An Exploratory Study of Green IT Adoption Issues among SMEs

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Abstract: Green information technology (Green IT) involves systematic consumption of resources through the utilization of IT infrastructure during various stages of product lifecycle to reduce emissions intensity while conserving the wellness of environmental and human health. The focus of this paper is to explore the views and issues of small and medium-sized enterprises (SMEs), who have already implemented Green IT practices, through the use of structured questionnaire. Ten respondents who held various positions in SMEs were interviewed to gauge some of the concerns and challenges experienced by respective companies when implementing Green IT. We elicited their responses on the extent to which they have implemented Green IT practices in their organizations, the experience and pressures that drive the implementation of greener business processes, and also how the implementation have benefited business from the perspective environmental performance. Suggestions on future extensions for those who wish to investigate this study from the context of SMEs are also presented.

1. Introduction

The information technology (IT) industry has kept up with economic growth. Owing to rapid development of information and communication technologies (ICTs) to do 'more with less', we are achieving a heightened level of business efficiency at the expense of environmental degradation. Greener use of information technology and its associated system by individuals and organizations contributes to the pursuit of sustainable environment (Murugesan 2008; Ramayah et al., 2013). The management of green IT composed of energy, emission and waste management. At present, the development of systematic and coordinated approach for managing the environmental impact of ICTs over their entire products' life cycle is premature among both developed and emerging economics. A higher standard of living or operating efficiency should not be attained at the expense of environmental well-being as our nature cannot hold the negative effects of the digital age much longer. Based on a green technology report published by World Economic Forum (2009), several executive officers revealed that ICT-related energy spending is not being monitored, thus creating difficulties in justifying cost reduction improvement projects. The report also pointed out that although overall IT spending rose at a rate of six percent, the cost of running data centre far exceeded this rate by an estimate of fourteen percent annually. Concurrently, IT industry is directly responsible for approximately

two percent of global carbon emissions and this figure is equivalent to total emissions accounted by aviation industry (Gartner 2007).

Alongside multinational corporations, small-medium enterprises (SMEs) play important roles in national development as SMEs are building blocks of economic and social development. The inefficiency of using computing resources is a prevalent issue which required attention. A UK study estimated that SMEs account for at least seventy percent (70%) of pollution and Hillary (2000) argued that the impacts of pollutants released by SMEs are significant despite indefinite information in regards to volume and level of toxicity. According to Zhen (2012), manufacturing-based SMEs perform traditional production methods that are energy-, labour-, and resource-incentive, and may have contributed to environmental degradation instances. Energy efficiency and emissions reduction is acquainted with utilization of Green IT. However, the inclination to adopt pollution prevention initiatives which required limited financial and technical requirements have resulted in low level of eco-efficiency among SMEs (Côté et al. 2006). It is believed that the combined effects of SMEs may surpass the environmental consequences brought on by large organizations. Drawing from Hillary' (2000) rationale in regards to passive responses towards eco-sustainability practices, the circumstances, which inhibit adoption of Green IT practices among SMEs, is as follow;

- Government environmental agencies pay little attention on SMEs' Green IT practices,
- SMEs are inattentive to the environmental impacts of energy inefficiencies within ICTs, including imminent Green IT policies that may affect them,
- SMEs are indifferent towards proactive adoption of Green IT practices, and
- SMEs are relatively difficult to reach or engage if environmental improvement programs are concerned as environmental management is considered peripheral to core business.
- Lack of substantial assets or collateral makes it difficult for SMEs to access financial assistance to invest in Green IT technologies.

Due to limited empirical studies that examine Green IT adoption among small- and medium-sized businesses, this exploratory study seeks to; (1) investigate the influence of institutional pressure, and (2) determine the facilitating conditions, which affect the implementation of Green IT practices. SMEs are chosen as the centre stage of study because these businesses are majorities in most countries if not all. For that reason, special attention is invested on SMEs as they account for a significant proportion of environmental damage. Finally, this paper also looks into the environmental benefits that are derived from implementing Green IT practices. The next section presents the literature review, followed by discussions on research design, as well as findings and conclusion drawn from this study. The final section outlines some limitations and suggestions for future researches.

2 Literature Review

As part of the broader strategy to thrive in the present business environment, firms have obligations to address climate change concerns, particularly global warming and greenhouse gas emissions, as they have captured worldwide attention. There are empirical evidences which showed that SMEs are not keen on dedicating resources to tackle environmental issues and tend to execute reactive rather than proactive measures towards the needs of the environment (Hillary 2004; Côté et al. 2006). Since the significant roles and potential contributions of SMEs towards economic growth have been acknowledged, firms should uptake producers' responsibility for having consumed large volume of resources and generated mass pollution. From the perspective of ICT, the emissions disseminated by equipments' lifecycle throughout production, consumption and product retirement phases deserved attention. As there is a growing needs to utilize greener IT, literature review discusses this aspect from institutional theoretic perspectives. This is followed by an examination on the facilitating conditions that

create a setting conducive for Green IT adoption, and the successive effects on environmental performance.

2.1 Green IT

The utilization of ICTs in greener businesses aims to conserve the natural environment by achieving better energy efficiency and equipment utilization (Watson et al. 2008). Firms adopt eco-sustainable approaches based on three environmental protection strategies, and they are pollution prevention, product stewardship and sustainable development. These strategies should not be viewed as cost of doing business but rather opportunities to reduce energy and material demand to 'do more with less'. The adoption of Green IT as an environmentally friendly initiative is parallel with the objectives of socio-economic development. According to Murugesan (2008), green objectives are incorporated with product lifecycle to address environmental impact of IT equipment and this conceptualized green design, green manufacturing, green use and green disposal (Ramayah et al., 2013). Molla et al. (2009) extended this concept to include green sourcing and considered the element of human and/or managerial aspects in managing IT infrastructures. The term, Green IT, is formally defined as 'the systematic planning, implementing and controlling the ecologically-friendly and efficient consumption of raw material and energy by IT infrastructures during design, manufacture, use and disposal to reduce emissions intensity, while maintaining firm's conformance to the goals of pollution prevention, product stewardship and sustainable development.' Bose and Luo (2012) proposed four broad objectives that facilitate the application of eco-friendly standards on IT. They are;

(1) Use natural and renewable resources for the purpose of sustainable consumption,
(2) Reuse and recycle used IT products, such as materials, components and subassemblies,
(3) Minimize or eliminate waste and pollution by adjusting conventional production and consumption patterns, and
(4) Continuous improvement on environmentally-oriented practices to conserve the well-being of environmental and human health.

Regardless of firm's nature of business, improving the environmental performance of SMEs is imperative as they are the engines of the society. Literatures have proposed quite a number of Green IT applications as solutions for reducing carbon emissions (Erek et al. 2009; Lee et al. 2013; Molla 2009; Park et al. 2013). These IT solutions complement the objectives of: (1) Energy efficiency, i.e. server and storage virtualization, cooling

optimization, personal computer power management, and energy efficient appliances; (2) Green office, i.e. printing optimization and cloud computing; (3) Green transport, i.e. telecommuting, video conferencing, and intelligent transport systems; (4) Green industries, i.e. smart building, smart appliances, and smart applications that uses sensor networks; (4) Waste management, i.e. minimize and control hazardous waste, and reuse and recycle resources. It is not surprising to find that SMEs shy away from investing in Green IT solutions as they could be slightly overwhelming to firms' financial capability. Currently, the adoption of green technologies by local businesses holds rooms for improvement as only straightforward environmental programs were implemented, for example, recycling activities, and establishment of specific goals to reduce wastes, discharges and emissions (Rasi, et al. 2010).

Nevertheless, the capability to integrate green process and product innovation with present business activities promises competitive advantage on top of improved environmental performance (Chiou et al. 2012). These positive outcomes make take longer to materialize among SMEs as studies have shown that the uptake of green initiatives by means of ICT is relatively laid-back even among large organizations. Literatures have stated that SMEs are generally reactive by nature (Coffey et al. 2013). Only selected few sustainable issues are addressed due to limited technical and financial commitments (Côté et al. 2006). They may include, but not limited to, printing optimization, replace desktop with laptop, automatically power off idle computers, and use energy-efficient bulbs. According to Gholami et al. (2012), the application of ICT to operationalize day-to-day activities efficiently is a green capability and business practices with higher sustainable values are more likely to score better environment-related benefits. Consistent with this judgment, Meacham et al. (2013) indicated that environmental performance is also determined by the extent of environmental monitoring and collaboration between supply chain players. This likelihood is due, in part, to information availability via green information system as corrective actions can be undertaken as soon as abnormalities occur. The installations of computing software enable business functions to make informed decisions or to take precautionary measures that eliminate cost of inefficiencies. In the effort to institutionalize green behaviour, some firms have either instated green policies (Molla, 2009; Gholami et al. 2013) or set specific goals to reduce overall wastes and hazardous emissions (Rasi et al. 2010; Zhen 2012; Coffey et al. 2013). These moves, along with leadership qualities, are favourable for SMEs to ascend towards higher environmental commitment via long-term strategic

thinking. Although Coffey et al. also pointed out that managers or owners of SMEs exert positive attitude towards the environment and acknowledge the marketability of environmentally sustainable business operations, these values are nevertheless insufficient to drive SMEs in making strategic decisions that are environmentally-friendly oriented. Therefore, the following subsections examine the roles of facilitating conditions and institutional pressures, particularly coercive and mimetic pressure, in driving the implementation of Green IT. Small- and medium-enterprises require considerable guidance, support and cooperation from various stakeholders to step up and participate in proactive environmental strategies.

2.2 Facilitating Conditions

With reference to the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003), facilitating conditions is identified as one of the determinants of UTAUT model and this study intends to analyze its influence on Green IT implementation. Based on literatures, facilitating conditions is defined as the degree to which individuals believe that supporting mechanisms, such as organizational and technical infrastructure, are well-prepared to support the use of technology (Venkatesh et al. 2003; Lang and Molley, 2013). Facilitating condition, as the term denotes, is the environment to which the technology is applied and that resources are available to address possibilities of abnormalities. The use of technology is directly influenced by the level of facilitating conditions experienced by end users. Favourable conditions that affect the intention to use Green IT may include: knowledge and technical support, complexity of green technology, compatibility of current and new technology, availability of clear and concise instruction manual, derivable convenience from using newer technology, and others. According to Venkatesh et al. (2012), facilitating conditions can be considered as proxy for actual behavioural control as they directly influence users' behaviour. Moreover, users who lacked in experience or familiarity towards technology are expected to exert higher dependence on facilitation conditions (Notani 1998). In the effort to ease the implementation of Green IT among SMEs, it is important that adequate training and on-going support are provided so that employees are receptive to green practices that are supposed to simplify business processes, deliver cost savings and reduce environmental burdens.

2.3 Institutional Pressure

Institutional theory is applied to explain how individual organizations and organizational fields develop a consensus on sustainability issues and

uptake a homogenous approach towards the development of ecologically sustainable organizations (Jennings and Zandbergen 1995). As the pressure to conform to 'rule like, social fact quality' gains acceptance among the broader society, organizations are compelled to align their structure and business functions in accordance with social norms institutionalized by firms' operating environment (Zucker 1987). Institutional theoretic perspectives are concerned about the influence exerted by internal and external factors unto firms to induce analogous practices overtime. Therefore, the institutionalization of Green IT practices among early adopters such as multinational corporations can be easily transferred or imitated by firms who are experiencing the pressure to reduce environmental impacts of their operating activities.

2.3.1 Coercive Pressure

As institutionalization is a process for instilling values, the critical role of coercive pressure, such as legislations and regulative framework, has long been recognized as a major driver to the adoption of environmental management practices. Quite a number of green policies, and regulations were introduced by the U.S. Government to encourage the development of green initiatives. For small businesses, the Environmental Protection Agency are somewhat supportive as a series of green opportunities or facilities, such as patents, solicitations, grants and resources for research and development, has been introduced to encourage these business entities to benefit from sustainable initiatives. These assistance programmes are important to SMEs prior to the introduction of mandatory regulatory requirements dedicated to Green IT products and practices. The passing of a directive on Green IT management is a forthcoming occurrence (Gholami et al. 2013) and maintaining ignorance to such possibilities is not cost-effective in the long run. Previous studies have acknowledged the role of coercive pressure in predicting the adoption of Green IT (Chen et al. 2011; Coffey et al. 2013). Although coercive pressure influences managers' attitude towards the environment (Gholami et al. 2013), a study by Coffey et al. (2013) indicated that representatives of SMEs perceived that implementation of regulations would be detrimental to business. On the contrary, other study showed that regulations are successful in raising SMEs' environmental commitment although they have been viewed as additional cost burden (Rutherfood et al. 2000).

In the case of China, the State Council has allotted the carbon intensity reduction targets to all provinces (Zhen 2012). Thereafter, the provincial government are responsible for developing the respective action plan and strategies to accomplish the goals of economic growth by means of low-carbon approaches. At the point of writing, SMEs in Malaysia are free to be innovative in adopting Green IT practices that meets their environmental goals as detailed guideline on management of sustainable environment, National Green Technology Policy, is under development. However, the outcome from freedom of choice or self-regulation towards Green IT implementation is expected to be somewhat futile. This is supported by Rutherfood et al. (2000), who indicated that reliance on supply chain pressures and promotion of win-win opportunities to evoke firms' environmental proactiveness are not as successful as perceived. Regulations are meaningful to SMEs which have engaged in environment friendly practices but they exert no effects to SMEs who deliberately chooses to ignore regulations (Coffey et al. 2012). Although regulations present guidance for green practices, these firms normally clean up their acts through environmental management system as attainment of ISO 14001 certification fulfils customers' requirement. As the effect of regulations is inconclusive, this study analyzes the influence of coercive pressure on the implementation of Green IT among SMEs.

2.3.2 Mimetic Pressure

Basically, the ease of implementing the concept of sustainable values is accompanied by the level of rationalization extended by organizational actors of existing social and ecological systems (Jennings 1995). As Green IT is considered as emerging practise, mimetic pressure plays a more significant role than normative pressure because the industry benchmark is a reliable point of reference to justify SMEs intention to implement green practices. Mimetic pressure, also known as mimetic isomorphism or competitive pressure, influences firms to adopt higher environmental standards than other firms which operate on similar level playing field. Based on the perspective of cost-benefit analyses, it is difficult to justify the intention to act in favour of environmental well-being by means of pollution prevention, product stewardship and sustainable development as environmental benefits cannot be measured. Therefore, firms may opt to mimic other firm' behaviour to maintain legitimacy and minimize the risk for becoming a first-mover (DiMaggio and Powel, 1983; Bansal and Roth, 2000). In other words, if competing firms experienced significant improvement in operating efficiencies and reduced resource consumption due to adoption of Green IT, the presence of win-win situation encourages firms to acquire or develop similar capabilities that potentially

elevate SMEs' environmental and economic performance.

The three distinctive approaches to mimetic isomorphism are: (1) frequency-based imitation; (2) trait-based imitation; and, (3) outcome-based imitation (Hausnchild & Miner, 1997). Generally, firms exercise outcome-based imitation as copying desired outcome is a rationally secured option. Gholami et al. (2013) argued that mimetic pressure does not influence managers' attitude in regards to environmental sustainability. On the contrary, Chen et al. (2011) presented evidence on the significance of mimetic pressure, particularly outcome-based imitation, in predicting the adoption of Green IT to achieve various level of eco-efficiency. Although SMEs may choose to ignore mimetic pressure, market-driven factors will catch up because there is a growing clientele who have higher environmentally consciousness and are willing to adopt green technology (Yang et al. 2013). Therefore, SMEs should adopt Green IT practices to create a competitive barrier and gain an advantage over other enterprises. When more firms including supply chain partners implement green technologies due to promising benefits or regulatory compliance, SMEs that disregard environmental friendly practices could put themselves at risks because the adoption of Green IT involves development of process-based capability that is fairly time-consuming. Based the abovementioned grounds, there is a need for this study to analyze the influence of mimetic pressure on the implementation of Green IT among SMEs.

2.4 Environmental Performance

Performance measurement is a point of reference to monitor and control the outcome of events. Gunasekaran, et al. (2004) defined performance measurement as the parameter for companies to achieve their desired goals. It serves as a guideline for business to set objectives, implement desired practices, evaluate performance and determine future course of actions. Environmental performance is a familiar performance measure for environmental management practices, such as: green supply chain management (Zhu et al. 2007); alignment of green practices and IS functions (Ryoo and Koo 2013); green information system (Gholami et al. 2013; Meacham et al. 2013); green product and process innovation (Chiou et al. 2011); sustainable IT practices (Nikkheslat et al. 2012); and environmental management system (Melnyk et al. 2003). Environmental performance focuses on implementing business activities that conform to the objectives of environmental preservation and conservation. At other times, maintaining environmental performance is important for SMEs to ensure compliance with regulatory and contractual requirements, as well as, continuation of good environmental reputation. Normally, firms utilize ICTs to conduct greener business so as to achieve reduction of waste and/or hazardous emissions, perform recycling activities, fulfill requisites of environmental certification, and accomplish greener purchasing and distribution practices.

3.0 Research Design

The study collects data by administering the questionnaire survey to ten representatives of SMEs who are implementing Green IT practices on their business operations currently. The survey instrument is developed based validated measurements found in green information system and environmental management literatures. Refer to Table 1 for the list of measurement items adopted from previous literatures. Based on purposive sampling method, respondents were asked to fill up a structured questionnaire which consisted of 5 sections. They are, organized as follow: Section 1 composed of six items that focuses on the extent of Green IT practices; Section 2 composed of five items that addresses the perceived behavioural control that facilitates the implementation of Green IT; Section 3 consisted of six items which examine the influence of coercive and mimetic pressure on the implementation of Green IT; Section 4 consisted of eight items which investigate the benefits from implementing green IT; and, Section 5 collects information on the demographic profile of survey respondents. All ten surveys were filled up completely and these data are used for further analysis.

4.0 Survey Results
4.1 Demographic Profile

Table 2 presents the demographic profile of the respondents and the small-medium enterprises who participated in this survey. The respondents were managers (5), business owners (3), and chief financial officers (2). At least 70 percent of the firms operated as sole proprietorship whereas 30 percent were private limited companies. In regards to firm size, 50 percent of the firms were small-sized and medium-sized enterprises, respectively. For length of experience in existing business, four respondents have served for six to ten years whereas two firms are recorded in each of the remaining categories.

4.2 Descriptive Statistics

The implementation of Green IT practices among ten business enterprises can be seen in Table 3. Based on the mean values, firms portrayed the highest preference to installation of software to make the product distribution and delivery more environmentally friendly ($\bar{M}$ = 4.00, SD = 0.471), but

rendered the lowest preference to installation of software to make material sourcing and acquisition more environmentally friendly ($\overline{M}$ = 3.70, SD = 0.483). The respondents also support the installation of software to reduce overall waste, encourage employees to telecommute, approves of the transformation to existing business processes to paperless office.

In terms of facilitating conditions for implementation of Green IT, the mean scores as seen in Table 4 shows that the respondents agree that their firms had the resources, knowledge and ability to use green IT ($\overline{M}$ = 3.90, SD = 0.316). Although they generally agree that Green IT practices are clear and understandable ($\overline{M}$ = 3.70, SD = 0.483), the respondents indicate a lower agreement towards the

ease of implementing ($\overline{M}$ = 3.60, SD = 0.516) and the ease of controlling activities ($\overline{M}$ = 3.50, SD = 0.527) related to Green IT practices. As they somewhat agree that environmentally friendly practices are simple to follow ($\overline{M}$ = 3.40, SD = 0.699), this may be an indication of slight resistance among employees. For institutional pressure, the respondents were asked to rate the level of coercive and mimetic pressure experienced from implementing Green IT practices. Table 5 presents the mean value for both dimensions of institutional pressure. For coercive pressure, current and forthcoming regulatory requirements ($\overline{M}$ = 3.85, SD = 0.682) are the main driver for green IT implementation.

Table 1. Constructs and measures

Construct	Items	Source
Green IT	My firm has policies that encourage installation of software to reduce overall emissions. My firm has policies that encourage installation of software to reduce overall waste. My firm has policies that encourage installation of software to reduce overall use of hazardous and toxic materials. My firm has policies that encourage installation of software to make material sourcing and acquisition more environmentally friendly. My firm has policies that encourage installation of software to make the product distribution and delivery more environmentally friendly. My firm has policies that encourage online collaboration tools (beyond email) to substitute for travel (e.g. video conferencing, etc.).	Gholami et al. (2013)
Facilitating Condition	Green IT practices are easy to implement. Green IT practices are simple to follow. Green IT practices can be easily controlled. Green IT practices are clear and understandable. My firm has the resources, knowledge and ability to use green IT.	Gopi & Ramayah (2007)
Institutional Pressure	**Coercive Pressure** Current and foreseeable regulations are pressuring my firm to adopt Green IT practices. My firm's suppliers are pressuring us to adopt Green IT practices. My firm's major customers are pressuring us to adopt Green IT practices. **Mimetic Pressure** My firm's main competitors who have adopted Green IT practices benefitted greatly financially. Within my firm's supply chain management those who have adopted Green IT practices have benefited greatly financially. Within my firm's supply chain management those who have adopted Green IT practices are perceived.	Gholami et al. (2013) Gholami et al. (2013)
Environmental Performance	Environmental certification. Reduction of waste. Reduction of emissions. Recycling performance. Environmental compliance improvement. Improved corporate image. Preserve environment. Social commitment.	Melnyk et al. (2003)

Table 2. Profile of respondents and company

Respondent	Position	Ownership	Size	Experience	Type
1	Owner	Proprietorship	Small	11-15 years	Wholesaler
2	Owner	Private Limited	Medium	16 – 20 years	Construction
3	Owner	Proprietorship	Medium	1 -5 years	Food
4	CFO	Proprietorship	Medium	6 – 10 years	Food
5	CFO	Proprietorship	Small	6 – 10 years	Travel
6	Manager	Private Limited	Medium	6 – 10 years	Construction
7	Manager	Proprietorship	Small	6 – 10 years	Food
8	Manager	Private Limited	Small	16 – 20 years	Retailer
9	Manager	Proprietorship	Small	1 – 5 years	Transportation
10	Manager	Proprietorship	Medium	11 – 15 years	Manufacturer

The respondents also pointed out that they are experiencing pressure from suppliers and customers to adopt green practices in doing businesses. For mimetic pressure, the respondents indicated that awareness towards competitors' financial benefits due to green IT implementation ($\bar{M}$ = 3.90, SD = 0.316) was a stronger source of influence that the financial benefits generated by internal supply chain members.

Table 3. Extent of green IT implementation

Item	Mean	Std. Dev.
My firm has policies that encourage installation of software to reduce overall emissions	3.75	.491
My firm has policies that encourage installation of software to reduce overall waste	3.90	.738
My firm has policies that encourage installation of software to reduce overall use of hazardous and toxic materials	3.80	.422
My firm has policies that encourage installation of software to make material sourcing and acquisition more environmentally friendly	3.70	.483
My firm has policies that encourage installation of software to make the product distribution and delivery more environmentally friendly	4.00	.471
My firm has policies that encourage online collaboration tools (beyond email) to substitute for travel (e.g. video conferencing, etc.)	3.80	.789
My firm has policies that encourage employee telecommuting	3.90	.316
My firm has policies that encourage transforming its business processes to be paperless	3.90	.568

Scale:1 = Strongly disagree; 5 = Strongly agree

For environmental performance, the respondents are enquired about specific benefits derived from implementing Green IT. Table 6 presents the mean values and standard deviation for each measurement items of environmental performance. Based on 5-point Likert-type scale, the mean values recorded by four items scored 4 and above, and they, in the order of highest to lowest, are higher social commitment ($\bar{M}$ = 4.20, SD = 0.632), preservation of environment ($\bar{M}$ = 4.10, SD = 0.568), improved environmental compliance ($\bar{M}$ = 4.10, SD = 0.738), and enhanced corporate image ($\bar{M}$ = 4.00, SD = 0.816). The items which scored slightly lower mean value are certification of environmental management practices ($\bar{M}$ = 3.90, SD = 0.312), reduction of waste ($\bar{M}$ = 3.90, SD = 0.316), reduction of emissions and improved recycling performance ($\bar{M}$ = 3.80, SD = 0.422). Despite the fact that companies are implementing environmentally friendly practices currently, these scores imply that SMEs are experiencing challenges in the effort to eliminate and reduce waste and/or emissions.

Table 4. Facilitating conditions of Green IT implementation

Item	Mean	Std. Deviation
Green IT practices are easy to implement	3.60	.516
Green IT practices are simple to follow	3.40	.699
Green IT practices can be easily controlled	3.50	.527
Green IT practices are clear and understandable	3.70	.483
My firm has the resources, knowledge and ability to use green IT	3.90	.316

Scale:1 = Strongly disagree; 5 = Strongly agree

5.0 Discussions and Conclusion

On overall, the results of the descriptive analysis showed that SMEs are receptive towards the implementation of Green IT practices and SMEs are aware that environmentally friendly business conducts have potential in generating better environmental performance. This study showed that external factors, such as coercive and mimetic pressures, and internal factors, such as facilitating conditions, are important drivers that encourages SMEs to 'green' their businesses.

In the effort to improve SMEs' environmental performance, firms are inclined to acquire IT software that improve the efficiency and effectiveness of product distribution and delivery. Due to visibility of information from the use of IT, firms are able to better manage inventories and attain improvement in not only on-time deliveries but also, improvement in acquisition of materials. This study also showed that SMEs are active in picking the low-hanging fruits to prevent pollution by installing software that reduce the generation of waste, facilitate the transition to paperless office, and enable teleconferencing or telecommuting, and others. One of the reasons for such environmental commitment could be in due part to the fact that SMEs are major suppliers of large corporations and are compelled to oblige by customer's environmental requirements. Although these Green IT initiatives are relatively straightforward, SMEs believed that using IT allow firms to: (1) comply with environmental standards outlined by certification bodies; (2) enhance corporate image due to improved recycling performance, reduce waste and/or emission; and (3) fulfill firm's corporate social responsibilities. According to Rasi et al. (2010), these enterprises have few resources and recycling activities serve as additional income due to cost saving opportunities.

Table 5. Institutional pressures of green IT implementation

Item	Mean	Std. Dev.
Coercive Pressure		
Current and foreseeable regulations are pressuring my firm to adopt Green IT practices.	3.85	.682
My firm's suppliers are pressuring us to adopt Green IT practices.	3.70	.675
My firm's major customers are pressuring us to adopt Green IT practices.	3.80	.632
Mimetic Pressure		
My firm's main competitors who have adopted Green IT practices benefitted greatly financially.	3.90	.316
Within my firm's supply chain management those who have adopted Green IT practices have benefited greatly financially	3.60	.516
Within my firm's supply chain management those who have adopted Green IT practices are perceived	3.70	.823

Scale:1 = Strongly disagree; 5 = Strongly agree

Table 6. Environmental performance

Item	Mean	Std. Deviation
Environmental certification	3.90	0.316
Reduction of waste	3.90	0.312
Reduction of emissions	3.80	0.422
Recycling performance	3.80	0.422
Environmental compliance improvement	4.10	0.738
Improved corporate image	4.00	0.816
Preserve environment	4.10	0.568
Social commitment	4.20	0.632

Scale: 1 = Strongly disagree; 5 = Strongly agree

Previous study argued that small businesses are unlikely to take a leadership role in Green IT and will wait for consensus to emerge rather than investing in uncertainties (Coffey et al. 2013). Therefore, the best approach to encourage business owners of SMEs to get involved is the development of regulations to ground some environmental and economic objectives for implementing Green IT. This study showed that SMEs are paying attention to current and future regulations. Maintaining compliance to the regulations is important for the survival of businesses that serve large industrial players, who in turn serve consumers that are becoming more informed about issues resulting from non-sustainable consumption of resources. The study also indicated that SMEs may consider the greening with IT if competitor or other members of the supply chain are gaining financial benefits from becoming

effective, efficient and eco-friendly. According to Côté et al. (2008), the benefits derived from single actions in the supply chain may be small but the cumulative effort by the whole supply chain as well as members of the industrial zone would generate significant reduction of green house gas emissions and solid wastes. The large number of enterprises supporting the industry reflects the size of positive contributions due to slight change for the betterment of environment. Nevertheless, it is important to note that for the Green IT to be implemented, they should fulfill the facilitating conditions outlined in this study, such as having the resources, knowledge and capability to use IT, ease of controlling, ease of implementation and so forth.

This study is descriptive in nature and can only conclude that SMEs are aware of benefits of environmentally friendly practices. As it is unlikely to expect self-regulation among SMEs for implementing Green IT, future studies should empirically investigate the role of institutional stakeholders and facilitating conditions in a larger sample. It would also be valuable to analyze the derivable economic benefits from implementing Green IT since financial gains are the primary objective of doing business. In the effort to gather higher commitment in Green IT and greening with IT, this initiative might be effective if the demand for eco-oriented products came from larger society particularly environmentally aware consumers.

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