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ABSTRACT

This paper reports the results of a study of small businesses in north Georgia, to determine to what extent they are utilizing green IT and what factors are encouraging or inhibiting this use. The research finds that while small business is aware of the possibilities and opportunities offered and some green IT practices are in evidence, the take-up varies significantly. It finds some support for a number of factors influencing the decision.   The paper concludes with an outline of its limitations, proposes approaches for further work and stresses the importance of this neglected area.

Keywords: technology adoption, green IT, small business

INTRODUCTION

Information technology offers many opportunities for organizations to operate in a greener manner and provides an opportunity to save costs or increase revenue. This is not to say that technology is without environmental drawbacks – toxic waste in manufacture and disposal, continual updating pressures (many people are on their 4th generation cell phone (or higher)) and the use of energy in data centers are some of them. But for organizations, high speed internet connections can mean improved contact with customers and telecommuting programs that reduce the demand for oil, GPS enabling improved logistics with further energy savings, and the consolidation of data and software "in the cloud". Many lower level activities come under the green IT heading too – screen savers to reduce power consumption, printing technologies to reduce paper and further the use of the "paperless office", video conferencing instead of travel to meetings and policies requiring purchases from "green" suppliers.

Corporate names such as IBM, Citigroup, KPMG, Office Depot, Hewlett-Packard and Microsoft are prominent in organizational use of green IT (Fanning 2009). Generally their activities in this field tend to be big projects such as reduction in the size of server farms, monitoring and re-allocation of energy use in "smart" buildings, virtualized desktops and thin client use. However, less well known is what small business is doing, or is capable of doing. In an attempt to understand the possible effect of green IT on small business and to assess the extent to which they are using it, the authors conducted an exploratory study on a number of small businesses in northern Georgia. This paper gives the results of that study and proposes a series of further studies to better understand the possible effects on small business.

BACKGROUND

Corporate awareness of "green IT" has evolved to the point where there is now general acceptance that green IT and green IS can be used to improve organizational performance – as an example the Gartner group has identified it as one of the top strategic technologies for a number of years (Gartner 2008, 2009, 2010). The phenomenon of green IT has moved from being a concern of purely environmentalists and scientists to a legitimate business strategy (Banerjee, 2002; Bonini, Hintz and Mendonca, 2008; United Nations Environment Programme, 2008).

Academic interest in green IT has been moving along a parallel path to that of the industry practitioners in addressing green IT (albeit somewhat spasmodically and perhaps more slowly) with a number of conference papers (Elliot, 2007; Elliot and Binney, 2008; Molla, 2008; Molla, 2009b; Sayeed and Gill, 2008; Hasan, Ghose and Spedding, 2009; Corbett 2010; Mithas, Khunita and Roy 2010), journal articles (Chen, Boudreau & Watson, 2008; Murugesan 2008; Molla 2009a; Watson, Boudreau, Li. and Levis 2010; Kuo and Dick 2009 and academic initiatives (Ghose, Hasan and Spedding, 2008; RMIT University, 2009). In addition a recently formed AIS Special

Interest Group has held a virtual meeting and a 2010 pre-ICIS workshop in an effort to provide some structure and taxonomy to the developing research.

The literature to date indicates there are three main sets of factors influencing the take-up of green IT – motivational, organizational and technological. Motivational includes such things as competitive pressures and effect on the bottom line (if other organizations in the industry are using their green IT standing as responsible corporate behavior to gain market share this results in competitive pressure; if IT, green or not, can reduce costs or increase revenue, the organization will be more receptive to such initiatives). Organizational includes both the capabilities of the organization to take advantage of the technology (i.e. telecommuting may or may not be practical; the cost of moving to a thin client base may preclude such a project) and the influence of management. Top management support is also a significant factor – as leaders generally determine the shape and direction of their organizations managerial attitudes can be expected to play a large part in the use of green IT. This notwithstanding, many small initiatives are begun by relatively low-level staff influenced by a sense of environmental responsibility – reduction of printing by printing on both sides of the paper, turning off computers when not in use, installation of screen savers, etc. Technological comes both as pro and con – high speed internet connections may enable better and richer communications but existing infrastructure, software constraints and complexity often work against take-up. As an example, consider video-conferencing as a substitute for travel – a nice idea but spoilt by connections dropping out, poor picture quality and its effect on other network operations. A more complete study of these factors is provided in Kuo and Dick (2010).

The study reported here then, attempts to address the following research questions:

1. To what extent are small businesses adopting green IT practices? and
2. To the extent that small business is using green IT, what factors are influencing the decision to do so?

DATA

A small number (16) of small businesses in the north Georgia area were chosen for the study. The survey questionnaire used in Kuo and Dick (2010) was adapted for administration by students conducting an information gathering exercise in a management upper level course. The students visited the organizations, interviewed personnel there and completed the survey, entering the data online. The data was downloaded into Excel and analysis conducted in Excel and SPSS. The survey instrument used had been previously assessed for validity and reliability.

The businesses covered by the study were involved in a variety of industries – food services, health services, entertainment, recreation, shipping, and provision of technical services. Most had less than 50 employees.

RESULTS

Most organizations are aware of the potential of green IT and are doing something – however the actions taken tend to be at the lower end of the green IT continuum. Actions implemented or planned across a majority of the organizations in the study include:

- Policies (or at least practices) that require or encourage the use of suppliers and vendors that follow sound environmental practices (such as recycling and proper disposal of toxic waste)
- Reduction of paper usage through the configuration of printers to use double-sided printing as the default
- Replacement of paper with online equivalents such as electronic statements and bills, ordering processes, etc.
- Policies and practices that encourage the safe disposal of e-waste and hardware recycling
- The use of IT to improve logistics such as the efficiency of travel, transport and storage

The organizations were asked to rate themselves on the use of IT to improve their environmental performance on a series of 5 point scales: few initiatives to many, limited to widespread, sporadic to ubiquitous, minimal to maximal, under- to well-developed, and immature to mature. These indicators of adoption were summarized into one variable (Adoption) and this data was then used to assess the overall adoption of green IT practices. The results are given in Figure 1.
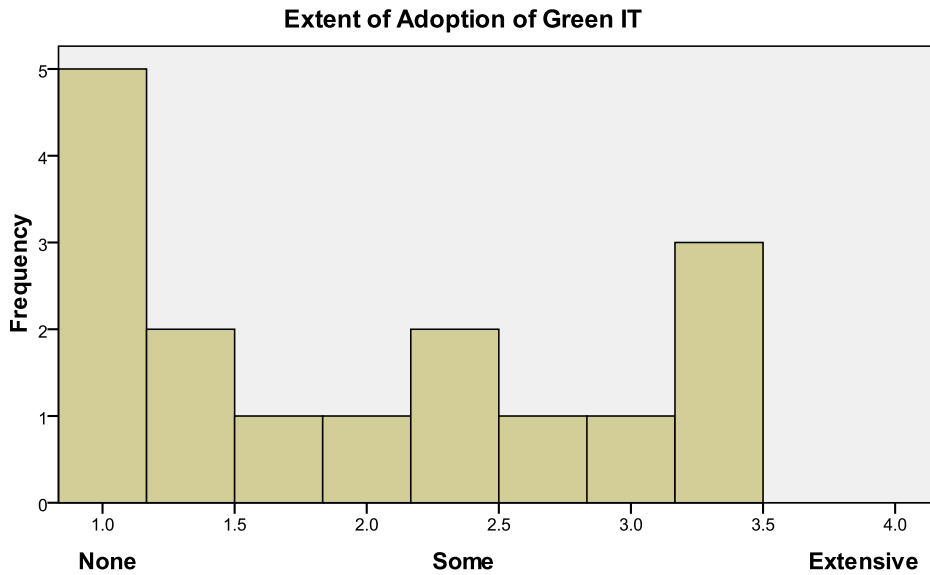
Extent of Adoption of Green IT

Figure 1

Almost half the firms involved in the study had none or very little Green IT activity, but several had made some considerable movement in that direction. In an effort to assess the influence of the various factors affecting the decision to move towards Green IT, regression analysis, using stepwise, was conducted to examine the variance in the adoption variable. The results are provided in Figures 2 and 3.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.772[a]	.597	.568	.5838
2	.841[b]	.707	.661	.5168

a. Predictors: (Constant), Ecological responsibility

b. Predictors: (Constant), Ecological responsibility, Customers

Figure 2

ANOVA^c

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.060	1	7.060	20.712	.000^a
	Residual	4.772	14	.341		
	Total	11.832	15			
2	Regression	8.360	2	4.180	15.653	.000^b
	Residual	3.472	13	.267		
	Total	11.832	15			

a. Predictors: (Constant), Ecological responsibility

b. Predictors: (Constant), Ecological responsibility, Customers

c. Dependent Variable: Adoption

Figure 3

The factors loading in the model suggest that the adoption of Green IT is influenced by the degree of ecological responsibility felt by the organization and the pressure (or not) from customers. These factors are explaining 66% of the variance.

Some organizations indicated that cost savings were the primary reason for the implementation of green IT practices, followed by revenue generation and social responsibility. These are perhaps related to the customers factor identified above. In connection with this it was noted that sales and marketing considerations were more influential than human resources or regulatory ones.   As might be expected all organizations reported the influence of senior management on green IT decisions was stronger than that of other staff. Generally speaking technological considerations were not seen as inhibiting.

LIMITATIONS AND CONCLUSION

This study has several limitations. First the data was collected by students in connection with a class assignment. While every effort has been made to verify the validity of the data, each student may be expected to have interpreted the information provided in a slightly different way – for example, what one student assessed as "sporadic" another may have assess as higher up the scale. The students were given guidelines in class preparation for the study but it might be expected that variations would occur. Secondly the sample size is small and crosses a number of industries … generalizations become problematic. Thirdly the data collected is subject to self-reporting bias – each organization was asked to assess its performance in a number of areas.

Nevertheless the authors believe that the data does provide some insights into the use of green IT in small business. First – there is something happening. Small business is interested and is doing something. What they are doing is very varied and seems to be strongly influenced by its effect on the bottom line. There is an awareness of social responsibility but it may be that this is connected to competitive pressures and sales. Secondly it confirms the expectation that these decisions are being made by the owners or managers. Thirdly it seems that the technology as it exists today is not an inhibiting factor in the decision to implement green IT.

Clearly further work is needed to better understand the position. The authors would like to suggest further studies focused on small business with the following:

1.   A much larger sample size to enable industry by industry assessment and robust generalization
2.   Further development of the research model to take into account factors specifically relevant to small

business (some large scale initiatives under way in large organizations such as virtualization to reduce the size of server farms are not relevant here, whereas the use of cloud computing may be)
3. A longitudinal focus that might provide some insight as to what can expected in future years

It is suggested that green IT offers opportunities for reductions in energy consumption and dependence on foreign oil. In addition there is a current focus on innovation and competition in American business. There are millions of small businesses across America employing tens of millions of Americans. To take advantage of this opportunity America cannot afford to ignore small business – it seems the way to them is via senior management or the owner and through a series of incentives and penalties that affect the bottom line, with a continued focus on social responsibility.

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