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THE STUDY OF GREEN INFORMATION SYSTEMS FROM THE THEORY OF PRACTICE PERSPECTIVE

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Abstract

In the last few decades, Information Systems (IS) and Information Technology (IT) have changed human behaviour profoundly and therefore have the potential to support the shift to a sustainable society. As a result, the role and contribution of IS to eco-sustainability has become the concern of many IS researchers. This paper is concerned with understanding the practice of using IS for eco-sustainability which is now coined as Green IS. We argue that Green IS can be studied from the practice perspective drawing from the Theory of Practice. A practice perspective provides powerful and relevant constructs such as habitus, capital and field to understand how the Green IS practices emerge. The examination of Green IS from a “practice” perspective provides useful lens to garner deeper and holistic understanding of the information systems that organisations develop, deploy, use and integrate for eco-sustainability and how Green IS practices become recurrent and what eco-sustainability outcomes they contribute to. The contribution of this paper is a conceptual framework and a set of propositions that can be used in future Green IS research.

Keywords: Green IS, eco-sustainability practices, Theory of Practice

1 INTRODUCTION

In the last few decades, information systems (IS) and information technology (IT) have changed human behaviour profoundly and therefore have the potential to support the shift to a sustainable society. Even so, IS and IT pose a great threat to sustainability issues. For example, while it is acknowledged that IS can improve efficiency, yet this does not automatically lead to a lower total environmental impact because demand in IS causes increase in power consumption and use of scarce natural resources (Elliot & Binney, 2008; Hedwig et al, 2009). To overcome this dilemma, the concept of sustainable information society (Fuchs, 2008) is suggested. Under this concept, the society makes use of IS/IT for “fostering a good life for all human beings of current and future generations by strengthening biological diversity, technological usability, economic wealth for all, political participation of all, and cultural wisdom” (Fuchs, 2008, p. 291). In line with this concept, the role and contribution of IS in eco-sustainability, commonly referred to as Green IS, has become the concern of many IS researchers. Accordingly, the use of IS to increase energy efficiency and the transformative power of IS in managing energy efficiency has been proposed (Watson et al, 2010a). Information systems shape beliefs of individuals and organisations in regards to improving environmental and economic performance (Melville, 2010). IS also improve carbon productivity as input to production systems and as tools to optimise production processes (Dedrick, 2010). All of these examples suggest that in most, if not all cases, researchers are working from the tool meta-concept of IS (Orlikowski & Iacono, 2001) focusing more on the utility of IS rather than the IS-enabled eco-sustainability practices that have emerged and become recurrent in organisations. Nevertheless, over the years, perspectives in IS research has evolved from a functional focus to a user focus (DeLone & McLean, 1993, 2003) and now to practice focus (Singh, 2009). This shift of paradigm shows the change of view from technology determinism and functional view to a more humanistic and process understanding view.

Green IS can arguably be considered as an emerging field of study within the information system community. Green IS studies using theory-driven approach are rare (Melville, 2010). An even smaller number of studies have investigated Green IS from a “practice” perspective (Chen et al, 2009; Seidel et al, 2010). Among these studies, researchers examining how information systems can be used to resolve eco-sustainability challenges have demonstrated a limited engagement with how organisational agents, attitudes, fields, dispositions and resources interrelate in order to translate into a successful Green IS practice and eco-sustainability outcome. A practice-oriented research helps to investigate how individual and collective activities are produced in a historical and social context, which gives structure and meaning to what people do and to the outcome that they can achieve (Levina & Orlikowski, 2009). The examination of Green IS from a “practice” perspective provides useful lens to garner deeper and holistic understanding of the information systems that organisations develop, deploy, use and integrate for eco-sustainability (which we call Green IS practice) and how Green IS practices emerge and become recurrent and what eco-sustainability outcomes they contribute to—something which has not been addressed in depth in previous studies. This paper is therefore concerned with the study of Green Information Systems (“Green IS”) use from the practice perspective. The paper seeks to understand how Green IS practices emerge and become recurrent in organisations and tackles the research question of “*How do Green IS practices emerge to support organisational eco-sustainability practices?*”

Eco-sustainability constructs and considerations have rarely been part of functional theories of information systems such as the Task-Technology-Fit (Goodhue & Thompson, 1995) and IS Success model (DeLone & McLean, 1993, 2003). This implies that as the use of IS for sustainability advances and new areas of applications keep coming out, researchers have to either adapt the functional theories and frameworks or adopt social theories that recognise the organisational background of Green IS to understand the new phenomenon. Pitt et al (2010) suggest that as mainstream theories currently used in IS research are inadequate to understand the issue of IS role in the context of eco-sustainability,

“researchers need to look into new theories that can cater to the age of sustainability” (Pitt et al, 2010; p. 9).

Therefore, this paper develops a conceptual framework and propositions drawing from the Theory of Practice (Bourdieu, 1977). The paper draws its anecdotal evidence from the recent literature (including the works of Watson et al, 2010b; Bengtsson & Agerfalk, 2011) to provide ground for the propositions made. For example, Watson et al (2010b) discuss the emergence and shaping of telematics use and practice to increase profitability and reduce carbon emissions via improved energy efficiency at UPS. Bengtsson and Agerfalk (2011) illustrate the use of reporting and analysis system for IT-supported sustainability initiative in a Swedish municipality. These cases help us to illuminate the complexity of interplay of actors and factors in IS use particularly as part of organisations’ eco-sustainability initiatives.

The main contribution of the paper is a conceptual foundation and set of propositions to advance future Green IS research. The paper provides a valuable idea and perspective whereby researchers can use the framework to further define each of the propositions and design an appropriate research strategy to examine them.

The rest of the paper is organised as follows. The following section provides the conceptual foundation for the paper by introducing the concept of practice based on the Theory of Practice, and review of literature on eco-sustainability and Green IS. The third section covers the proposed framework and propositions. Finally, the paper concludes with the academic contributions, areas for future research and some current limitations.

2 CONCEPTUAL FOUNDATION

The conceptual foundation of the paper draws from a number of distinct but converging streams of literature: practice, eco-sustainability and information systems (Green IS).

2.1 Practice-oriented research

Practice can be defined as “the outcome of a dialectic relationship between a situation and a habitus, being understood as a system of durable but transposable dispositions” (Bourdieu, 1977, p. 261). Levina and Vaast (2006, p. 15) assert that a focus on practice means “being attentive to people’s recurrent, everyday activities”. Practice can also be understood as clusters of recurrent and structured human activities informed by shared institutional meanings in order to get work done (Schatzki, 2005). Orlikowski (2002, p. 256) argues that practice is a “recurrent, materially bounded and situated action engaged in by members of a community”. A practice orientation takes into account not only the objectified social structures within which actions recurrently occur, but also the construction of these structures and the ‘social’ outcomes of the practices (Bourdieu, 1977). Thus, a practice-oriented research needs to investigate how individual and collective activities are produced in a historical and social context, which gives structure and meaning to what people do and to the outcome that they can achieve (Levina & Orlikowski, 2009). Practices produce outcomes that in return have an impact on social position of the field as well as the amount and distribution of capital possessed by the field (Hurtado, 2010). Thus, outcomes ultimately reproduce the objective condition of the field (Hurtado, 2010).

One of the most influential theories to study practice is Bourdieu’s Theory of Practice (Bourdieu, 1977). The theory provides three core constructs, namely *field*, *capital* and *habitus*. A *field* is defined as “a distinctive social space consisting of interrelated and differentiated positions, a configuration of objective relations between positions, a space of objective relations between individuals or institutions who are competing for the same stake” (Bourdieu & Wacquant, 1992, p. 97). Fields are not fixed entities: the boundaries of fields are imprecise and shifting, and fields can be located within other

hierarchically structured sets of fields, for example the workplaces in modern business organisation. Examples of the fields include politics, agriculture, religion, education, information systems (IS) and eco-sustainability. Bourdieu identifies *capital* as all goods, whether material or symbolic, ‘that present themselves as rare and worthy of being sought after in a particular social formation’ (Bourdieu 1977, p. 178). Bourdieu argues that, it is possible to convert one type of capital into another. For instance, if individuals increase their wealth (economic capital) they may begin to move in a new circle of useful acquaintances (social capital); if they increase their cultural capital through academic achievements, they may also increase their economic capital through higher paid employment. The *habitus* is a general disposition that generates practices, perceptions and attitudes that are largely unconscious that predispose people to act in certain ways (Bourdieu, 1990). Habitus is a product of social conditioning through which individual classify the world, coming mainly from early socialisation in the family but changing according to life experiences. Someone’s backgrounds play a major role in defining habitus. On a primary level the habitus is influenced by family, parents, friends, etc. On a secondary level the habitus is influenced by education, jobs, etc. Taken together, the constructs of field, capital and habitus explain practices, strategies and outcomes. Bourdieu's Theory of Practice is relevant to the current study because it explains practice as a product of “agents’ fields”; relations and relational differences or power among agents; the nature of capitals available to them, the agents’ dispositions and also where the “sense of the game” takes place in the field-of-practice which we will discuss in more detail in Section 3.

A few previous IS research draw from the practice perspective to explain the cause and consequence of IS to different organisational work practices. For instance, Richardson and Howcraft (2006) employ Bourdieu’s concepts to support a critical interpretation of call centers, showing how work practices are tightly constrained by oppressive technologies and managerial practices. Kvasny and Keil (2006) finds that the concepts of habitus and field are useful in interpreting the futility of community technology initiatives to bridge the ‘digital divide’ separating urban social classes. Levina and Vaast (2005) argue that practices can be changed even when there are formally designed roles of an agent. In their subsequent research, Levina and Vaast (2006) suggest that the production of practices with respect to embodiment relies quite heavily on a number of elements including community norms, community ties, as well as reciprocity. Each agent or individual draws on “memories of their interpersonal interactions and mimics acceptable behaviours, appearances and manners to reproduce existing relations” (Levina & Vaast, 2006, p.16).

2.2 Eco-sustainability Practice

Sustainability is a complex concept. It refers to the triadic nature of the concept encompassing ecological, economical and social dimensions—the so-called triple bottom line (Elkington, 1997). In broader sense, the concept of sustainability stemmed from sustainable development. The Brundtland Commission defines sustainable development as “development that meets the needs of the present world, without compromising the ability of future generation to meet their own needs,” (Brundtland, 1987; p. 8).

This research focuses on IS’s role on promoting eco-sustainability. Starik and Rands (1995; p. 909) define eco-sustainability as “the ability of one or more entities, either individually or collectively, to exist and flourish (either unchanged or in evolved forms) for lengthy timeframes, in such a manner that the existence and flourishing of other collectivities of entities is permitted at related levels and in isolated systems”. In relation to organisations, from the literature on eco-sustainability, two interrelated aspects of eco-sustainability can be identified - eco-sustainability goals (DeSimone & Popoff, 1997; McDonough & Braungart, 1998; Gray & Bebbington, 2000) and eco-sustainability practices (Hart, 1995, 1997).

Eco-sustainability goals refer to the outcomes organisations intend to achieve and are commonly classified into three categories of eco-efficiency (DeSimone & Popoff, 1997), eco-effectiveness

(McDonough & Braungart, 1998) and eco-equity (Gray & Bebbington, 2000). Eco-efficiency refers to a businesses' ability to deliver competitively priced goods and services that satisfy human needs and bring quality of life while progressively reducing ecological impacts" (DeSimone & Popoff, 1997; p. 47). Eco-equity focuses on the equal rights of people to environmental resources and a business's 'social responsibility' for the future generations (Gray & Bebbington, 2000). Eco-effectiveness generally attempts to stop contamination and depletion of natural resources by directing individual and organisational attention to the underlying and fundamental factors of environmental problems through a fundamental redesign of the system (McDonough & Braungart, 1998).

Organisations follow several practices in pursuing eco-sustainability goals. For example, Hart (1995, 1997) proposes three stages of eco-sustainability practices - *pollution prevention*, *product stewardship* and *sustainable development*. *Pollution prevention* focuses on the control and prevention of polluting emissions and effluents during and after production and operations processes (Hart, 1997). *Product stewardship* requires environmental impacts to be considered throughout the entire lifecycle of the organisation, including raw-material sourcing, product design and development processes (Hart, 1995, 1997). *Sustainable development* encompasses the use of technologies to transform business processes by implementing practices that conserve resources, energy efficient, non-polluting and low waste (Hart & Milstein, 2003). Therefore, Hart's eco-sustainability practices concepts can provide a good starting point to investigate and classify organisational Green IS practices.

2.3 Information Systems and Green IS

Information systems (IS) can be defined as the use of computer software and business and/or social applications that utilise information technology (IT) (Laudon & Laudon, 2006). On the other hand, the term information technology (IT) is defined as technologies dedicated to information storage, processing and communications (Ang & Koh, 1997). Thus, the notion of IT focuses on a combination of hardware, telecommunications and office equipment that transform data into useful information. Taking these differences between IS and IT in the context of eco-sustainability, two constructs have emerged in the practitioner and academic literature – Green IS and Green IT. Green IS commonly refers to the use of IS and IT for "greening" organisations and for making businesses more sustainable (Chen et al, 2008, Melville, 2010; Watson et al, 2010a). Green IT refers to the action of "greening" IT artefacts, IT departments and the IT industry (see Murugesan, 2008; Molla et al, 2008). In this paper we focus on Green IS.

From extant literature on Green IS, three main themes of how organisations use Green IS can be identified—to *enable*, to *promote* and to *transform* eco-sustainability practices. For example, Boudreau et al (2008) view IS as an enabler in inducing changes within business processes such as production activities and modify (i.e by decreasing) their environmental impacts. York et al (2009) highlight how the use of IS promotes and encourages organisations to make more sustainable behavioural choices and proposed five general means (a) enabling rational decisions, (b) persuading, (c) enhancing the analysis of past behaviour, (d) altering habits and, (e) magnifying normative forces. IS can shape the beliefs of decision makers and individuals about the environment which is essential to create sustainable processes and practices of organisations (Melville, 2010). Watson et al (2010a) demonstrate the transformative power of IS to create an environmentally sustainable society. For example, the use of RFID systems for tagging and tracking each unit of pollution will make it possible for organisations to assign and measure the external environmental costs to the society in terms of low quality air and water. In this transformative power of IS, the society can use this information to "internalise these externalities" (Watson et al, 2010a, p. 9). Further, the use IS to remotely sense and measure pollutants can and will be transformative especially in the context of environmental law (Esty & Winston, 2006). Overall, the current Green IS literature identifies various ways for using IS in eco-sustainability. However, it is less clear how Green IS practices emerge. Based on the background review in this section, the next section will present a conceptual framework that will help in understanding how Green IS practices get established.

3 THE GREEN IS PRACTICE FRAMEWORK AND PROPOSITIONS

Based on Hart’s (1995, 1997) and Hart and Milstein’s (2003) classification of eco-sustainability practices, three categories of Green IS practices can be identified—*Green IS as pollution prevention practice*; *Green IS as product stewardship practice* and *Green IS as sustainable development practice*. The successful emergence of the Green IS practice in organisations is likely to be influenced by (a) the prevalence of the “Green IS field”, (b) the dispositions (habitus) of individuals and groups towards IS and eco-sustainability, (c) the economic, knowledge, and technological resources (capitals) available to different agents (such as environmental stewards, IS managers and professionals, and top management) within an organisation’s Green IS field, and (d) the interaction and relationships that exists among the different agents, their stakes, interests, strategies and positions within the Green IS field. Figure 1 captures a pictorial representation of our main argument and the following sections discuss our conception and proposition in detail.

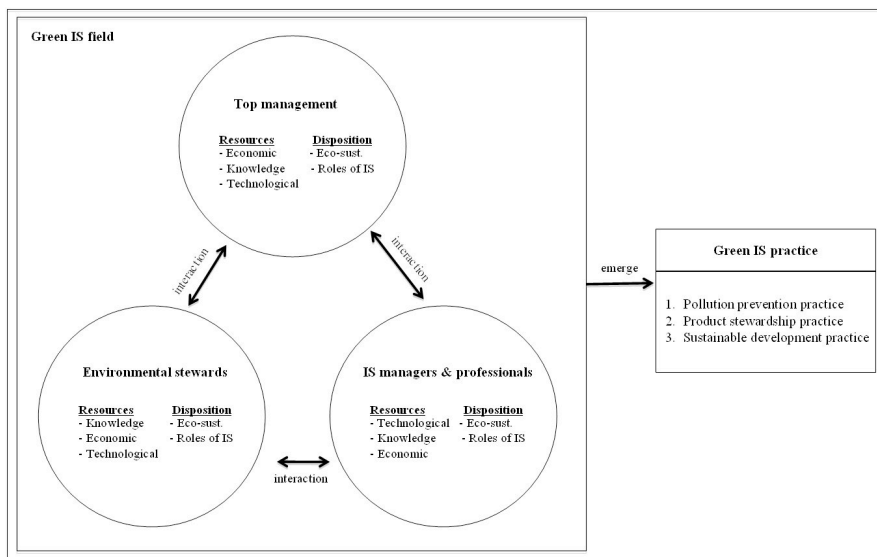


Figure 1. Conceptual framework of Green IS as Practice

3.1 Green IS Practices

Green IS as pollution prevention practice refers to the innovation and use of IS (such as enterprise carbon and energy management systems) to reduce pollution generated by business operations. In managing pollution, the use of IS to reduce an organisation’s carbon footprint can be in the form of the global positioning system (GPS) technology or telematics systems (Watson et al, 2010b). From the implementation of a telematics project, UPS is reported to have reduced the trucks mileage, lowered emissions, and cut maintenance costs as the gathered information in its trucks are exploited to advance the company’s sustainability objectives (Watson et al, 2010b).

Green IS as product stewardship practice refers to the innovation and use of IS (such as enterprise digital platforms and communication and collaboration system) that enhance the environmental friendliness of upstream and downstream supply chains (Chen et al, 2010). For example, from the product design perspective, design for environment (DfE) has been defined as the systematic process through which products are designed in an environmentally conscious way (Albino et al, 2009). In particular, the use of analytical tools such as the life cycle assessment (LCA) software in the design phase can help organisations to pursue product stewardship strategy. Additionally, the use of IS in the design and manufacturing of product packaging facilitated by Computer-Aided Design (CAD)

software can also be categorised as the use of IS in the context of product stewardship (Berkhout & Hertin, 2004).

Green IS as sustainable development practice refers to the innovation and use of IS (such as sustainable knowledge and learning management systems) that transform business operations. The use of a Compliance-to-Product (C2P) application in IT manufacturing firms for supporting organisational sense-making, decision making and knowledge creation for eco-sustainability discussed in Butler (2011) is an example of Green IS as sustainable development practice. Another example of this type of Green IS practice is the implementation and routinisation of a reporting and analysis system for improving eco-sustainability indicators and routines in a Swedish municipality discussed in Bengtsson and Agerfalk (2011).

3.2 “Green IS field” and Green IS practice

In the Theory of Practice, the concept of field is regarded as the focal area of study as the relationships within the field are more important than the individual actors (Rhynas, 2005). Fields can be seen as arenas where agents with various amount and of various types of capital interact (Bourdieu & Wacquant, 1992). Given this centrality of field, in this research, the hypothetical field which provides the frame of analysis is the “Green IS field” situated within an organisation. For the purpose of analysis, this Green IS field can be argued to be constituted of three sub-fields: *information systems managers and professionals*, *environmental stewards* and *top management*. Within the Green IS field, all agents pursue their own stakes and interests to achieve the objectives of their respective subfields. The result of the dynamic and complex interactions of the organisational “Green IS field” (comprising of various other subfields) is the emergence and recurrence of Green IS practices. Subsequently, the recurrent Green IS practices would be able to reshape how the organisation is advancing its future eco-sustainability practices, especially those enabled by IS.

The UPS case (Watson et al, 2010b) demonstrates how a highly prevalent “Green IS field” led to the emergence of the telematics-based Green IS practice. The prominent role of IS for eco-sustainability put by the UPS staff ensured the successful deployment of the company’s telematics-based project. The case further highlights the continuous support given by the *top management* of UPS in driving the telematics-based project as they realise the social, economical as well as environmental benefits of the project to the organisation. Similarly, the *IS managers and professionals* in UPS (system designers, engineers and developers) also share the same commitment in designing, developing, testing, deploying and maintaining the telematics system with eco-sustainability considerations in mind. The end-users of the system who are mainly the truck drivers also display strong support for the project by giving their cooperation in rolling out the project. These end-users (truck drivers), due to their interest and stakes in fulfilling the requirements of the company can be seen as part of the *environmental stewards* at UPS. The fact that UPS provides a series of training, education program and campaigns to inform the drivers, union agents and other related parties on how telematics works and why it is important show the commitment of UPS in making the “Green IS field” more prevalent within the organisation.

P1. Green IS practice is more likely to successfully emerge if “Green IS field” is prevalent in the organisation.

3.3 Disposition (Habitus) and Green IS practice

The general disposition or habitus towards eco-sustainability can be seen from three main positions: one is dominant and mainstream, the second position is minority and sceptical and the third takes a middle ground. The mainstream view maintains that the climate is changing at an alarming rate and human (including business activities) contribute to the deterioration of the global eco-system (Costello et al, 2009). The skeptics maintain that the alarm about climate change is overstated (Kinninmonth,

2004). However, there are others who embrace the precautionary principle and believe that there is a potentially serious or irreversible risk if climate changes do occur (UNEP, 1992). From the business point of view, both large and small business organisations have started to take steps in addressing the issue of eco-sustainability (Lamb, 2009). Melville (2010) provides an example of business leaders' positive dispositions towards eco-sustainability by highlighting the case of Chevron's development of a decision support system in response to the need for improved environmental risk management. In some, if not most organisations, environmental stewards act as change agents (or change actants), catalysts, facilitators and demonstrators of organisational eco-sustainability strategies and practices (Walley & Stubbs, 1999; Bengtsson & Agerfalk, 2011). Therefore, environmental stewards' positive disposition towards eco-sustainability and the role of IS is a critical enabler for the emergence of Green IS.

On the other hand, the disposition of IS managers and professionals towards eco-sustainability is only recently emerging but steadily increasing (Watson et al, 2010b; Dedrick, 2010). It is argued that IS managers and professionals are more focused on reducing the direct environmental impacts of IT such as making data centers and personal computers more energy efficient (Dedrick, 2010). This view is supported by the findings of an earlier research among IT professionals in Australia which found that most of them are concerned about climate change but only practicing simple behaviours to support eco-sustainability practices (Molla et al, 2008). In the case of Green IS practice at the Swedish municipality, Bengtsson and Agerfalk (2011) contend that the workplaces surveyed acknowledged the previously inefficient ordering and distribution systems. This logistical aspect is then regarded to have the potential to be improved, where "... the notion that there was a need to address logistical issues from an environmental perspective was also beginning to emerge." (Bengtsson & Agerfalk, 2011, p. 103). The increase in sustainability awareness mentioned in the case demonstrates the positive disposition towards eco-sustainability of the workplaces. Thus, we argue that individuals' and groups' dispositions towards eco-sustainability and the role of IS for supporting eco-sustainability practices are important criteria in ensuring the success of Green IS practice. If the dispositions of agents in different subfields are not harmonious, that is there are no shared/common values or norms pertaining to eco-sustainability or IS, it will lead to conflict and inhibit the successful emergence of Green IS practice.

P2. Green IS practice is more likely to emerge if there exist a shared dispositions (habitus) among individuals and groups in the organisation towards IS and eco-sustainability.

3.4 Resources (Capital) and Green IS Practice

Access to resources and its distribution (or amount) can determine the social position of the subfield within an organisation. For example, because members of the top management subfield are entrusted as caretakers of an organisation, they usually have more access to and own more economic resources compared to the environmental steward and IS managers and professionals subfields. As a result, they hold the dominant position in the power relationship compared to the other two subfields. While the IS managers and professionals subfield may have limited access to economic resources, however their position in the organisation is deemed highly due to the knowledge and technological resources (skill) value that they own. This is also the case with environmental stewards who probably have lack of access to economic resource but their environmental disposition and the knowledge they have on issues pertaining to environmental issues make their position in the organisation is valued. The knowledge resource they own provides them a dominant position and the ability to influence other people in the company, hence making them the suitable eco-sustainability change agents.

Applying the notion of capital and Green IS practice to the example of UPS' telematics projects (Watson et al, 2010b), it can be argued that the top management of UPS hold the most economic capital and are able to fund for the entire project. It can also be seen that the top management of UPS also possess strong disposition regarding eco-sustainability issues. This facilitated for the pilot telematics project to be designed, developed and deployed by the IS managers and professional teams

of UPS. The resource available to the IS groups are mostly in the technological and knowledge domains. The other subfield in the equation of UPS' telematics project is the end-user group. This end user group is represented by the truck drivers who hold the knowledge resource in the package delivery activities. They also create and hold valuable data needed by the IS professionals and the top management for further analysis. For example, the data on the engine idling practice, reversing the vehicle practice while making delivery or pick up, and the route taken in delivering packages are captured through the mounted firmware in the vehicle's GPS chip (Watson et al, 2010b). Hence, for Green IS practice to successfully emerge, the subfield that holds the dominant social position (i.e the top management) will require for other subfields to submit in what Bourdieu (1998) called as "symbolic violence" where the subordinate agents take on board and submit to the attitude of the dominant agent without hesitation (Free & MacIntosh, 2009).

P3. Green IS practice successful emergence is influenced by the economic, knowledge and technological resources available to the different agents in the Green IS field.

3.5 Interaction and Green IS Practice

In the dynamic life of "Green IS field", there always exist complex interplay of interaction and relationship among subfields (Watson et al, 2010b) and we argue that in the course of interacting, there bound to be conflict among groups. In belief formation, Melville (2010) argues that tensions may arise within subfields due to differences between organisational values (i.e profit-oriented goals) and personal values (i.e being green for the environment). Additionally, this can be attributed to the different dispositions towards certain issues such as eco-sustainability, different amount of resources available (i.e different priorities of which Green IS practice needs to be implemented first), different access to resources (i.e who have budget to procure the Green IS and under whose responsibility) and also different positions the people hold in the organisation. While a healthy interaction and trusting relationship among the groups are implicit and difficult to model, it is argued that a harmonious interaction and relationship is influential in making Green IS as practice emerge in the quest for organisational eco-sustainability practices. In the case of the Swedish municipality' IS-enabled eco-sustainability practices, Bengtsson and Agerfalk (2011) argue that a successful implementation of IS for eco-sustainability require the top management to engage and provide the employees as well as their external stakeholders (such as suppliers) the necessary support to embrace the change brought about by the new system. This is because such eco-sustainability system would entail significant changes to the existing working practices within the organisation including its business processes. Thus, it is vital that the same belief, value and disposition towards eco-sustainability is established and shared by everyone in the organisation, and potentially along the business value chain as well. Further, the case also suggests that organisational resistance and tensions concerning to sustainability issue can be addressed partly by having a "thorough review of organisational routines and standards to find solutions that can enrol all affected stakeholders" (Bengtsson & Agerfalk, 2011, p. 108).

P4. Green IS practice is more likely to emerge when the relationships that exists among the different agents, their stakes, interests, strategies and positions are harmonious within the Green IS field.

4 CONCLUSION

Seidel et al (2010) observe that organisational Green IS practices can be seen as a two-side of a coin. Firstly, organisations generally aim at providing their customers solutions that can be used for managing their eco-sustainability issues. Secondly and more intrinsically, organisations are seen to struggle and strive to develop and make their internal eco-sustainability practices recurrent. In this paper, we put forward a conceptual framework that organisation and practitioners can refer to in understanding how Green IS as practice can emerge and become recurrent as a function of harmonious interaction among groups, dependency on each other's competencies and trusting relationship. By

understanding and providing the necessary resources, as well as by rightly shaping peoples' dispositions towards eco-sustainability issues and the roles of IS for supporting eco-sustainability strategies, organisations can effectively manage their eco-sustainability endeavours.

The study of Green IS from a "practice" perspective provides useful lens for IS researchers and practitioners to gain deeper and holistic understanding of the information systems that organisations develop, deploy, use and integrate for eco-sustainability (Green IS practice). The study of Green IS as practice is important to both IS theory and practice. The contribution of this paper is that it provides a valuable perspective and researchers can use the proposed framework to further define each of the propositions and design an appropriate research strategy to examine them. Moreover, the application of the proposed framework in an empirical study would address important questions such as the utility of the Theory of Practice to Green IS and its explanatory power and the external validity of the propositions suggested in the paper. However, we acknowledge the following limitations of the paper. First, the propositions were made without empirical data or practical suggestions to showcase. Second, the proposed conceptual framework did not capture the reshaping element of the Green IS field as a result of the emergence and recurrent Green IS practices. We expect to address these limitations in our future works.

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