THE PRACTICE OF USING GREEN INFORMATION SYSTEM (GREEN IS) SOLUTIONS FOR ECO-FRIENDLY ORGANISATIONS

Mohamad Taha Ijab

Institute of Visual Informatics, Universiti Kebangsaan Malaysia, Malaysia, taha@ukm.edu.my

ABSTRACT. This paper reports on the practice of using two Green Information System (Green IS) solutions in a large organisation called Acadia. These Green IS solutions are the Unified Communications and Collaboration (UCC) system and a Sustainable Knowledge Management and Sharing (SKMS) system. The Green IS refers to specific information system artefacts that organisations create and/or apply to achieve Green goals such as to reduce emissions or to encourage pro-environmental behaviour. The data was collected through a descriptive survey of 150 participants and was analysed using descriptive analysis. The findings indicate that the practice of using Green IS solutions is still considerably low. However, efforts towards promoting the use of Green IS solutions for the benefits of creating eco-friendly organisation is a continuous process and require more awareness on the part of the individual staff members.

Keywords: Green IS Solutions, Sustainable Practices, Eco-friendly Computing.

INTRODUCTION

This paper reports on an investigation of Green Information System (Green IS) solutions use for eco-friendly computing in an organisation. Generally, there are concerns by IS scholars that few organisations are creating and using information systems to advance eco-friendly computing (Seidel et al, 2013; Gholami et al, 2016). The Information Systems (IS) sub-field that concerned with addressing this challenge is known as Green IS and it is just started to be understood. The Green IS refers to specific information system artefacts that organisations create and/or apply to achieve Green goals such as to reduce emissions or encourage pro-environmental behaviour and such artefacts are not widely diffused and implemented (Grant & Marshburn, 2014; Rickenberg et al, 2014).

The Information systems (IS) can be defined as the use of computer software and business and social applications that utilise information technology (IT) (Avgerou et al, 1999; 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 the 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. The Green IS commonly refers to the use of IS and IT for "greening" organisations and for making businesses more sustainable (Melville,

2010; Watson et al, 2010; El Idrissi & Corbett, 2016). While, the Green IT refers to the action of "greening" IT artefacts, IT departments and the IT industry (Molla et al, 2008).

From the 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, Degirmenci and Recker (2016) 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 propose five general means (a) enabling rational decisions, (b) persuading, (c) enhancing the analysis of past behaviour, (d) altering habits and, (e) magnifying normative forces. Further, according to Yang et al (2017), the existence of Green IS strategy plays an important role in the process of Green IS implementation from motivation to performance. They argue that without its guidance, employees' collective Green IS effort may lose momentum or even directions while a well-established strategy helps people to form a shared vision and once employees are mentally prepared, they are likely to participate in Green IS development and utilization. The following section covers the research methods and then followed by the research findings and discussion section. The final section provides the research conclusions.

RESEARCH METHOD

This research is based on a single organisation setting called "Acadia" (a pseudonym), a large telecommunication company in an Asian country. The principal activities of Acadia are the establishment, maintenance and provision of telecommunications-related services. Acadia is vocal in communicating its desire to become an eco-conscious company. In order to get the participants for the survey, the researcher was given access to the company's internal portal for employees. The researcher then randomly selected 500 employees and sent each employee an email inviting them to participate in the survey. A total of 150 responses were received at the end of the survey period. The survey was conducted between November to December 2011 and it was hosted on SurveyMonkey. The purpose of the survey was to capture wider set of views among Acadia's staff members about the diffusion of the Green IS systems, namely the practice of the Unified Communications and Collaboration (UCC) and the Sustainable Knowledge Management and Sharing (SKMS) within the company.

FINDINGS AND DISCUSSION

The Green IS Solutions: UCC and SKMS

The first Green IS selected for this study is the Unified Communication and Collaboration (UCC) system. The communication and collaboration systems are a form of Green IS (Hasan et al, 2014) as they can enhance organisational efforts to reduce environmental degradation through the ability to reduce travel and improve workforce efficiency. The intent of the UCC development was to support online communications and collaboration across Acadia. The system incorporates multiple modules for voice-based communication, fax to send and receive messages from computers, the ability to show staff availability, multi-party messaging and chat functionality, video conferencing, file sharing features and functions to enable collaborative work on documents. The second Green IS selected for the study is the Sustainable Knowledge Management and Sharing (SKMS) system which is based on intranet portal technology**.** The system facilitates sustainable knowledge management and sharing, environmental engagement and sustainability education and shapes environmental orientation at both employee and organisational levels (Mines, 2011). The SKMS comprises of two components: the Sustainable Document and Management System (SDAM) and an Intranet portal (called the MyEarth portal). Table 1 below summarises the UCC and SKMS.

Table 1. UCC and SKMS Green IS Solutions

Systems	UCC	SKMS: Sustainable Document and Application Management (SDAM) and Intranet portal (MyEarth portal)
Year Developed	Late 2006	Dec 2008
Developers	Internal R&D	Corporate IT Department implementing a Microsoft solution , Content developed and managed by Group Corporate Communications Division
Target Users	Everyone within the company (Organisational users)	Everyone within the company (Organisational users)
Development environment	Java OOP, Peer-to-Peer (P2P) architecture	Intranet portal, MS-SharePoint Server 2007
Key outcomes/benefits	Emission reduction (savings from business travel and carbon emissions) and economic benefits through cost savings from reduction in travel; indirect social benefits through change in workplace practices and shaping of Green beliefs and attitudes.	Post-hoc realisation of potential energy saving from consolidated servers, perception of better environmental sustainability knowledge management and sharing, and behavioral changes from environmental campaign

The Practice of Using UCC

Based on the survey conducted that involved 150 Acadia staff members further reinforced the view that UCC has yet to be adopted widely in Acadia as most of the respondents did not utilise all the features of UCC (see Table 2). For example, only half of the respondents used UCC to chat with colleagues and 42% used short message service (SMS) to message colleagues. However, the survey also reflected that less than one third of the respondents used UCC for file transfer (30%), engaged in collaboration by creating special interest group (28%), established collaboration by making VoIP calls (25%), and for video conferencing (20%). The least frequent use of UCC was for faxing documents (18%).

Table 2. UCC Use Among Acadia Staff

Practice Use of UCC …	Using (%)	Not Using (%)
To chat with colleagues	50	50
To send SMS to colleagues	42	58
To make VOIP calls	25	75
To do video conferencing with colleagues	20	80
To do file transfer with colleagues	30	70
To fax documents to colleagues	18	82
To create special interest group with colleagues	28	78

It is important to note that the UCC had been in operation for more than 2 years when the above survey data was collected. The findings indicated that the use of UCC was found to be less successful when judging from the relatively low use of the UCC features.

The Practice of Using SKMS

The survey also evaluated on the practice of the SKMS (SDAM and MyEarth portal) use among Acadia's staff. The findings (see Table 3) pertaining to the extent of SDAM use sug-

gest that the staff can be grouped into two types: (i) passive users (i.e., consumer of content), and (ii) active users (i.e., producer and consumer of content). Accordingly, 94% of the users use the SDAM to download company's documents such as procedures, manuals, work instructions, forms and other documents. Ninety one percent (91%) of the users are also accessing the company's online applications and other online services. A big percentage of eighty five percent (85%) use the SDAM to read the CEO's blog. It was also observed that many of the staff members are active users of the SDAM. For example, 76% of the staff claimed that they downloaded and used the documents shared by their colleagues while 72% of them were sharing their own documents with others.

Table 3. SKMS (SDAM) Diffusion Among Acadia Staff

Practice Use of SDAM …	Using (%)	Not Using (%)
To download company's documents (such as procedures, manuals, work instructions, forms, and others for ISO9001, ISO14001, HR Policy, Staff's Terms and Conditions)	94	6
To access the company's online services/applications relevant to your work.	91	9
To read the messages written by the CEO on various topics including on eco sustainability related entries.	85	15
To download shared documents by your colleagues in Acadia.	76	24
To share documents with your colleagues in Acadia.	72	28
To book/reserve a meeting room.	59	41
To create small applications on your division's Workgroup (such as creating e-forms).	51	49
To create and maintain your personal MySite.	48	52

There was only a few staff that created small applications and workflow systems. For example, it was indicated that only 51% of the staff created small applications such as e-forms to assist their daily work practices by converting manual, paper-based forms into electronic forms. However, a slightly higher percentage (59%) of the staff was using the SDAM to make booking or reservations of meeting rooms. From a social networking perspective, only 48% of the staff members were using the MySite to create and maintain the MySite in order to engage with their colleagues in an enterprise "social networking" environment. The above results can be attributed to the newness of the SDAM capabilities in Acadia (less than 2 years when the data collection was conducted).

As regards to the extent of use of the MyEarth portal (see Table 4), again, most of the users were passive users (i.e., consumer of content). This is because 85% of the staff members were just readers of the tips and opinions on environmental sustainability shared by their colleagues. This might be because of (i) their own environmental sustainability practices are low, or (ii) their knowledge and confidence in using the MyEarth portal for sharing environmental sustainability information is still not strong, (iii) their individual characteristics whereby people are more comfortable to be the consumers instead of the producers of the content, and (iv) the awareness campaigns conducted by the company has yet to transform from the "belief formation" stage into an actual practice stage. Admittedly, there were 56% of the users who were using the MyEarth portal to download electronic calendar (e-calendar) and this indicates that about half of the company's population are still preferring the manual calendars or not using any calendar at all to manage work practice.

Table 4. SKMS (MyEarth Portal) Diffusion Among Acadia Staff

Practice Use of MyEarth Portal ..	Using (%)	Not Using (%)
To read environmental sustainability tips and opinions shared by your colleagues within Acadia.	85	15
To download MyEarth e-Calendar.	56	44
To register yourself to become a volunteer in MyEarth related activities.	45	55
To register yourself to become a Nature Loving Club member.	43	57
To share environmental sustainability tips and opinions with your colleagues within Acadia.	35	65

However, it is interesting to note that Acadia's staff are involving themselves in "Sustainability Communities of Interest" or COIs (albeit the membership is still low). For example, 45% of the survey participants claimed that they have registered themselves to become a volunteer in the MyEarth related activities that the company is organising. By registering themselves into the programme, whenever the Group Corporate Communications Division is planning to have any environmental sustainability related events in any locations in the country, the registered staff that lived within or close to where the events will be held would be communicated, engaged and expected to participate actively. The other 43% of the staff mentioned that they have registered themselves into the Nature Loving Club (NLC). The NLC arranges events such as Earth Camps in association with an external partner, a non-governmental organisation (NGO), which is the National Nature Loving Society. The members of NLC participate in camping and other outdoor activities with school children and indigenous people with the aim of appreciating the natural environment and the importance of caring for the environment. There were 35% of the surveyed staff claimed that they shared the environmental sustainability tips with others. This indicates that only a small percentage of the staff members are willing to share their knowledge on environmental sustainability matters with others while the rest are still not used to do so. The above results might also be attributed to the newness, and awareness of the MyEarth portal. However, based on the extended use of SKMS for MyEarth portal, the practices could be enhanced through more knowledge sharing and awareness sessions, continuously conducted by Acadia via its Group Corporate Communications Division.

CONCLUSION

The study of Green IS solutions from the practice perspective is important to both IS theory and practice (Seidel et al, 2013; Baskerville et al, 2016). Although there is now a recognition that IS can play a key role in making organisations more eco-friendly, there is still a lack of research that provides evidence of how deep the practice of using information systems for environmental sustainability in the context of organisations. Seidel et al (2013) observe that organisational Green IS practices can be seen as a two-side of a coin. Firstly, the organisation is generally aimed at providing their customers with solutions that can be used for managing their eco-sustainability issues. Secondly and more intrinsically, the organisation is seen to struggle and strive to develop their internal eco-sustainability practices such as the low take-up rate or practice of using Green IS solutions, as indicated in this study. Based on the data of the survey, it is vital for the organisations to understand and provide the necessary resources as well as support in shaping the staff's dispositions towards eco-sustainability practices. It is noted too that the findings of this study is limited as its investigation was based on

a single organisational setting and therefore future studies might be undertaken in a broader set of contexts to extend and enhance the findings.

REFERENCES

Ang, J., & Koh, S. (1997). Exploring the Relationships Between User Information Satisfaction, International Journal of Information Management, 17(3), pp. 169-177.

Avgerou, C., Siemer, J., & Bjorn-Andersen, N. (1999). The Academic Field of Information Systems in Europe, European Journal of Information Systems, 8(2), pp. 136-153.

Baskerville, R., Pries-Heje, J, & Recker, J. (2016). Principles for Re-Designing Information Systems for Environmental Sustainability, IFIP World Information Technology Forum.

Degirmenci, K. & Recker, J. (2016). Boosting Green Behaviors Through Information Systems That Enable Environmental Sensemaking, International Conference on Information Systems (ICIS 2016), 11-14 December, Dublin, Ireland.

El Idrissi, S. & Corbett, J. (2016). Green IS Research: A Modernity Perspective, Communications of the Association for Information Systems, 38(30).

Gholami, R, Watson, R., Molla, A., Hasan, H., & Bjørn-Andersen, N. (2016). Information Systems Solutions for Environmental Sustainability: How Can We Do More?, Journal of the Association for Information Systems, 17(8), pp. 521-536.

Grant, N. C., & Marshburn, D. G. (2014). Understanding the Enablers and Inhibitors of Decision to Implement Green Information Systems: A Theoretical Triangulation Approach, Proceedings of the Twentieth Americas Conference on Information Systems, 7-9 August, Savannah, GA.

Hasan, H., Molla, A., & Cooper, V. (2014). A Green IS Taxonomy. In H. Hasan (Ed.), Being Practical With Theory: A Window into Business Research, Wollongong, Australia.

Laudon, J. P., & Laudon, K. C. (2006). Essentials of Business Information Systems (7th Edition): Prentice Hall.

Mines, C. (2011). Six Types of Sustainability Software that Meet Any Company's Needs, http://www.greenbiz.com/blog/2011/06/15/6-types-sustainability-software-meet-any-companys-needs

Molla, A., Cooper, V., Corbitt, B., Deng, H., Peszynski, K., & Teoh, S. Y. (2008). E-readiness to G-readiness: Developing a Green Information Technology Readiness Framework, The 19th Australasian Conference on Information Systems, 3-5 December, Christchurch, New Zealand.

Rickenberg, T. A., Koukal, A., & Breitner, M. (2014). Building a Better World Through Information Systems— An Explorative Survey among Leading IS Researchers, In Proceedings of the International Conference on Information Systems, 14-17 December, Auckland, New Zealand.

Seidel, S., Recker, J., & Vom Brocke, J. (2013). Sensemaking and Sustainable Practicing: Functional Affordances of Information Systems in Green Transformations, MIS Quarterly, 37(4), pp. 1275-1299.

Watson, R.T, Boudreau, M-C & Chen, A.J. (2010). Information Systems and Environmentally Sustainable Development: Energy Informatics and New Directions for the IS Community, MIS Quarterly, 34(1), pp. 23-38.

Yang, Z., Sun, J., Zhang, Y., Wang, Y., & Cao, L. (2017). Employees' Collaborative Use of Green Information Systems, The Proceedings of the 50ᵗʰ Hawaii International Conference on System Sciences, 5-8 January, Kauau, Hawaii.

York, P.T, Watson, R. T, Boudreau, M-C & Chen, A.J. (2009). Green IS: Using Information Systems to Encourage Green Behaviour, The 2009 Academy of Management Annual Meeting, 7-11 August, Chicago, IL.