needed to examine why organizations have failed to incorporate more in-depth Green IT/S practices into their environmental initiatives.

The unexpected results in the cross-case analysis of banks and credit unions reveals another potential explanation as to why employees, particularly those at credit unions, may have a limited focus on Green IT/S in their discussions about CSR. Counter to our expectations, we found that bank employees discussed environmental issues much more frequently than credit union employees. While this may indicate that banks are more focused on the environment as a domain of their CSR program or that these employees are more aware of the initiatives, it may also suggest that there are fundamental differences between bank employees and credit union employees in terms of what activities they consider as part of their CSR programs. Specifically, given that employees were asked to discuss issues related to their organization's CSR programs, it seemed that bank employees included all of the positive activities undertaken by the bank, including legal obligations (e.g., equal opportunities for minorities) whereas credit union employees were more likely to focus on activities going above and beyond regulations (e.g., designing a 'green' branch). Thus, their conceptualizations of what CSR represents appear to be different. Perhaps best capturing this dynamic is this quote from a credit union employee:

You'll have noticed how I've been muttering around with this stuff and I've explained it as: "[CSR] is so built into the way we operate that I have trouble separating it out". That applies directly to the rank and file staff too. Because it's so much a part of what we do, it's just what we do. So, putting it on a more personal basis, you know, you as an individual going out once a week to stack boxes in the food bank or something, it brings it home as to the type of organization you're working for. (Participant D1)

This credit union employee describes how difficult it is to even identify what is part of the CSR program and what is not. Similar sentiments were expressed by many of the credit union employees, suggesting that, because the discussion was restricted to CSR activities, credit union employees may not have commented on equivalent activities to those at the bank because they viewed them as simply part of the way their organizations did business, rather than as part of the CSR program. Similarly, given the nature of their organizations, it is likely that credit union employees have different standards and expectations for their organizations in terms of environmental initiatives. Therefore, a Green IT/S initiative that may be considered worthy of mentioning by a bank employee may not be noted by a credit union employee. It is especially important to consider this dynamic in light of the much higher proportion of behavior-related comments by credit union employees, signaling stronger participation in environmental initiatives, as well as the tendency for bank employees to speak about environmental gaps much more frequently than credit union employees. Thus, while a surface-level look at the results suggests that bank employees are more aware than credit union employees, this may be attributable to their respective views of CSR, what they perceive to be part of the CSR program and which environmental initiatives are deemed noteworthy. Additional research is necessary to examine this potential discrepancy in CSR views and how it may shape employee and organization-level perceptions of environmental initiatives and Green IT/S issues in particular. In doing so, it will help further advance our understanding of whether employees and/or their organizations lack awareness of Green IT/S issues and also to better understand how employees perceive the relationship between certain environmental initiatives and their organizations' CSR programs.

Turning once again to an aggregate assessment of the results, we see a predominant reliance on Green IT/S indirect Type 1 prevent and control strategies (e.g., reducing printing and paper use, sharing environmental knowledge and collecting feedback), which suggests that the organizations are engaging

primarily in incremental environmental changes rather than transformational changes. The prevalence of Type 1 strategic approaches to environmental management practices and Green IT/S raises the issue of whether organizations may be hesitant to pursue more intensive strategies without substantiating the economic and commercial viability of more advanced environmental initiatives. Given the upfront investment required to pursue Type 2 and Type 3 strategies, it seems that organizations may opt to pursue a less resource-intensive Type 1 strategy. However, in light of the fact that this study focuses on employee perceptions of CSR programs, it is also critical to examine whether the apparent prevalence of Type 1 strategies might instead be attributable to a lack of employee knowledge regarding organizational activities at the other levels or, as noted earlier, discrepancies in how certain employees, and organizations, perceive CSR programs. In the first case, additional research is needed to examine the barriers preventing organizations from pursuing more intensive environmental strategies and, in the latter cases, additional research is needed to investigate why organizations are not actively communicating the importance of Green IT/S to employees. Given CSR activities have been shown to enhance employee morale (Peloza & Hassay, 2006) and elevate levels of employee motivation, commitment, loyalty, pride and organizational identification (Berger et al., 2007; Branco & Rodrigues, 2006; Godfrey, 2005), it seems that if organizations are pursuing higher-level environmental strategies, they are missing out on significant opportunities by not communicating the activities to their employees. Further, given the importance of employee buy-in and involvement in environmental initiatives noted in the management literature (Ramus, 2002), additional research is needed to understand the role of employees in determining, both directly and indirectly, the success of Green IT/S applications.

While Type 1 strategies emerged as the most common approach to Green IT/S issues, the frequency with which employees noted gaps and inconsistencies in their organizations' Green IT/S and environmental practices implies that the organizations in this study are ineffective in implementing the most basic environmental initiatives. This is particularly concerning given that the organizations examined are primarily engaged in environmental initiatives that require a low level of commitment. Specifically, the results suggest that organizations, though taking some prevention and control measures

to reduce their organizations' environmental footprints and improve efficiencies, fail to consistently follow through on these measures. Further research is needed to determine whether the failure to follow through on Type 1 strategies is the result of tangible barriers or, rather, attributable to the organization's inability to commit to environmental strategies and fully transition to Type 2 and Type 3 strategies.

The forces driving the organization's involvement in environmental strategies were noted to stem from both internal pressures (i.e., top management, values and beliefs of employees) and external pressures (i.e., regulatory and market forces, socio-cultural). While additional research is needed to determine if certain forces are more effective in driving organizations to implement effective environmental initiatives and the complementary Green IT/S applications, there also appears to be a critical gap in employee knowledge and behaviors with regards to how technological factors may also influence corporate environmental practices. The lack of employee references to technological forces as a key motivator may be because the employees interviewed were, for the most part, not associated with the IT function and did not necessarily possess a lot of knowledge regarding potential technological factors. This also highlights the importance of raising employee awareness regarding the capabilities of IT/S for improving environmental sustainability.

Directions for Future Research

We are left with the question: how can organizations align employees' environmental attitudes, cognitions, and behaviors to impact the environment (as suggested by the last two components of Figure 1)? To determine how they might align, we turn to organizational learning theories. These theories suggest that alignment between attitudes, cognitions and behaviors leads to sustained long-term behavioral changes. For example, organizational learning theories differentiate between learning that involves cognitive development versus behavioral development, also referred to as unreflective change (e.g., Fiol & Lyles, 1985). While some studies suggest that cognitive changes don't necessarily result in behavioral changes (e.g., Fiol & Lyles, 1985), others suggest there is a reciprocal relationship between cognitions and behaviors – cognitive changes can result in behavior changes and vice versa (e.g., Crossan, Lane, & White, 1999). Learning new things starts with cognitive developments at the individual level,

which translate into cognitive and behavior developments at the group level through the creation of new routines (Crossan et al., 1999). These routines then become institutionalized at the organizational level. Thus, the result of the organizational learning process is alignment between cognitions, attitudes, and behaviors. However, a challenge arises when these entrenched routines become unquestioned and, as a result, constrain future cognitive and behavioral developments. This is particularly problematic for environmental issues, where changing entrenched behaviors and mindsets is necessary to promote pro-environmental activities. Therefore, we suggest that researchers draw on organizational learning theories to study how best to align employees' environmental cognitions and attitudes with the behaviors that effectively implement Green IT/S initiatives.

Changing environmental behaviors is especially difficult, but necessary, if organizations want to move from alignment to environmental impacts as diagrammed in Figure 1. Our results suggest that employees had some awareness of the environmental initiatives that their companies were undertaking (or not undertaking) and about environmental issues in general. However, given the relatively limited number of participation-related quotes, it seems that employees are less involved in these activities. Implicit in this result, and consistent with findings in the extant literature (e.g., Ohtomo & Hirose, 2007), is the notion that employee behaviors are not aligned with their beliefs and, perhaps more importantly for organizations, the notion that merely changing attitudes and cognitions will not change behaviors. Further, in relation to IT/S issues more specifically, the focus remained once again on only a narrow subset of IT/S initiatives, which, as noted, seems indicative of a lack of awareness regarding the wider array of possible applications of Green IT/S. Thus, despite some employees seeming very engaged in issues of environmental sustainability, this study suggests that employee knowledge regarding the breadth of Green IT/S applications is quite limited.

This study revealed a potentially critical knowing-doing gap, where knowing-doing gaps refer to discrepancies between knowledge and actions (Pfeffer & Sutton, 1999). These gaps are of critical importance to all organizations and present ongoing challenges with regard to how best to convert "knowledge of what needs to be done" into "action or behavior consistent with that knowledge" (Pfeffer

& Sutton, 1999, p. 4). To enrich our understanding of how to close these gaps, researchers need to look at behavior change theories to stimulate employees' environmental behaviors in organizations. We propose that social marketing is particularly appropriate in this context as it is concerned with creating social change through the application of behavior changing techniques (McKenzie-Mohr, 2000).

Research on "social marketing", or interventions in which "promoters identify the activity to be promoted and the barriers to this activity and then design a strategy to overcome these barriers, using psychological knowledge regarding behavior change" (McKenzie-Mohr, 2000, p. 531), suggest ways in which employees can be motivated to engage in more environmentally sustainable behaviors. This approach draws on research in psychology such as persuasion theory (Cialdini, 1993). It demonstrates that informational campaigns rarely affect behaviors in the short term; in contrast, behavior change occurs when an activity's benefits are increased and barriers are reduced (McKenzie-Mohr, 2000). Social marketing techniques include commitment strategies (Katzew & Wang, 1994), persuasion (Cialdini, 1993), behavior framing strategies (Schultz & Zelezny, 2003) and aligning collective interests with self-interests (Fransson & Garling, 1999). We propose that researchers draw on these strategies to affect real behavioral changes in organizations to help close the knowing-doing gap.

Conclusions

This research offers important contributions to both the management and MIS literatures. While prior studies have examined environmental issues at a broad level and Green IT/S issues at a conceptual level, this empirical study of Green IT/S applies a comprehensive research framework to provide an in-depth look into the current state of practice. Further, given the current gap highlighted by Elliot and Binney (2008) in empirical research on issues of Green IT/S and its capacity to enhance environmental management practices, this study takes a necessary first step towards enriching our understanding of organizational approaches to Green IT/S. However, our study is subject to several limitations: 1) only the individual level of analysis was examined, 2) data were collected from a small number of organizations within one industry, 3) we did not question senior management – business or IT – about planned or existing Green IT/S initiatives, and 4) participants were not asked explicitly to discuss Green IT/S during

the interviews. With regard to the final issue, we believe that our findings are a truer representation of employees' perceptions because no 'leading questions' were asked about Green IT/S. However, framing the interviews under the umbrella of CSR and allowing environmental issues to emerge may have created biases in terms of which environmental initiatives the employees included as part of their organizations' CSR programs. Nevertheless, these limitations suggest additional areas for future research such as developing an instrument to specifically probe the area of Green IT/S within organizations, involving IT and senior management in the discussion of Green IT/S activities, exploring additional levels of analysis such as the group, organizational and technology levels, and examining a wider array of industries and organizations.

By examining the extent to which employees associate issues of Green IT/S as a critical component of their organizations' environmental programs, we highlight a critical gap in organizational knowledge. Specifically, this study suggests that organizations lack awareness and knowledge about (1) the substantial influence of IT/S on the organization's environmental footprint, (2) how Green IT/S can be integrated into their environmental programs, and (3) how to communicate to employees in order to significantly advance their sustainability practices. Without this awareness and the knowledge of how to capitalize on Green IT/S opportunities, organizations will find it challenging to move towards sustainable practices. In taking this initial step towards understanding how, and if, organizations have incorporated issues of Green IT/S into their environmental management practices and, more generally, their CSR agendas, we propose that researchers draw on organizational learning and social marketing theories to help affect this change. Finally, given the narrow view of Green IT/S currently held by employees and the seemingly minimal level of organizational commitment towards supporting environmental strategies with Green IT/S applications, future research should develop a richer understanding of the current barriers, either subjective or objective, that prevent organizations from adopting Green IT/S applications.

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TABLE 1
Overall and IT/S-Specific Environment Quotes

Theme/Code	Number of Participants	Number of Quotes	Number of Pages
Overall Environment	21	165	30
IT/S-Specific Environment	15	58	10
% IT/S	71%	35%	33%

TABLE 2
Gap Quotes – Overall and IT/S-Specific Environment Quotes

Theme/Code	Number of Participants	Number of Quotes	Number of Pages
Overall Environment Gaps	10	45	8
IT/S-Specific Environment Gaps	5	10	2
% IT/S	50%	22%	22%

TABLE 3
Quantity of Quotes – Overall and IT/S-Specific Environment Quotes (including Gaps)

		Environment		IT/S-Specific Environment	
		Number of Participants	Quotes ^a	Number of Participants	Quotes ^a
Strategy					
	Type 0: Image-Oriented Only	4	12 (8)	1	3 (3)
	Type 1: Prevent/Control	18	74 (20)	15	55 (9)
	Type 2: Product Stewardship	13	31 (10)	0	0 (0)
	Type 3: Sustainable Development	3	4 (0)	2	2 (0)
Motivating Forces					
	Ecological	3	6 (0)	0	0 (0)
	Organizational	11	25 (9)	2	4 (1)
	Regulatory-economic	7	17 (5)	3	3 (1)
	Socio-cultural	6	14 (2)	1	1 (0)
	Technological	0	0 (0)	0	0 (0)
Employee Cognitions, Behaviors and Attitudes					
	Employee Cognition	16	68 (21)	9	22 (7)
	Employee Participation	10	29 (9)	6	15 (3)
	Employee Attitudes	16	61 (21)	9	13 (4)

a: Number of quotes concerning current initiatives and perceived environmental gaps (number of quotes highlighting gaps)

TABLE 4
Illustrative Quotes – Motivating Forces: Overall and IT/S-Specific Environment

Force	Overall Environment Quotes	IT/S-Specific Quotes
Organizational	<p>“At this stage of the game, it’s still kind of at a corporate level and it’s filtering down slowly but it’s not filtering down through employee actions, it’s filtering down through corporate actions. So, we’re going to only flights through carbon offset.” (C2)</p>	<p>“Sometimes, when an executive is sponsoring a specific program it would be again communicated by them through email.” (B1)</p> <p>“I know we're trying to move to electronic forms but I get the sense that we're doing that more because it's more convenient” (A2)</p>
Regulatory-Market	<p>“Our focus has been actually very much in a business aspect – so how can we get our suppliers to recycle more? Those kind of things so sort of a strong business element to it. But those are ones which are measurable and they ultimately save us money as well.” (B4)</p>	<p>“And I’m sure too that customers, customers will say I don’t want, why do you send me a statement when I can check it electronically.” (B3)</p>
Socio-Cultural	<p>“One thing is we have, just within society, it’s the interest has increased considerably and so the bank wants to respond both because people are showing an interest and it doesn’t look good if we have no policy that we do.” (B4)</p>	<p>“How do we present ourselves on the web? How does my website that I work with differ from others that I see out there from different credit unions? And, how much do we link it back in terms of our community initiatives?” (D2)</p>
Ecological	<p>“It’s a Green branch and because we’re part of the process of it being planned and built we saw how environmental factors became part of designing the branch and the whole point system; the more Green your building is the higher the points system. So that’s pretty personal to the people who work at this branch, and they’re doing that because of environmental impact and social impact.” (D1)</p>	N/A

TABLE 5
Illustrative Quotes – Strategy: Overall Environment

Strategy Type	Illustrative Quotes
Type 0: Image-Oriented Only	<p>“So, we're telling people these are the things that we're doing and I guess what I'm saying is that from an employee perspective there's, sort of, there's a website and we had an announcement about a year ago saying there's a website and you can read about all these things that we're doing, um, but I'm saying in terms of how my job goes day to day I haven't seen an impact.” (A2)</p> <p>“They felt pressured in a sense that this is probably the worst bank when it comes to it, you know [competitor's name] is light years ahead, [competitor's name] is better and everyone is better. So, there's sort of, I think, trying to catch up and she goes well that's what [competitor's name]'s looks like so that's what we're going to do – and I'm going so what!” (B6)</p>
Type 1: Prevent/Control	<p>“The two that I'm noticing with the new organization is environmental and you know really reducing paper, and doing the carbon offset and, for example, all of our flights are carbon-offset flights. We can't book through, I guess if there's no carbon offset to it, then we're not allowed to book that flight.” (C2)</p> <p>“There's a sign on the water cooler asking people to try to used mugs and glasses rather than Styrofoam cups ...it was signed off as 'Thanks, the Corporate Social Responsibility Team'” (A6)</p>
Type 2: Product Stewardship	<p>“I'm going back to the branches that they're building and they decided to be environmentally friendly. We weren't going to have drive-thru ATMs because of the idling factor, so what we're building instead is a drive-up ATM – where you can park and get out of your car and the ATM's like right there.” (D1)</p> <p>“I think we even have, we might have a new branch that might be LEEDs certified...I think this is LEEDs building I was talking about – this overhang, I'm not an architect, but there's another LEEDs building that this looks very similar to – and this overhang, it casts a shadow onto the windows when the sun is direct so it keeps it cools and to reflect light in when it gets darker and the sun starts to set.” (B2)</p>
Type 3: Sustainable Development	<p>“And, also reacting to what's going on in the environment. If the environment is changing then you need to change your strategy, your processes and getting everybody aligned - your resources. And I think COMPANY B does that very well – they're always scanning the environment, looking for new changes that are happening and reacting, and allocating resources and bringing in consultants. I did some work with some consultants on a project. So we're very proactive here.” (B5)</p>

TABLE 6
Quantity of Quotes – IT/S-Specific Environment Strategies (Including Gaps)

Strategy	Number of Participants	Quotes (Gaps)^a
Type 0: Image-Oriented Only	1	3 (3)
Good intentions	1	3(3)
Bad intentions	0	0
Type 1: Prevent/Control	15	55 (9)
Direct	3	5 (2)
Proper disposal	1	1
Power management	2	2 (2)
Reuse and refurbish	1	3
Indirect	14	51 (8)
Incremental reduction in printing and paper use	6	13 (6)
Incremental introduction of telecommuting to reduce travel	0	0
Incremental use of electronic documents	3	6 (4)
Using IT to share environmental knowledge and feedback	14	38 (2)
IT responsible for managing a portion of environmental initiatives	1	1(1)
Type 2: Product Stewardship	0	0
Type 3: Sustainable Development	2	2
Substitute travel with videoconferencing	1	0
Substitute travel with telepresence and collaboration tools	0	0
Substitute traditional business transactions with E-commerce	1	0
Completely paperless interaction	0	0

a: Number of quotes concerning current initiatives and perceived environmental gaps (number of quotes highlighting gaps)

TABLE 7
Illustrative Quotes – Strategy: IT/S-Specific Environment

Strategy Type	Illustrative Quotes
Type 0: Image-oriented only	“So you know, maybe we're doing it in the branches maybe we have more online forms and fewer paper forms so I'm less aware of the branch side of things but certainly at head office, aside from the recycling bins, I'm not seeing anything different in the last few years, even though we've come out with statements about where we stand on various issues.” (A2)
Type 1: Direct: Proper disposal	“We donate all of our used computer equipment. Instead of all the computers going into landfills and stuff, there's a concerted effort. Two pronged – one is to donate computers for reuse mainly but also to make sure that whatever we dispose of is done in a friendly way.” (A1)
Type 1: Direct: Power management	“And, I wish there was more time because I really think we could do some things here. Small scale things that would make quite a difference - like just making sure computers are turned off at night and just, you know, having some Green initiatives within our own small environment.” (C3)
Type 1: Indirect: Incremental reduction in printing and paper use	<p>“There's been some advice about trying to reduce the paper, and they're going to try – the only printers that will be available will be two-sided. They're going to make some changes to general office supplies that all paper will be recycled – and you don't have a choice about if you prefer general stock – you know this is what you will get whereas that was never the case before – so you can see tangible things on that. The policies are being updated.” (B2)</p> <p>“My understanding is some of our board meetings, they're starting to do either carbon offset to any of the printed materials or they're trying to do without them – like reduce paper. There's a push on things like double siding when you're printing and there's a push on – I would say probably it's in its infancy, I think.” (C2)</p>
Type 1: Indirect: Incremental use of electronic documents	<p>“So, there's stuff like how much do you use electronic documents rather than print things.” (B4)</p> <p>“I know we're trying to move to electronic forms but I get the sense that we're doing that more because it's more convenient.” (A2)</p>
Type 1: Indirect: Using IT to share environmental knowledge and feedback	<p>“So you can see... we participate in the carbon disclosure project, you know keeping track of everything and reducing our energy.” (B2)</p> <p>“We have a website, a link on our corporate website. But for sure on our intranet site we have a link that you can go there and find out what are the different environmentally friendly products that we sell or the different initiatives that are going on within COMPANY B.” (B5)</p>
Type 3: Substitute business transactions with E-commerce	“COMPANY B is looking to be environmentally friendly by introducing biodegradable products that you can buy on their website. It could be anything from little notebooks to gadgets and stuff like that.” (B5)

TABLE 8
Illustrative Quotes – Attitudes, Cognitions, and Behaviors: Overall and IT/S-Specific Environment

Attitude/ Cognition/ Behavior	Overall Environment Quotes	IT/S-Specific Quotes
Employee participation	<p>“Like I have personally, on my floor, decided to take charge, and I have asked that our water bottles be changed because they’re number 7, I have asked that the Styrofoam cups be replaced with non-Styrofoam cups...obviously that’s from the 80s. I’ve asked for the recycling to be more clearly marked. We don’t have a paper recycling in our kitchen and there are two that are like maybe these are cans, maybe these are garbage and then it’s ruined. So I went and tried to change.... So, these are all things I’m doing myself that you don’t see a change happening.” (B6)</p> <p>“Big mandate is to inform, get employees involved, get them acting better or get them to even know what’s going on like you ask anyone here and unless they sit down and read the 6000-page CSR report, like they have no idea, right? ... Like, that’s a big mandate – we’re committed to, you know, getting employees to care about and carpool and all of these things well – I’ve never seen carpooling.” (B6)</p>	<p>“I’m involved...COMPANY A is one the largest contributors of computer equipment in the country. We donate all of our used computer equipment.” (A1)</p> <p>“My involvement, I think would simply be as far in my own workplace to be aware of sort of environmental issues as far as making sure that I don’t print too much paper.” (D7)</p>
Employee cognition	<p>“These are still important to us and while there may be some impact because we’re spending more money – the bank recently bought some Green power which I know - but it was a significant, Green power which is available in several geographical areas, but I know that costs more - so we’re going to spend more because it’s the better thing to do.” (B2)</p>	<p>“In terms of absolutely knowing details about COMPANY A is doing, with the environment...So, for example, my team would know about computers for schools and they are specifically involved with it, they know about the Run for the Cure and annual United Way. But, the thing for those employees who are involved in their day-to-day jobs in terms, you know, doing their CSR part, would be able to articulate that. For example, some of our tech guys who work with PCs would know that the PCs are now donated, but that would be, I think,</p>

Attitude/ Cognition/ Behavior	Overall Environment Quotes	IT/S-Specific Quotes
		<p>the extent.” (A1)</p> <p>“It’s mainly the communication. I’m really finding that it’s definitely the corporate communications – like there are now little bulletins that say ‘consider yourself environment friendly before deciding to print this email’. So, it’s making you more socially conscious as to whether or not you wish to - you know: do you need to print off this email or can you just save it in your Inbox and look at it next time that you go in?” (C2)</p>
Employee attitudes	<p>“We talk about reducing our paper usage I sort of think ok well that’s a good thing to do and we should do that but I mean we should be doing that in our homes and that kind of thing too, right? ...I don’t see it as something that’s really changing the way we do business. I don’t see it as...it’s not a big sacrifice.” (A2)</p> <p>“But environmentally, to be honest, I sort of see us as almost neutral just because we’re talking a bit about it - yes we have recycling bins. But I mean recycling bins are almost like a basic, like I do that at home, right, so it’s sort of a base level and I’m sure we talk about using e-forms as a way of reducing our paper use. I’m not convinced that that’s why we’re doing it. It doesn’t make me dissatisfied about that, you know, but it doesn’t enhance, you know, my views.” (A2)</p>	<p>“You know I’m kind of interested in environmental stuff so you know it’s interesting to see what’s happening with regards to an environmental system, the responsible lending – well, you know, that’s one of our challenge areas and there it is [points to section on intranet page] you know we’re going to talk about it.” (B2)</p>

TABLE 9
Quantity of Quotes – Cross-Case Analysis Overall Environment: Banks vs. Credit Unions

Environmental Framework	Banks		Credit Unions	
	Number of Participants	Quotes ^a	Number of Participants	Quotes ^a
Strategy				
Type 0: Image-Oriented Only	3	10(7)	1	2(1)
Type 1: Prevent/Control	9	44(13)	9	30(7)
Type 2: Product Stewardship	7	15(8)	6	16(2)
Type 3: Sustainable Development	2	3(0)	1	1(0)
Motivating Forces				
Ecological	2	3(0)	1	3(0)
Organizational	8	17(8)	3	8(1)
Regulatory-economic	6	15(5)	1	2(0)
Socio-cultural	3	8(2)	3	6(0)
Technological	0	0	0	0
Employee Cognitions, Behaviors, and Attitudes				
Employee Cognitions	9	51(16)	7	17(5)
Employee Participation	5	15(6)	5	14(3)
Employee Attitudes	9	43(18)	7	18(3)

a: Number of quotes concerning current initiatives and perceived environmental gaps (number of quotes highlighting gaps)

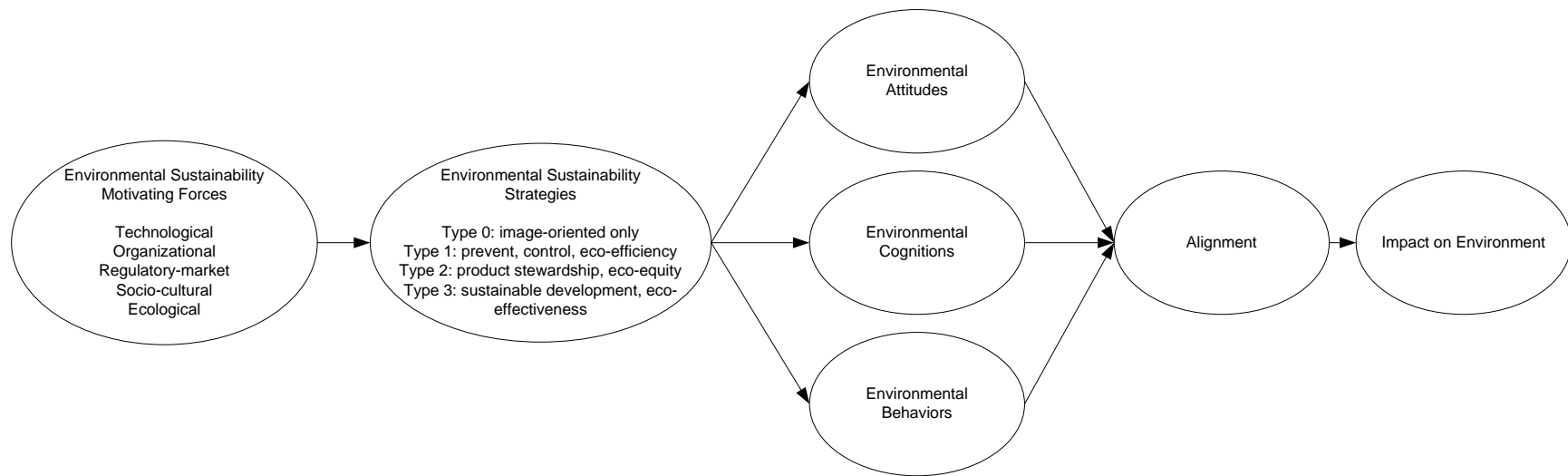
TABLE 10
Quantity of Quotes – Cross-Case Analysis IT/S-Specific Environment: Banks vs. Credit Unions

Environmental Framework		Banks		Credit Unions	
		Number of Participants	Quotes (Gaps) ^a	Number of Participants	Quotes (Gaps) ^a
Strategy	Type 0: Image-Oriented Only	1	3(3)	0	0
	Good intentions	1	3(3)	0	0
	Bad intentions	0	0	0	0
	Type 1: Prevent/Control	7	34(7)	8	21(2)
	Direct	1	3(0)	2	2(2)
	Proper disposal	1	1(0)	0	0
	Power management	0	0	2	2(2)
	Reuse and refurbish	1	3(0)	0	0
	Indirect	7	31(7)	7	20(1)
	Incremental reduction in printing and paper use	4	8(5)	2	5(1)
	Incremental introduction of telecommuting to reduce travel	0	0	0	0
	Incremental use of electronic documents	2	5(4)	1	1(0)
	Using IT to share environmental knowledge and feedback	7	23(2)	7	15(0)
	IT responsible for managing a portion of environmental initiatives	1	1(1)	0	0
	Type 2: Product Stewardship	0	0	0	0
	Type 3: Sustainable Development	1	1(0)	1	1(0)
	Substitute travel with videoconferencing	0	0	1	1(0)
	Substitute travel with telepresence and collaboration tools	0	0	0	0
	Substitute traditional business transactions with E-commerce	1	1(0)	0	0
	Completely paperless interaction	0	0	0	0
	Motivating Forces	Ecological	0	0	0
Organizational		2	4(1)	0	0
Regulatory-economic		1	1(1)	1	1(0)
Socio-cultural		0	0	1	1(0)

Environmental Framework		Banks		Credit Unions	
		Number of Participants	Quotes (Gaps)^a	Number of Participants	Quotes (Gaps)^a
	Technological	0	0	0	0
Employee	Employee Cognitions	5	14(5)	4	8(2)
	Employee Participation	3	7(2)	3	8(1)
	Employee Attitudes	5	9(3)	4	4(1)

a: Number of quotes concerning current initiatives and perceived environmental gaps (number of quotes highlighting gaps)

FIGURE 1
Green IT/S Research Framework^a



a: adapted from Jenkin et al. (2009)

APPENDIX A

Interview Protocol

The interviews were largely unstructured, allowing the participant to determine the flow of the discussion so that key topics could emerge. The discussions began with casual questions to build rapport followed by a grand tour question to frame the discussion. The interviews were steered in large part by the participant's initial responses and simple probing questions were used throughout the discussion to guide the flow of the conversation and delve into certain responses that seemed to touch on interesting and important points.

Introduction

- Standard opening conversation: introductions, general purpose of the study, how are you, nice weather, etc.
- Explain the process: present letter of information, consent form, reiterate that the interview would be recorded, emphasize discussion-based interview style.

Grand tour question (to begin the discussion and frame the interview):

- How important is CSR to your organization?

Critical questions:

Authenticity-focused:

- Would you mind comparing, in your view, a successful versus an unsuccessful CSR initiative?
- Do you feel that your organization's CSR programs are authentic? Why or why not?
- Do you think authenticity is important in developing successful CSR programs? Why or why not?
- How do you feel about your organization's CSR programs?

Outcome-focused:

- How does your perception of CSR authenticity influence your view of the organization?
- What does it mean to be part of an organization who engages in CSR activities?
- What do you believe motivates your firm's involvement in CSR?
- What does it mean to be associated with [insert organization name]

Final Question

- Do you believe that the views you've expressed today are representative of those held by other employees in this organization? Why or why not?

Prompts

- Could you please tell me more about that?
- So what I hear you saying is....?
- What are some of the reasons that make you believe this?
- Could you provide an example of...?
- What stands out in your mind on this topic?

APPENDIX B

TABLE B1
Code Definitions: Overall and IT/S-Specific Environment Codes

Parent code	Child code	Description
1.1 Strategy		Includes 4 types of environmental strategies, ranging in degree of impact on the environment and amount of change required.
	1.1.1 Type 0: Image-oriented only	Portraying an image of caring about the environment by publicly announcing environmental policies, yet not implementing or carrying out these policies. Explicitly mention that they do not perform the activities.
		1.1.1.1 Type 0: Good intentions: organization intends on implementing, but currently doesn't have the resources or ability to implement.
		1.1.1.2 Type 0: Bad intentions: organization has no intention of implementing. Only wants to provide image of caring about the environment, but take no action.
	1.1.2 Type 1: Prevent/control	Mechanisms to capture and properly dispose of waste to minimize harm, mechanisms to prevent/reduce waste, or mechanisms to make more efficient use of natural resources.
		1.1.1.1 Direct
		1.1.1.1.1 Proper disposal: reducing waste by properly disposing of obsolete computer equipment
		1.1.1.1.2 Power management: reducing power consumption by purchasing energy efficient servers, powering off PC's, and consolidating servers using virtualization technology.
		1.1.1.1.3 Reuse and refurbish: reducing waste by upgrading components, refurbishing computers, and recycling computer components.
		1.1.1.2 Indirect
		1.1.1.2.1 Incremental reduction in printing and paper use
		1.1.1.2.2 Incremental introduction of telecommuting to reduce travel
		1.1.1.2.3 Incremental use of electronic documents
		1.1.1.2.4 Using IT to share environmental knowledge/feedback
		1.1.1.2.5 IT responsible for managing a portion of environmental initiatives
	1.1.3 Type 2: Product stewardship	Minimization of product's environmental impacts through redesign of production (or service provision) processes or the product or service itself. Looks at impact throughout the product's lifecycle (raw material utilization, design, production, packaging and distribution, disposal). Embodiment of environmental sustainability in the product or service itself. Includes "green buildings", which are part of the production process or service provision.
	1.1.4 Type 3: Sustainable development	Minimization of the firm's global environmental impact from its economic growth and activities. Goal of zero waste and emissions. Completely redesign/restructure how organization does things in relation to the environment. Also referred to as clean technology.
		1.1.3.1 Substitute travel with videoconferencing

		1.1.3.2 Substitute travel with telepresence and collaboration tools
		1.1.3.3 Substitute business transactions with E-commerce
		1.1.3.4 Completely paperless interactions
1.2 Motivating Forces		Motivating forces that influence the choice of environmental strategy.
	1.2.1 Technological	Technological capabilities/innovations influence the degree to which organizations can implement Green technologies.
	1.2.2 Organization	Power of internal stakeholders (including employees), leadership, structure, policies, financial considerations and their influence on environmental strategy.
	1.2.3 Regulatory- market	Standards, fulfilling requirements/requests of customers, market (competition), and regulatory pressures, influence the degree to which organizations will want to implement Green technologies.
	1.2.4 Socio- cultural	Values, beliefs, worldviews, and trends in society related to the environment, the influence of media as well as organizations' need for social legitimacy.
	1.2.5 Ecological	Current resource levels, consumption rates and level of degradation, all of which affect the choice of environmental strategy.
1.3 Employee Cognitions/ Behaviors/ Attitudes		Employee level cognitions (how they think), behaviors (how they act) and attitudes (emotions, affect) environment.
	1.3.1 Employee participation	Employee behaviors regarding the environment: participation in environmental initiatives in the organization.
	1.3.2 Employee cognition	Employee cognition regarding the environment: understanding and awareness of the environmental issues and initiatives. Evidence of this is explaining/describing a specific issue or initiative.
	1.3.3 Employee attitude	Employee values regarding the environment: positive or negative affect explicit in the quote. Keywords include values, appeals, embraced, significant, important etc.