ORGANIZATIONAL SELF-RENEWAL: THE ROLE OF GREEN IS IN DEVELOPING ECO-EFFECTIVENESS

Completed Research Paper

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Abstract

Recent research has acknowledged the key role of information systems (IS) in helping build sustainable organizations. Although many organizations have implemented strategies for increased sustainability, empirical evidence for the effects of such strategies is sparse, and the understanding of the underlying processes to reach eco-effectiveness is limited. We draw upon the competing values framework and a longitudinal study of Nordea, a large Nordic bank, to develop a theoretical model that explains the processes through which an organization passes as to successfully institutionalize a sustainable work environment, and the role of Green IS in this process. Three main findings emerge: First, the transformation towards eco-effectiveness can be understood as an incremental process, involving a number of actions over a long time period. Second, Green IS initiatives cannot be studied in isolation from other sustainable initiatives, since they are re-enforcing each other. Third, Green IS initiatives can act as ‘motors’ towards eco-effectiveness, in bridging competing models of organizational effectiveness.

Keywords: Green IS, Green IT, eco-effectiveness, sustainability, competing values
Introduction

The significance of sustainability is now widely acknowledged. Today, an organization’s ability to create an ecologically sustainable business is recognized not only as a defensive mechanism to retain legitimacy, but also as a core strategy and ongoing lifelong task (Chen, Boudreau and Watson 2008; Marcus and Fremeth 2009; Porter and Kramer 2006). A recent survey of 1,000 CEOs for the United Nations Global Compact, reports that an overwhelming 93% of CEOs considered environmental sustainability as critical to the future success of their business, while 96% believed that sustainability should be engrained in the strategy and operations of their organization (Accenture 2010, p. 12).

In spite of the fact that the adoption of Green IS and sustainability projects appears to be on the increase (Chen et al. 2008; Symantec 2009) only 30% of companies report having actually implemented a “Green IS” strategy (Symantec 2009). Part of the challenge is that Green IS initiatives often has been driven by shortsighted efficiency goals (Corbett 2010; Molla, Cooper and Pittayachawan 2009), including reducing power consumption and cooling costs (Corbett 2010; Pretorius, Ghassemian and Ierotheou 2010).

Past research has asserted that organizational sustainability requires change and innovation, and that the outcome is expected to have economic, social, and environmental impact (Ambec and Lanoie, 2008; Marcus and Fremeth, 2009). Ecological sustainable organizations require a level of balance among these realms. Such balance is, however, not easily accomplished. Consistent with a dialectic view of the organization (Benson 1977; Seo and Creed 2002), organizations need to navigate between and make progress among different initiatives related to environmental pressure, IT costs, stakeholder acceptance, and management directives as to become (or remain) effective and increase their sustainability. To mount high aspirations, an organization may ultimately need to go through a process of self-renewal whereby both the members and external constituents need to embrace the sustainability goals.

Whereas literature is replete with variance based studies of whether the economic benefits of becoming environmentally sustainable outweighs the costs incurred (Ambec and Lanoie 2008; Pfeffer 2010), green management (Marcus and Fremeth 2009), cost management (Ambec and Lanoie 2008), stakeholder involvement (Sharma and Henriques 2005) and institutional factors related to change initiatives (Chen et al. 2008), there is a dearth of process research in examining the evolution that surrounds an organization’s sustainability process (Young and Tilley 2006), and how sustainability may become an integral part of any organization’s agenda (Shrivastava 1995). Against this backdrop, we address the following research questions:

- **What is the process by which a firm changes as to reach eco-effectiveness?**
- **How does green IS initiatives form part of an eco-effectiveness process?**

Following Chen et al. (2008) and Starik & Rands (1995) eco-effectiveness refers to a firm’s ability to exist and thrive to ensure long-term ecological viability (see the theoretical section for an explanation on the relationship between eco-effectiveness, eco-efficiency and eco-equity). The eco-effectiveness process is the process in which the organization re-invents itself as an eco-effective organization. To understand the eco-effectiveness process, we ground the work in the competing values framework (CVF) (Quinn and Cameron 1983; Quinn and Rohrbaugh 1981; Quinn and Rohrbaugh 1983) and the Green IS literature (Chen et al. 2008; Melville 2010; Molla et al. 2009; Watson, Boudreau and Chen 2010). We adapt and extend the theoretical base, to theorize about the underlying dynamic processes of eco-effectiveness.

Three main findings emerge from this study. *First*, the transformation towards eco-effectiveness can be understood as a continuous progression where the view of ecological sustainability (including Green IS initiatives) is transformed from organizational means to ends. *Second*, to understand the role of Green IS in this progression, Green IS initiatives cannot be studied in isolation from other green initiatives. In the Nordea case Green IS forms part of a greening spiral, that progress between competing effectiveness models. Thus, green IS initiatives build on and trigger greening initiatives with no difference made between Green IS and Green non-IS initiatives. *Third*, Green IS initiatives can act as ‘motors’ in the progression towards eco-effectiveness, in bridging competing models of organizational effectiveness through commonalities between the models of organizational effectiveness.
Theoretical background

Paralleling an increasing interest in environmental sustainability from practitioners, the IS discipline has lately experienced a surge in research on sustainability aspects on information technology (IT) and IS (Watson et al. 2010). Yet, research on how organizations adopt Green IS is sparse.

The exceptions include research on understanding the factors that influence the initiation of Green IS initiatives (Kuo and Dick 2010; Molla et al. 2009). Also the implementation process of Green IS and IT initiatives has received attention. For example, Sarkar and Young (2009) found that the existence of an effective cost model and awareness programs surrounding Green IT initiatives would influence managerial attitudes towards Green IS. Kim and Ko (2010) used financial and environmental indicators to identify Green IS leaders versus followers. They examined the influence of management, bottom line considerations, and normative legitimation pressures on the extent of Green IS initiatives in organizations. Similarly, Schmidt et al. (2010) studied the predictors of Green IT adoption, such as corporate management, environmental engagement and initiatives from IT staff. Recently, Butler (2011) studied how institutional imperatives influence the adoption of Green IS initiatives.

In this stream of research, the choice in wording between Green IT (Bose and Luo 2011; Dedrick 2010) and Green IS (Chen et al. 2008) has, roughly divided, come to denote a perspective stance in whether the technology itself is the focal point of research, or whether the technology is seen as a mean to enable the organization to operate more environmentally sustainable. Green IT, in general, relates to the designing, manufacturing, using and disposing of computer, servers and associated sub-systems efficiently and effectively with minimal impact on the environment (Bose and Luo 2011; Dedrick 2010). In this research we regard IS as an integrated component of organizational operations, thus we adopt the term Green IS, as defined by Watson et al. (2010, p. 24): “concerned with analyzing, designing, and implementing systems to increase the efficiency of energy demand and supply systems.”

Green IS and Ecological Sustainability

While many organizations are generally positive towards the role of ecological sustainability in their business, the practical connotation of the standpoint varies. For some, sustainability refers to a defensive mechanism to retain legitimacy. That is, to continue business in much the same way as before, but ensuring the efficient use of resources in the operations as to not to be perceived wasteful. By adopting eco-efficiency (Chen et al. 2008; Marcus and Fremeth 2009) the organization is tuned to use a minimum of resources, having a positive impact on both ecological footprint and balance sheet, as resources generally are costly to consume (Hedman and Henningsson 2010). Others focus on the fair distribution of natural resources between current and future generations. These initiatives are referred to as eco-equity and is driven by the concern for social legitimacy (Chen et al. 2008). A third type of ecological sustainability is eco-effectiveness. Eco-effectiveness involves ways to fundamentally redesign the economy and embrace sustainability, restoration and regeneration as core organizational values. Thus, eco-effectiveness “…aims beyond merely reducing negative environmental impact by ending ecological degradation. Seeking an ultimate solution for ecological problems, eco-effectiveness oftentimes requires a shift of mindset and transformation of business models.” (Chen et al. 2008 p. 188)

The notion of Green IS as a mean for creating eco-effectiveness has been acknowledged in recent information systems literature (Bengtsson and Ågerfalk 2011; Butler 2011; Watson et al. 2010). Green IS includes information systems that are used to support an organization to become and remain environmentally sustainable. As such Green IS may involve the transformation of existing IT based platforms, business models and overall firm strategies (Butler 2011). Butler (2011) suggests that Green IS initiatives are framed by three main activities – sensemaking (interpretation), decision taking and knowledge creation.

Examples of organizations embracing an eco-effectiveness strategy are rare. One reason for this is the organization’s ability to incorporate and take advantage from these technologies that held back the adoption of Green IT (Molla et al. 2009). This conclusion is in line with previous studies on organizational greening processes illustrating the problems associated by activating and orchestrating of a range of stakeholders, public and private, in shaping green organizational strategies (Carraher, Buckley and Carraher 2008).
Current research present high-level frameworks (Melville 2010) for the role of Green IS, while others provide theoretically informed empirical studies on several aspects of either Green IT (Bengtsson and Ågerfalk 2011; Molla et al. 2009), or Green IS (Watson et al. 2010), or both (Butler 2011). However, in their attempts to understand the specific role of Green IT or IS, these works present a reductionist tendency that downplays the embeddedness of IS as an integrated part of organizational greening process. In organizations seeking eco-efficiency the role of IS is in the streamlining of business processes. IS hold the potential of enabling resource optimization, by, for example, better planning of production processes, scheduling of operations, administrative processes, and planning of transportation routes. IS can also add to the efficiency work by providing information of the consumption pattern and resource waste, thus assisting in the direction of streamlining work (Chen et al. 2008; Hedman and Henningsson 2010). The role of IS in the process towards eco-effectiveness lies in the transformational potential of IS. In information-intensive settings, IS are deeply embedded into the business processes and practices, making it oftentimes hard to even distinguish between the IS itself and its environment (Sawy 2003).

A conceptual model of green IS effectiveness

Shrivastava (1995) suggested that if goals of sustainability are to be achieved, organizations must be radically reformed and redesigned to minimize their ecological impacts. However, the notion of radical change has had limited success (Davenport and Stoddard 1994). Today, the enthusiasm for green management is growing, and corporations are increasingly moving past government regulation as to become environmentally responsive (Marcus and Fremeth 2009). It has been suggested that the cornerstone of sustainable development involves economic, societal and environmental aspects. Thus, sustainability, as suggested by Shrivastava (1995, p. 955) “…must be integrated into the logic of corporations and sustainability should become an integral aspect of any corporation's effectiveness.”

Organizational eco-effectiveness

Following Shrivastava (1995) the theoretical logic for understanding the processes behind ecological sustainability may thus be found in the organizational effectiveness literature. Organizational effectiveness is an important theoretical concept especially since the introduction of contingency theory (Galbraith 1973; Lawrence and Lorsch 1967; Thompson 1967). Traditionally, organizational effectiveness was defined as meeting or surpassing organizational goals (Bedeian 1987), despite criticisms (Hall 1980) that organizations have multiple goals (Cameron 1981) and that effectiveness criteria are ambiguous (Meyer, 1985). Alternative approaches to organizational effectiveness have emerged to deal with both these problems and others, for example the resource dependency approach (Pfeffer and Salancik 1978), the internal process approach (Ostroff and Schmitt 1993), and the stakeholder approach (Tsui 1990). Despite these efforts, it is still difficult and potentially controversial to quantify organizational effectiveness (Cameron and Whetten 1983).

The CVF emerged as a response to the debate on organizational effectiveness (Campbell 1977) and in the early 80’s Quinn and Rohrbaugh (1981) began to synthesis organizational theorist perception regarding the construct of organizational effectiveness. They suggested that, “...organizational effectiveness is a value-based judgment about the performance of an organization”. In consequence, organizational effectiveness can only be understood by recognizing that there are competing views that define effectiveness differently. Put shortly CVF includes three theoretical underpinnings of organizations (Quinn and Rohrbaugh 1983). First, CVF views organizations as purposeful systems that exist to achieve certain goals or ends. Second, CVF incorporates the existence of simultaneously and conflicting goals, which an organization must balance in order to be effective and efficient. Third, CVF is based on the hypothesis that there is a tension between existing underlying value dimensions in organizations, including focus (internal versus external), structure (flexibility versus stability), and means versus ends. Based on the two first value dimensions, four organizational effectiveness models emerge, each with unique settings of means and ends.

- The human relations model focuses on internal flexibility to develop employee cohesion and morale. It stresses human resource development, participation, empowerment, team-building, trust building, conflict management, support, internal communication, developing individual plans, feedback to individuals and groups, and developing management skills.
- The open systems model focuses on external flexibility and suggests readiness and flexibility as the
reason by which growth may be achieved. Important issues in the open systems model include the acquisition of scarce resources, the support of interaction with the external environment, the identification of major trends, facilitation of changes, dedication to research and development, and influence the environment.

- The internal process model stresses internal stability and communication to develop stability and control. Focus are on enhancing the understanding of business activities, ensuring that standards, goals, and rules are met, maintaining organizational structure, coordinating activities, and collecting and distributing information internally.

- The rational goal model is characterized by a focus on external control and relies upon planning and goal setting to gain productivity. This involves formulating goals, problem identification, evaluation of alternatives, creation of rules and policies, evaluation of performance, and quality control, motivation of organizational members to enhance productivity and maximization of profit.

Figure 1 represents our conceptualization of the mechanism through which ecological effectiveness is shaped. Green IS forms part of the four value models as means and ends. That is, a Green IS projects can be the mean to achieve the end objectives of, for example, increased profitability (Rational Goals model), business innovations (Open Systems model), more communication (Internal Process model) or employee moral (Human Resource Model). However, Green IS can also be seen as an end in itself, forming an institutionally accepted position as something worth striving for.

While the initial research concerning the CVF aimed to clarify the organizational effectiveness construct (Quinn and Rohrbaugh 1981; Quinn and Rohrbaugh 1983) later work by Quinn and Cameron (1983) explored how competing values could explain an organizations life cycle. The underlying idea is that the perception of organizational effectiveness is not static, but rather evolves along four stages:

(1) Entrepreneurial stage - characterized by knowledge exploration, creativity and innovation
(2) Collectivity stage - characterized by communication and the formation of work teams
(3) Formalization and control - stage characterized by planning, productivity and stability
(4) Elaboration of structure stage - focusing recourse acquisition and growth

Importantly, the four effectiveness models are not equally prominent during an organizational life cycle (Quinn and Cameron 1983), as shown in Figure 2. During the Entrepreneurial stage, the Open Systems model is most prominent. Moving towards a Collectivity stage, the Rational Goal model and, in particular, the Human Resource model gains importance. In the Formalization and control stage both the Internal Process and Rational Goal model becomes important. During the Elaboration of structure stage also the
Open Systems model become prominent. Quinn and Cameron (1983) suggested that organizations must adapt the primary criteria of effectiveness in order to survive. Translated into the organizational reinvention towards eco-effectiveness, it is a relevant point of inquiry if the same pattern can be seen in the organizational greening process.

In line with Quinn and Rohrbaugh (1981), our view of eco-effectiveness is a value-based judgment of the performance of an organization. It is a judgment based on ecological sustainability. By drawing on CVF, we define an organization’s eco-effectiveness as the extent that the four competing value models operate towards ends of ecological sustainability. Conversely, a situation where the organization operates by means of ecological sustainability but without the ends of ecological sustainability would be an eco-efficient organization. Note, this definition does not imply that ecological sustainability cannot be part of an eco-effective organization. By contrary, it is hard to imagine an eco-effective organization that does not make use of initiatives related to ecological sustainability to arrive to ends of ecological sustainability. Thus, we apply the four stages of evolution as to elaborate on the process of ecological sustainability. We deviate from the original use of CVF in that the process we study is not the process of inventing an organization, but the process of re-inventing an organization.

The dialectic view (Benson 1977) of the four competing value models implies that changes in the value models will occur over time. The four value models do not exist in isolation from each other. By contrary,
Quinn and Rohrbaugh (1981) note that there is a temporal dimension to organizational effectiveness, as the four value models are continuously adapting to each other. In consequence, organizational effectiveness is not a static, but dynamic construct. This extended use of the CVF framework has previously been found relevant to explain changes in organizational in a diverse set of areas, including organizational culture, agility, and innovation potential (Cameron and Quinn 2011) it has also been applied to understand management information systems (Cooper and Quinn 1993) and innovation ecosystems (Selander, Henfridsson and Svahn 2010).

Method

This research is designed as a structured case study (Carroll and Swatman 2000) with the intention to identify “patterned regularities over time” (Markus and Robey 1988). Thus, we collected qualitative process data (Langley 1999) to reveal Nordea’s process of reinvention as to become eco-effective. The ensuing narrative is based on interviews and documentation following Carroll and Swatman’s (2000) recommendations for structured case studies.

Put shortly, the essence of the structured case study approach is an iterative research cycle upon a formal theoretical framework (Carroll and Swatman 2000). The structured case approach is an interpretative approach that has its major strength in sensemaking of complex and rich empirical settings, as multiple perspectives can be accumulated in a process towards theoretical saturation. The approach has been found applicable in a variety of IS studies, addressing phenomena including e-government systems (Grimsley and Meehan 2007), environmental management (Claver et al 2007), and IS integration in mergers and acquisitions (Henningsson and Carlsson 2011), to refine explanatory accounts of complex and multifaceted development processes.

The Nordea case presented here is not a case of a company re-inventing itself as an eco-effective in its purest sense. That is, by the end of our study the company does not exist solely to improve the environment. However, the case is a story of a company that has transformed into a substantially higher degree of recognizing ecological sustainability as the end objectives of the organization. It represents a substantial change in organizational eco-effectiveness, as defined in the literature review above, that enabled us to study how the transformation towards eco-effectiveness proceeds, and the role of IS in the transformation.

Data Collection and Analysis

We used two main sources of data to trace Nordea’s efforts to transform into a more sustainable organization (1) interviews with key informants and (2) internal documentation. Our data collection and analysis consisted of three steps; data collection, data structuration, and data visualization.

Step 1: Data Collection

The initial interviews were based on a broad framework, including strategic, organizational, managerial, and technological aspects related to Green IS. The ambition was to identify relevant initial conditions, states, events, and transformations necessary to capture Nordea’s Green IS development process (Van de Ven 1992). The eighteen interviews (Table 1) started in March 2010 with the Green IT manager to get an overview of the development process. The interviews then followed a snowball approach and covered retrospectively a time frame of ten years.

After initial interviews, it was jointly decided together with Nordea representatives on how to expand the study. The interviews lasted on average 60 minutes, and as illustrated in Table 1, the respondents ranged from the CIO to the line and IT executives at senior and middle level management. Interviews were wide-ranging and conversational to facilitate the collection of information. It is worth noting that Nordea had one requirement on the collaboration and data gathering phases, namely that the interviews did not contribute to the CO₂ emissions. Consequently, we did most of the interviews over the phone, except for those that were local to the interviewers. All interviews were recorded and transcribed.

External and internal documentation, including annual reports from 2005-2010, CSR reports from 2009-2010, projects plans for Green IS projects, workshop documentation, project proposals, and return on investments-analyses, were used to complement the interviews and to triangulate research findings.
Table 1. Interviews

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/role</th>
<th>Interview date</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dennis Jönsson</td>
<td>Green IT manager and project manager</td>
<td>2010-03-19</td>
<td>Face-to-face</td>
</tr>
<tr>
<td></td>
<td>for Live meeting</td>
<td>2010-05-19</td>
<td>Face-to-face</td>
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<tr>
<td></td>
<td></td>
<td>2010-08-09</td>
<td>Phone</td>
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<td></td>
<td></td>
<td>2010-10-08</td>
<td>Face-to-face</td>
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<tr>
<td></td>
<td></td>
<td>2012-04-20</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>Erika A Andersson</td>
<td>Project co-worker, Video conferencing</td>
<td>2010-07-01</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>Tim Gilbert</td>
<td>Active user and idea creator</td>
<td>2010-07-01</td>
<td>Phone</td>
</tr>
<tr>
<td>Rikke Højland</td>
<td>Project co-worker, conferencing</td>
<td>2010-07-14</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>Susann Remnert</td>
<td>Group IT Communication</td>
<td>2010-07-22</td>
<td>Phone</td>
</tr>
<tr>
<td>Liisa Jauert</td>
<td>CSR manager</td>
<td>2010-09-07</td>
<td>Live meeting</td>
</tr>
<tr>
<td>Juha Olkinuora</td>
<td>Premises manager and Ecological footprint manager</td>
<td>2010-09-07</td>
<td>Phone</td>
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<tr>
<td></td>
<td></td>
<td>2010-10-25</td>
<td></td>
</tr>
<tr>
<td>Tobias Edström</td>
<td>Project leader of Power off</td>
<td>2010-09-14</td>
<td>Phone</td>
</tr>
<tr>
<td>Jackline Casselgård</td>
<td>IT developer of Power off</td>
<td>2010-09-14</td>
<td>Phone</td>
</tr>
<tr>
<td>Patrik Felixson</td>
<td>Chairman Green IT committee</td>
<td>2010-09-14</td>
<td>Phone</td>
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<tr>
<td>Ylva Andersson</td>
<td>Group IT Communication</td>
<td>2010-09-20</td>
<td>Phone</td>
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<tr>
<td>Tapio Saarelainen</td>
<td>CIO</td>
<td>2011-02-25</td>
<td>Phone</td>
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<tr>
<td>Tone Lauritzen</td>
<td>Eco-Footprint manager</td>
<td>2012-04-20</td>
<td>Face-to-face</td>
</tr>
</tbody>
</table>

Step 2: Data structuration –Coding and Clustering

Coding was made by themes in passages. First-phase coding of interviews essentially followed the approach for descriptive coding described by Saldana (2009). Inspired by Strauss and Corbin (1994) a technique similar to systematic categorization was employed, with a priori categories based on previous literature. The categories included the four value models of organizational effectiveness derived from the competing values framework. Second phase coding was made by events and states, representing the combination of coding categories. Following protocols based on Saldana (2009) the initial coding process was conducted by the first two authors of this paper. The third author of this paper was able to review and comment upon the list of coding categories. The categorization of passages was made using constant comparison to passages already coded with the same categorization.

Step 3: Visualization

In analyzing the categorization of the codes, we began by constructing a timeline as to visualize major events and decisions. By conducting a cross-stakeholder analysis to sensitize multiple interpretations (Klein and Myers 1999) we were able to compare and reflect upon the codes related to each value model. After discussing the coding scheme within the research team, we compared the empirical findings from our interviews with internal documents such as presentations and annual reports as to confirm and disconfirm our findings. Finally, pooling our different data sources, we used our competing values lens to yield four episodes of Nordea’s transition towards eco-effectiveness; (1) the entrepreneurial stage (2) the collectivity stage, (3) the formalization and control stage, and last, (4) the elaboration stage.

Nordea’s transition towards eco-effectiveness

With its 11 million customers, 33,809 employees and 1,400 branch offices in 2010, Nordea is one of the largest financial institutions in the northern part of Europe. Despite the crisis in the financial sector,
Nordea remains on the Fortune 500 list. The bank is in good financial condition, indicated by an operative profit of just above €3.6 billion during 2010. However, only two decades ago, the banks that today make up Nordea were bleeding financial units fighting for their survival. In the early 1990’s the Nordic countries experienced a profound financial crisis that challenged the existence of many financial institutions. In the wake of the crisis, four Nordic banks Merita Bank (Finland), Nordbanken (Sweden), Unibank (Denmark), and Christiania Bank og Kreditkasse (Norway) merged and joined under the label Nordea. In the first few years after the merger, the bank had a strong focus on implementing economies of scale enabled by the merger, and restoring profitability. Lars G. Nordström, Nordea’s first CEO, managed the company by the keywords of “focus”, “speed”, and “performance”. In this early stage, Nordea had limited room for initiatives with an ecological sustainability focus.

In the following we will present Nordea’s transition towards a more eco-effective organization based on our theoretical framework. We start with the four stages of the eco-effectiveness process, and then turn to how the transition led to ecological sustainability forming part of the ends in the effectiveness models.

1997-2006 Entrepreneurial stage

During this time period, individuals searched to launch initiatives that aimed to improve Nordea’s impact on the environment. The first example of IS being used to decrease the company’s total environmental impact was when the premises manager used IS to optimize the use of office space. About the same time, in Sweden, another initiative was taken to reduce power consumption; in this case in the server halls by server virtualization. A third example comes from the British subsidiary. Upgrading the CPUs (central processing unit) in the server park decreasing power consumption by 30%.

Common for these initiatives was how they were motivated in economic terms, as a consequence of reducing resource consumption. However, it was not a coincidence that the initiatives emerged where they did. In all places, specific individuals can be tied to these early initiatives. These individuals were driven both by an organizational economic rationality, but primarily by a personal desire to do what they could do to reduce Nordea’s ecologic impact.

“I got involved in the Green project for the London branch because people where aware of my interest, my knowledge and so on. [...] My knowledge about sustainability is based on life experience; both from work and elsewhere. You can’t remove someone’s personal background from their work or vice versa so ... my Green knowledge is based on my personal life. I wonder if I was asked because I have probably the “greenest” house of anyone working here. I have solar panels for hot water, solar panels for electricity and heat recovery ventilation system... that’s not what you normally find in a UK house. [...]” (TG)

“When it comes to Green IT, it was more or less Dennis who was driving this initially. He was inspired of new thinking and started to look at how we in IT could use Green IT. When he came to me, we went through his ideas in this area. He made a very good presentation and was able to link actions to CSR and our role on the globe and the impact we have on the environment.” (TS)

Nordea’s early initiatives can be associated with these ‘entrepreneurs’ and their personal interest in ecological sustainability. In the area of premises management, the work continued with both operational performance and environmental impact as goals. The premises manager explains:

“We [in premises] were thinking about the environment and sustainability well before the latest boom... For instance, in 2002 we participated in the global sustainability congress in Oslo. ... We’ve also been part of establishing the ‘Green building counsel of Finland’, which I am chairing... These counsels are channels we’re using for networking. Not only gathering information, but also sharing our information... we want take our story to other companies.” (JO)

In contradiction to the personal interests in ecological sustainability, on the organizational level, these early initiatives were only valued in terms of financial savings – not environmental impact. The selling argument was not in the project being environmentally friendly, but in showing how much money it earned for the company. Thus, the sustainability ‘entrepreneurs’ at Nordea needed to navigate between and make progress among different parallel initiatives related to IT costs, stakeholder acceptance, and management directives as to become (or remain) effective.

“You could explain it in terms of CO2 too, but that isn’t as concrete. Money is more concrete. You can translate CO2 into how many trees or how many miles in a car ... but it is still less concrete. ... When I explained that this hits quite hard... that it would lead to substantial savings. Then many began to understand that it probably was good anyway, because the impact was so big.” (JC)
These early initiatives were not governed by strategic decisions, rather it was individual managers that tried to reduce their operational costs and be more productive. However, by the sheer existence of these initiatives, more and more people could see that it was possible to cater for projects that reduced Nordea’s ecological impact.

### 2006-2008 Collective stage: Internal and external pressure

The year of 2006 became a turning point in Nordea’s transition towards eco-effectiveness. By then Nordea appointed a new CEO, Christian Clausen. The appointment was part of a strategic process to reposition Nordea with an increased customer focus. The new CEO altered the management style based on discussion among employees and initiated a revision of the corporate values. The new corporate values became; “It’s all about people”, “One Nordea team”, and “Excellence of customer experiences”.

In the processes that lead to the new corporate values, Corporate Social Responsibility (CSR) emerged as a key concern among Nordea’s customers and employees. This was at a time when CO₂ let-out and global warming were on many politicians’ agendas, competing banks begun to publish Green budgets, and the Swedish state (at that time Nordea’s biggest share holder) was putting pressure on firms to be more sustainable. Nordea, also noticed that potential employees were asking new types of questions, including questions about their environmental program and CSR.

> “… we tried to see what kind of issues people found important and motivating for them. In addition we were also following the rest of the world and noted that the leading banks were taking care of their CSR.” (CIO)

In process of establishing a more formalized CSR agenda a new position as CSR manager was established in the summer 2008. The position was created after a strategic discussion about CSR in the Executive Group Management and Liisa Jauri was the appointed head of CSR. Liisa explains the role of this position:

> “At this time, there were a lot of green initiatives going on in various places in Nordea. I was hired to take a holistic grip on all these efforts and to facilitate future work by bringing people together to share experiences. The ambition was never to introduce CSR from top-down..., it has to be a natural part of all the activities the bank do. Based on the three values: “It’s all about people”, “One Nordea team”, “Great customer experiences ”, we think that doing responsible business is a prerequisite for staying in business. That’s why these values and the thinking ties the story together, we need to have all Nordea employees to understand what is needed to be done and what responsibility is.” (LJ)

During and after the transition to new corporate values it appeared as if employees found new ways to connect to each other. For instance, an early morning in the fall of 2007, Dennis Jönsson, an employee of Nordea IT, was reading about the latest reports on global warming around the world and thought that someone ought to do something about it. Then he realized that he and his fellow co-workers at Nordea, was part of the problem. He decided that he wanted to do something about this problem:

> "Of course I had reflected on these things before. But now the timing was right. … I got great support from my manager. A couple of months later I was called up to Helsinki to give a presentation on ‘Nordea and Global Warming’, focusing on actions Nordea could do.” (DJ)

The underlying question in the presentation was if Nordea could use IT more effectively to save costs meanwhile reducing environmental impact at the same time. Later in 2008, Dennis Jönsson was appointed Green IT manager at Nordea.

> "Dennis’ [Jönsson] presentation was very convincing. It was obvious that this was something that fitted very well into the emerging strategy.” (TS)

Slowly business practice was changing towards eco-effectiveness. For instance, all business activities from lending to investments were affected. To support the internal initiatives Nordea had signed United Nations Process for Responsible Investments, Equit-principles, following the OECD guidelines for multinational enterprises. Nordea also engaged in more general attempts to influence the business society at large. One of these initiatives is the participation in the “Carbon disclosure project”. One of the projects was the 500 idea project, which aimed at engaging all the employees at Nordea to come up with green innovations. Dennis Jönsson, the Green IT manager at Nordea reflected upon the project:

> “We were at first discussing to suggest a Green IT campaign... but the issue with that would have been that people aren’t too interested in many of the Green IT issues. Server virtualization, who really cares about that except the IT people ourselves...? So, the campaign was broaden I think was essential to reach out to
and to engage a broader audience. After all the Green IT issues have to be seen in a wider context to be really interesting.” (DJ)

During the collective stage it appeared as if the strategic focus of the sustainability work changed from performance driven towards ecological driven rooted in the new corporate values. Nordea managed to establish coherency for green initiatives, and an ‘organizational moral’ slowly emerged in which ecological sustainability found a given place.

2009-2010: Formalization and control

The appointment of the CSR manager was the starting point of the formalization process that enabled new Green IS to surface. The role of the CSR manager was to facilitate, organize, and structure green initiatives. Furthermore, the CSR manager was responsible for producing the green annual report and participating in external groups. An umbrella initiative, labeled the Eco-footprint project, was established. The project organized eight workgroups (internal paper, external paper, internal logistics, waste management, water usage, energy consumption, buildings, and Green IT). These projects had a broader mandate than just focusing on direct economic returns. For instance the premises manager, who also was the Eco-footprint project manager explained:

“We have established two paper groups, one for external papers and one for internal paper consumption. [...] Mandatory documents are by law required to be printed. These teams are working on how to change the practice and laws. Some legislation is local and other is EU law.” (JO)

The transition from the collaboration stage into the formalization stage is not clear-cut. Initiatives that enable coherence and acceptance for ecological sustainability among employees are still launched. One way of involving employees and also to foster innovation was the 500 ideas project, where the employees were invited to propose green ideas in an internal competition. The fact that this campaign was sanctioned from top management spread the notion of appreciation of ecological sustainability in the organizations. It also triggered concrete innovations, many of the picked up in the workgroup of Green IT.

“What is [...] very clear is the whole mindset of the employees have changed during 2009. They have realized that there is this green activity and sending proposals so there is also a pressure from non-IT employees, employees not specifically working in any IT department.” (JO)

Green IT got formalized into the Green IT workgroup, and the creation of a role as Green IT manager:

“Dennis has created the structure... He is responsible for the umbrella, so to speak, and underneath there are a lot of initiatives. He manages all the administrative and you get feedback from him too.” (JC)

A steering group consisting of the green IT manager, the CSR manager, and the premises manager headed the green IT workgroup. All in all, Nordea considered that many of the potential application areas of Green IT was within the domain of the premises manager. In particular, the new module for monitoring resource use in the facility management system showed promise to become a key asset:

“I think one of our eye-openers has been when we were able to monitor our electricity consumption. We noticed that our buildings consumes equal amount energy when people are not there as when they are there. It’s great when IT systems can provide us with this information. So I think information is the key, we have to measure and compare the trends and act thereafter.” (JO)

The CSR manager also uses data from the facility management system for tracing carbon footprint. The carbon footprint information is distributed to all the financial controllers and is also used in the CSR report. The data could potentially be used to develop sustainable oriented KPI’s.

“We have objectives that we publish in the CSR report. And when you publish these goals, you commit yourself to act in this way, and also to measure the outcome of it. We have understood that we must strive to become more environmentally conscious when we do business, and we have figures showing that we have streamlined our energy consumption and reduced leak.” (SR)

In 2010 ecological work has reached a stable position, immersed into the organizational structures of Nordea. The idea to reach ecological sustainability was, at least partly, institutionalized. The formalization of CSR and the dedicated people working on green issues gives other employees a channel to put forward ideas.
**Elaboration stage: 2010 - on-going**

By 2010 Nordea had moved into an elaboration stage, searching for domain extension. Through the formalization stage, the structures were in place to elaborate business with an eco-effectiveness focus.

“It’s part of the business, it’s not a separate box next to the CEO, which is one way of doing it. I feel if you have a separate box somewhere called CSR with a team of people and a wonderful budget, you are able to create many things, but will it stay there, do people understand it? We took a more rocky road, chased it a bit longer... But now, whatever we do as a business unit or central function unit we are responsible for incorporating CSR as part of our normal work.” (LJ)

By that point, a remaining issue was related to the shortcoming of people with experience and knowledge of sustainability.

“I think that there are many ‘green thinking’ people here at Nordea now. People who have the mindset, but many times they do not have the right experiences to do it. Finding a person that could coach and follow-up all of these things [sustainability work] is difficult. We have external consultants doing that, but it should be someone from inside Nordea as well.” (JO)

A key concern was, and still is, to create reward systems and being able to measure green activities and behavior. The need of instruments to measure the sustainability progress was considered difficult but critical. So, to change, for instance, the current travelling behavior required a new set of measurements, more so, it required a change of mindset:

“Every day Nordea employees do 500 travels with aircrafts. Of these 400 are for meetings, workshops, and other internal reasons. Only about 100 are to meet with customers. The 100 externally motivated flights might be a bit hard to reduce, but the 400 internal can to a large extent be substituted by technology enhanced meetings” (DJ)

However, at present, there are no green Key Performance Indicators (KPIs), except for those employees working directly with green projects. Consequently, there is limited impact on the individual or office level. There is an on-going discussion about new KPIs that include green measures, a delicate discussion.

“We are thinking about different ways to do this now. KPI on office and/or employee level related to sustainability for example. We couldn’t have done such a thing initially. We had to reach a level of trust both for the CSR in general, but also for the specific Green IT initiatives. Now that we have reached this stage management and employees are able to see that what we have done so far, and that our work have had positive impact on the organization... now it’s possible for us to suggest more profound changes. The KPI thing wouldn’t have been possible before we reached this stage of trust.” (DJ)

“There are no specific KPIs for this yet, but we are heading there. The involved people are very self-motivated and the work with Green IT makes them feel good. And when 34000 co-workers are working towards the same end – it makes a difference.” (PF)

**Case Discussion - Eco-effectiveness process characteristics**

The discussion and analysis of Nordea’s greening process will consist of two parts. First we will assess how the progression fitted the four the stages of organizational life cycles, and what enabled the move from one stage to the next. Second, we will attend to the role of green IS in this maturity process in relation to the competing values model.

**The Eco-Effectiveness life cycle**

Although existing research has identified numerous sources of eco-effectiveness, understanding the very process of how to reach such goals is a critical piece of the puzzle. The CVF provides insights into how organizations need to re-invent themselves in becoming eco-effective. It is not necessarily a question of radical transformation, as suggested by Shrivastava (1995), instead it a incremental process that evolves through stages with focus on different effectiveness models. To understand this slow moving process we applied the CVF. Quinn and Cameron (1983) work describes four stages, Entrepreneurship, Collectivity, Formalization and Control, and Elaboration. Each stage having distinct differences regarding focus on the internal vs the external, stability vs flexibility, and means vs ends. As the stage-model was not developed for organizational re-invention, an assessment of model fit is warranted.
The early years of Nordea’s sustainability process was characterized by individuals pursuing green initiatives in isolation from each other. In this entrepreneurial stage of the eco-effectiveness process individuals made green innovations based on knowledge exploration and creativity, which was opposing to the overarching effectiveness model of the organization at that time. The rational goal model was in clear dominance of the organization, and all attempts to launch a green agenda were typically filtered through the rational goal control mechanisms focusing on external control and productivity improvements. Consequently, only those initiatives that fitted with those ends, including profit maximization were the ones that saw the daylight. This included server virtualization, upgrade of CPU, and optimization of office space. Thus, by that time, the goal was to cut costs and sustainability was considered a secondary track only implemented if the financial incentives were clear. This reveals an ongoing dialectic process between the entrepreneurial stage (driven by the ‘eco-entrepreneurs’) and the rational goal model (driven by management).

Over time, after solving the immediate financial crisis in 2006, it appeared that Nordea assumed a more balanced and open approach to the eco-effectiveness initiatives. This follows Quinn and Rohrbaugh (1981) suggestion that for long-term survival, organizations should search of balancing the four competing value models. It became possible to think in other terms than just rational terms and consequently green projects were motivated with arguments related to any of the four value models. The change opened up for a ‘green moral’. This included the appointment of CSR Manager and Green IT manager, and participation in the Carbon disclosure project. These actions were tightly linked to the new corporate values. Consequently, the previously isolated individuals driving green projects were increasingly connected to each other. In 2007 and 2008 these individuals found themselves in green workgroups and forums - building collectivity and coherence for green projects. Following Butler (2011) this collectivity stage was characterized by sensemaking and dialogue.

The transition into the formalization stage is not clear-cut, which is also emphasized by Quinn and Cameron (1983). Initiatives to build green coherence and moral were a continuous process at Nordea well into 2009. To some degree, the formalization work commences even before 2009 with institutionalizing various green roles. The formalized structure was managed and absorbed in the 500 ideas project and other green workshops. The new structure was also able to monitor current resource consumption. In 2009 the formalization takes a leap with establishment of formal structures, and establishment of KPI for the people working in green roles. As found by Quinn and Cameron (1983) the internal processing model were gaining additional prominence in the green work process.

The elaboration stage is still to take off properly. In line with what Quinn and Cameron (1983) found, the internal processing model lost some of its prominent position as the fundamental control needs were met. Then comes the subsequent question of how to move the green work into new business opportunities. One of the obstacles is the lack of performance measurers for every employee related to sustainability. At this stage there is a high agreement within the organization that Nordea should to try to seek out those potentials, indicating a high presence of the open systems model. Competences for doing so are sought, and employees are actively working with transforming the regulative and legislative framework to enable more ecological sustainable business.

In sum, the later stages of Nordea’s greening process fits very well with the stage model outlined by Quinn and Cameron (1983). However, organizational re-invention is different from organizational evolutions in that the re-invention normally is triggered by rare events unique to the particular organization at hand (Quinn and Cameron, 1983). This corresponds well to what we see in the Nordea case. The financial situation pre-2006, and focus on the rational goals model had strong influence on early green initiatives. However, as the process took off the pattern with stages that are unequally focused on different value models can be recognized. This then entails a follow up question regarding how the interaction of the different value models can be understood. This, and the role of green IS in this interaction, will be addressed in the following section.

**Interaction between value models: the role of Green IS**

The CVF suggests that there is a dialectic tension between different aspects of organizational effectiveness; between internal and external, between flexibility and control, and between means and ends (Quinn and Rohrbaugh 1981; Quinn and Rohrbaugh 1983). In particular, the early problems to launch
green initiatives can be understood with these dialectic tensions. For example, whereas the organization as a whole emphasized rational goals, the individuals who searched to drive green initiatives by cohesion and moral where placed at the diametrically opposite in the dialectic dimensions (typically belonging to the human relations model).

Since 1997, Nordea runs a number of projects stressing control and communications (both internal and external), i.e. internal processing projects (Quinn and Rohrbough, 1981) aiming to better understand the resource consumption. The argument being that in order to reduce environmental impact the organization has to know where and when resources are consumed. Additionally, Nordea introduced a new model for tracking travel enabled assigning carbon let-outs from travels down to employee level. The new information systems had the outspoken motivation to, in the future at least, enable green KPI’s as a fundament to assess organizational departments. In this stage, green projects had to be defended with direct economic efficiency-returns to be accepted. While these goals were rational and important, strongly convinced coworkers at Nordea strived towards more radical changes.

Thus, dialectic tensions continued to influence the greening process. In particular new IS initiatives had to balance the needs for control vs flexibility, and internal vs external focus. The facility management system was motivated by internal control ends, but turned out to be an eye opener for what can be done in the rational goals model now that the information is available. By building collectivity and coherence for green IS projects, Nordea started to communicate a “green profile” within the walls of the firm. Thus Nordea slowly started to move from the rational model towards the internal model focusing on information management as discussed by Quinn and Rohrbaugh (1981). By taking a decision to set up a CSR organization and responsible, Nordea’s green profile increasingly gained momentum within the internal organization. For example, the removal of ATM receipts motivated in the open systems and rational model had a spillover internally on the human relations model.

Thus, by 2010, Nordea recognized that sustainable work had become an integral part of the employees identity and that their green profile was considered being a reason why someone would chose to work for Nordea. We found, in accordance with Butler (2011) that the small initial green initiatives was followed by a transformation of existing IT based platforms, business models and in the end overall firm strategies (Butler, 2011). Cohesion, communication and a new internal ‘green morale’ was growing as Nordea increasingly started to cultivate a new green profile and identity. This initiated self-reinforcing loops amongst employees and management at Nordea and increasingly the means of becoming eco-efficient was transformed towards the ends of becoming eco-effective. In this stage, however, the initial ‘eco-entrepreneurs’ expressed their concern about employees having a clear view of the goals of Nordea becoming sustainable, but were lacking in knowledge and experience in how to reach the goals. Moving from the human relations model towards the open system model Nordea was ready to externally communicate their green profile, focusing on growth and resource acquisition (Quinn and Rohrbaugh 1981) however the means of how to get there was not all in place.

There are several examples of how green IS initiatives formed part of the eco-effectiveness processes. As such, they became transcending objects that connected and fueled positive spirals in each of the effectiveness models. In the Nordea case it appeared as if the green IS initiatives, besides from taking part of the model-specific spiral towards eco-effectiveness, also served as bridges between different value models, as illustrated in Figure 3.

- **Human relations and open systems share a flexibility bridge**: The growing sustainable consciousness triggered firstly individuals to implement green ideas, for example office space reduction and virtualization of servers, at the departmental level. These initiatives gave sustainability work internal credibility and inspired others to put forward ideas. For instance, the 500 ideas project used this credibility to get employees involved and come up with new green ideas.
- **Open systems and rational goals share an external bridge**: The early initiatives, including office space reduction, virtualization of servers and replacement of CPU, were clearly based rational goal, but they were later used as examples to build credibility for other Green IS projects, including Power-Off and consolidation of server halls. The development of new IT systems and the Green profile was externally communicated as to increase credibility and strengthen the Nordea brand as a sustainable bank both in monetary and environmental terms.
- **Rational goals and internal processing share a control bridge**: The new IT systems provided the organization with data on resource consumption, but also the outcome of ongoing sustainability
projects. This was communicated extensively through the intranet, enhancing the green moral. Facility management systems provided data on the explicit use of energy, at branch office level, enabling discussion and reflection branch managers. Other examples are the Power off project, CPU upgrade, virtualization of servers, and IS to optimize office space.

- **Internal processing and human relations share an internal bridge:** The intranet was used extensively, to communicate existing projects and thereby build green moral. For instance, the top management use of video conferencing signaled that the organization should use video conferencing to reduce cost, save the environment and improve work life balance.

By 2011 Nordea is not an eco-effective organization in the purest sense – the organization does not exist solely to improve the environment. However, by assessing the effectiveness models in CVF, it is clear that by 2011 ecological sustainability have become more and more integrated in both the ends and the means of all four effectiveness models. By, extending the idea of bridges, which resembles Quinn and Rohrbaugh view of organizational effectiveness as continuums rather than discrete states, we construct a framework for eco-effectiveness based on the view of eco-effectiveness represents the degree towards ecological sustainability forms part of the ends in the four effectiveness models. The explanation for how an organization moves towards eco-effectiveness can be understood as a four-stage process of Entrepreneurship, Collectivity, Formalization and Elaboration. During this process, the competing effectiveness models needs to be balanced, meaning that eco-effectiveness needs to find a place in all four value models, or the process might get stalled. On the other hand, green initiatives might also trigger spillover effects between the four effectiveness models through the bridges stemming from that each of the effectiveness models share ends with two of the other models.

### Implications and Conclusions

In this paper, we set out to analyze the process by which a firm transforms towards ecological effectiveness, with particular attention given to Green IS. With this focus in mind, we conducted a longitudinal study of Nordea's transformational process towards ecological effectiveness. The insights from the study of Nordea provide us with inputs to develop a process model of how firms turn eco-effective. Here we will present our research contributions and put them into the context of previous research on ecological effectiveness and the role of Green IS.
Research limitations

There are several particularities of the eco-effectiveness transformation of Nordea that may have influenced the analysis above. First, as noted the elaboration stage is still in its making. How this step of the transition turns out may impact the assessment of model fit, compared to the four-staged organizational invention model by Quinn and Cameron (1983). Second, Nordea is an organization that is fused with IS (c.f. El Sawy, 2003). From top to bottom, IS is integrated in the daily operations. The prominent position of IS increase probability that potential implications of IS in the eco-effectiveness transition will surface and stand out, it also implies that for organizations where IS plays a minor, or at least more supportive role, the transition may play out differently. The embeddedness of Green IS in the transition process may be downplayed. Third, Nordea operates in the financial industry that is considered to be conservative and resistant to change. As elaborated further below, we see in Nordea a very vulnerable transition process that requires a careful and sensitive managerial touch. It might be assumed that the role of management may vary based on the institutional characteristics of the industry as well as the specific organization in question. With these limitations in mind, we proceed to suggest theoretical and practical contributions based on our study of Nordea.

Theoretical contribution

Previous literature on Green IS describes a fundamental difference between transformation towards eco-efficiency and eco-effectiveness (Melville 2010). Eco-efficiency has been seen as an activity of ‘polishing the stone’, whereas Eco-effectiveness has been associated with fundamental changes deep into the organizational values and structures (Chen et al. 2008). Consequently, the transition towards eco-effectiveness has been associated with a radical, disruptive shift in the organizational life.

Nordea’s transition towards eco-effectiveness displays a different story. In the case of Nordea we see a slowly evolving process with no dramatic change, except for the changes in corporate values. In that regard, describing Nordea’s transformation does not correspond to a radical change between two discrete states. Rather, the transformation follows the dialectic view of organizational culture as described by Quinn and Rohrbaugh (1981; 1983). Thus, we might need to seek for, or develop, theoretical models that are not radical but continuous instead.

The consequences of this conceptualization are important. First, it implies that green (IS) initiatives can be both the means and the ends in an eco-effectiveness model, at the same time. There is no inherent opposition between the two. Second, a transformation process towards eco-effectiveness will not have to be a radical transformation (Shrivastava 1995) between discrete logics, but may instead be a gradual transition and a question of organizational re-invention. Note, during particular conditions progress towards eco-effectiveness may take a significant leap that can be perceived as a shift towards a discrete state, but as illustrated by Nordea case these transition can equally well be gradual. Third, there is no inherited opposition between ends related to the other dimensions in CVF. This is something that Nordea employees kept coming back to over and over again, that there were no opposition between economic and ecological ends. This is not to say that these ends are mutually reinforcing, but neither that they are mutually excluding.

Now, taking a step back to understand what the above analysis means for the role of green IS in the process towards eco-effectiveness. What become clear in the Nordea case are the limitations of an isolative view of Green IS. As discussed in the theory section if this paper, green IS initiatives have frequently been studied as something different than other organizational initiatives towards ecological sustainability. In the Nordea case the role of Green IS is that it forms part of a greening spiral that progress between effectiveness models through bridges of commonalities between the models. Green IS initiatives build on and trigger greening initiatives with no difference made between Green IS and Green non-IS initiatives. This follows the multilevel view proposed by Melville (2010) and links to organizational evolution as expressed in Quinn and Rohrbaugh (1981; 1983) and Quinn and Cameron (1983).

The analysis ties together several findings in the extant literature. We show how the different factors influencing the initiation of Green IS initiatives (Kuo and Dick 2010; Molla et al. 2009), are prominent in the different stages of the progression towards eco-effectiveness as means and ends. Sarkar and Young (2009) found that the existence of an effective cost model and awareness programs surrounding Green IT initiatives would influence managerial attitudes towards Green IS. This is likely to be prominent in the
stages of development with extensive focus on rational goals. Kim and Ko (2010) identify Green IS leaders versus followers. We contextualize the importance of leaders in the process, and also show their emergence are related to formalization and structuration of the process. Kuo and Dick (2010), Schmidt et al. (2010), and Butler (2011) highlighted the importance of different aspects, including managerial drive, environmental engagement, initiatives from IT staff, and institutional imperatives. Our analysis that is summarized in Figure 3 show how these aspects ties together in the progression towards organizational eco-effectiveness.

To understand the organizational greening processes, Green IS initiatives have to be understood in relation to other ecological sustainability initiatives. This is since the Green IS initiatives connect to other green initiatives in the greening process (cf. Melville 2010). Green IS processes leads to changes in the effectiveness models, that triggers Green non-IS changes, that in turn triggers Green IS changes. Therefore, by only studying the IS initiatives one will see fragments of the greening process, and consequently never be able to make sense of how the progression takes place.

**Practical implications**

The practical suggestion is that eco-effectiveness is an evolution that progress over time; you cannot start with formalization or collectivity unless there is an entrepreneurial stage. However, entrepreneurial efforts will be short-lived anecdotes unless it’s combined with top-down support clearly link to strategic goals (Porter and Kramer 2006). In this way, green IS contributes towards organizational eco-effectiveness if, and only if, initiatives are located in a bottom-up and top-down nexus.

A positive spiral means that green IS initiatives forms part of a spiral effect by transcending effectiveness models (Starik and Rands 1995). Green initiatives become boundary objects that trigger positive chain reactions and functions as bridge between stages. This means that if one of the value models in the organization seems resistant to inclusion of ecological ends as part of the effectiveness ends, the organization can actively search to support green initiatives in the adjacent effectiveness models. For example, by focusing on internal processing, data that can fuel a rational goals model can be captured.

Our research suggests that re-invention of organization as eco-effective may be a slow, continuous process rather than based on radical transformation. The process has been very slow moving and delicate. One of the success factors for Nordea’s continuous progression through the eco-effectiveness stages we believe was a careful strategy of avoiding negative impact on day-to-day activities. This might also be a consequence of the conservative industry context in which Nordea operates. From a managerial perspective, we suggest that management of an organizational effectiveness process benefits from being regarded based on a cultivation metaphor, rather than a design or construction metaphor.

Lastly, from a managerial perspective it makes little sense to distinguish between green IS and other green initiatives if one is interested in the eco-effectiveness of the organization. This should be reflected in the formalization stage of an eco-effectiveness process. The core finding of this paper is that the activities ties into each other in a positive spiral effect that transcends effectiveness models. We cannot in this research see any difference on how the initiatives affect the effectiveness models, related to the focus on IS or not.

**Acknowledgements**

The authors thank Dennis Jönsson for his support and engagement in Green IS and we thank Nordea for participating in the study. We also thank the anonymous reviewers for their constructive and insightful comments on how to improve the paper.

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