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A Preliminary Study of Green IT Readiness in Indonesian Organizations

Minsani Mariani[1*] Karen Imam[2]

1. School of Information Systems, Binus International, Binus University, Jakarta, Indonesia
2. School of Management, Binus International, Binus University, Jakarta, Indonesia

* E-mail of the corresponding author: mmariani@binus.edu

Abstract

As a follow-up to the previous study titled "IT Professionals Awareness: Green IT International Comparison Study" written in 2010 by Widjaja, Mariani and Imam, this paper aims to measure Green IT readiness among twenty organizations in Indonesia as an early indicator to understand the implementation of Green IT initiatives in Indonesia. The findings were then compared with results derived from similar studies of 143 organizations from Australia, New Zealand and the USA. Overall, the findings show that the surveyed organizations lacked adequate level of readiness of Green IT implementation. Current initiatives related to Green IT were driven by cost reduction. Finally recommendations are proposed to help organizations implement their Green IT initiatives

Keywords: Green IT, Sustainability, Indonesia

1. Introduction

In this era of globalization when individuals and corporations are pursuit of constant improvement, faster communication and interconnection, IT performs a strategic role in business. Various theories have been proposed regarding the role of IT in business, such as Powell and Dent (1997): IT as an element of human resources; IT as an element of business resources; and IT as element of technology resources. These increasingly prevalent elements evoke two aspects of Green IT: *IT as part of the problem* and *IT as part of the solution*.

The first aspect relates to a strategy integrating green initiatives in each phase of the IT product life cycle as advanced by the National IT and Telecom Agency in the "Green IT guidelines for public authorities" (2008):

- The *development* phase aims to integrate green material in the design of the IT products and processes to reduce the energy consumption as well as minimise the waste
- The *production* phase aims to lower the cost of the production process by reducing the energy consumption as well as trying to use energy subsidies to reduce CO2
- The *usage* phase enhances the organizational behaviour of the company in term of users, strategy, infrastructure
- The *disposal* phase is far from the most difficult phase to integrate with IT. Companies as well as governments play a strong role, the first one by controlling the purchase and usage of the IT products; the second one by creating and implementing strict regulations

The second aspect casts IT as part of the solution for tackling environmental issues, from enabling analysis of carbon footprints, monitoring and reporting capability to deploying IT solutions to increase energy efficiency and reduce carbon footprints (Molla et al., 2009).

The latest data from the World Bank shows that with an average GDP growth of 6.1% in 2009 and a population of 230 million, Indonesia represents a major economic actor in South East Asia and the rest of the world; moreover, Indonesia plays an important role within the ASEAN region and G20. The World Bank publication also indicates that in 2009 only 1% of Indonesians had access to internet while 63% owned cellular phones. It is then critical to understand the urgency of implementing Green IT in Indonesia.

2. International background

In the United States, The Environmental Protection Agency has launched its Environmentally Preferable Purchasing

(EPP) program in 1993. As explained on the EPA website [retrieved on June 30th, 2010]: "EPP helps the federal government 'buy green,' and in doing so, uses the federal government's enormous buying power to stimulate market demand for green products and services. As far as IT is concerned, EPP supports IT equipment's suppliers who have fulfilled the green standards applied by EPA and promotes software to measure the energy consumption and efficiency of data centers and IT supplies".

Closer to South East Asia, Australia is a good example of Green IT integration. The government has taken serious initiatives to position Australia as one of the most proactive nations in term of Green IT. Based on the information shared on the Department of Finance and Deregulation website [retrieved on June 30th, 2010], the Australian government has developed some guidelines for the private and public sector. The main priorities listed include some basic changes like the usage of blank screens or static screen savers instead of active screensavers or the necessity to provide automatic shutdown of desktops and laptops after office hours. It is also suggested that agencies should measure the power consumption of IT as a component of total power use, as well as using tools and practices to assist employees reduce the number of printed pages per employee per month. Lastly, agencies should replace inefficient monitors at the end of their life cycle with more energy-efficient models (e.g. replace CRT monitors with more energy-efficient alternatives) and finally they are requested to undertake a telephone audit and to consider technologies that optimize energy-efficiency and minimize duplication of handsets per employee.

3. Green IT Readiness framework

Molla (2009) developed two-dimensions of Green IT – *Green IT Reach* and *Green IT Rich*. Green IT Reach refers to the extent to which Green IT is permeating an organization's IT activity chain from sourcing/development, operation, to end-of-IT-life management. While Green IT Rich refers to the extent of maturity of Green IT policies, practices and technologies. These dimensions combined to form a matrix named the "Green IT Reach-Richness Matrix" as shown in Table 1. The maturity level in Green IT reach and richness will indicate the strength of a firm's Green IT strategy and commitment to the main goals of Green IT initiatives: reduction in e-waste, reduction in energy consumption, reduction in green house gases, reduction in water and its ability to generate economic return out of the initiatives.

4. Research Method

This research is largely descriptive providing a preliminary insight into the Green IT diffusion in Indonesian organizations with a comparison of previous results in other countries. In 2009, Molla and Corbitt (2009) conducted a similar survey of 143 organizations from three countries: Australia, New Zealand and the USA.

The questionnaire was uploaded to a website, from October to December 2011, to allow participants to access the survey easily. The first selected sample was based on the same data that the previous research on Green IT Awareness but narrowed to financial institutions. However following the low response rate, the survey has been sent a second time to the whole database which meant various sectors responded. With not much feedback, the author has tried to extend the research to wider database by asking help from the organizer of the Indonesian Green IT conference 2011 as well as to the research department of their institution. Unfortunately the sample has shown a very poor interest in supporting this research and after sending the questionnaire to more than 1000 persons, only 20 replied. This rate could have been influenced by several causes. It was the end of year, a busy period where most of the managers have to focus on their team achievement. Other possible cause is that the questionnaire was written in English; in addition, the low Green IT readiness of the sample organizations could have influenced the motivation to respond.

5. Profile of Respondents

Among the 20 surveyed institutions, 65 percent of the respondents were Senior Managers ranging from Chief Executive Officer, Chief Information Officer or IT Department Head. Others (35%) held various positions such as IT Consultant, IT manager and IT support. The industry backgrounds varied from Financial (30%), IT (30%), Telecommunication (25%) and the remaining 15 percent consisted of two government institutions, a media corporation, an education institution and an automobile dealer.

6. Results

6.1 The pervasiveness of Green IT awareness

Awareness among IT and business leaders play a significant role in deploying Green IT initiatives. It measures the

extent to which they are aware and interested about the economical, strategic, regulatory, environmental and social concerns related to the use of IT. As described by Galtung (1986), whether an individual joins the green movement, is dependent on subjective motivation and subjective capability. In addition, Chan and Yam (1995) found that to encourage people to act environmentally, emotional appeal has a stronger impact than logical reasoning or factual description of harmful effects from environmental pollution, as the knowledge of an individual is only weakly related to self-reported actual environmental behaviour. Therefore IT and business leaders' attitude to environmental concerns will be one of a key factor in determining the effectiveness of an organization in tackling the Green IT issues.

Findings shows the efficiency of cooling and lighting data centres and IT energy consumption as the top issues. This result replicates similar trends in other countries surveyed in 2009 but the level of maturity was higher than the result derived in Indonesia. Figure 1 depicts the comparison of the pervasiveness of Green IT awareness between Indonesia and other countries.

6.2 The Maturity of Green Policies

The maturity of Green policies measures the extent to which green and sustainability policies are developed throughout an organization and permeate the value chain. Three value chain areas can be considered to assess the extent of the maturity of Green IT policies - IT sourcing, IT operations/services and IT end-of-life management (Molla, 2009).

The result indicates deficiencies in having such policies in place in Indonesia. Despite the level of maturity, employees use of IT in an energy-efficient manner is the top issues. It demonstrates the policies related to green issues in Indonesia are still at a very basic stage while other countries show more coverage. Figure 2 explains such comparison.

6.3 The Maturity of Green IT Sourcing Practices

The maturity of Green IT sourcing practices measures the extent to which environmental considerations are factored in IT and other purchasing decisions. Rao and Holt (2005) argued that green sourcing revolves around evaluating the environmental behavior of suppliers and partnering with suppliers to improve their performances. Therefore involvement of suppliers is a critical element of Green IT sourcing practice. The result derived from the surveyed Indonesian organizations shows very little concern about environmental consideration. In comparison such practices were more widely deployed in New Zealand, Australia and the USA as shown in Figure 3.

6.4 The Maturity of Green IT Operation Practices

The maturity of Green IT operation practices examines the extent of actions to reduce power consumption. Such actions can range from clients to server. For example, at the client level, such as "slowing down processors, spinning down hard disks and shutting off monitors" while the server level includes retiring systems, operating existing systems in an efficient manner; and migrating to more energy efficient platforms by using, for example, blade servers. The result derived from Indonesian organizations indicates a lack of such practices. Figure 4 compares Green IT operation practices maturity between Indonesia and other countries.

6.5 The Maturity of Green IT disposal practices

The maturity of Green IT disposal practices measures the compliance of equipment/machinery manufactures, users, and resellers in Green IT end of life management. Alsever (2008) stated that IT manufacturers should provide information whether the IT equipment and/or packaging is reusable because crushing and/or burning these IT equipments or materials could harm the environment. The finding shows that such practices were poorly deployed in the surveyed Indonesian organizations while other countries result indicated a higher degree of maturity as described in Figure 5.

6.6 The Maturity of Green IT Technologies & Green Data Center Physical Infrastructure

The maturity of Green IT Technologies measures how an organization acquiring more environmentally effective (greener) technologies. Some of the commonly adopted green technologies include server virtualization, IT recycling, data centre energy optimization and rightsizing IT equipment (Info~Tech, 2007). Despite the lower maturity compared to the result from other countries, Indonesian organizations showed better maturity level in Green IT Technologies in comparison of other elements of Green IT maturity levels (Figure 6 and Figure 7). This result

indicates that the key driver of deployment of "greener" technologies is more influenced by cost reduction.

6.7 Green IT Governance

Green IT Governance refers to the management infrastructure to implement Green IT. It is the operating model that defines the administration of Green IT initiatives (Molla, 2009). It is needed to establish clear roles, responsibilities, accountability and control of Green IT initiatives. The result shows deficiencies in establishing clarity of management infrastructure related to Green IT initiatives implementation. Figure 8 shows the comparison of Green IT Governance between Indonesia and other countries.

7. Discussion and Conclusion

Based on the data gathered, we can conclude that the understanding and adoption of Green IT in Indonesia still has a lot of room for improvement. In comparison to the 2009 data from US, New Zealand and Australia, for which technically Green IT should still, be in its early stages, Indonesia is showing significant deficiencies in both the breadth and depth of Green IT adoption.

Reducing energy consumption has been the focus and effective driver in the pursuit of corporate environmentalism's target as well as a top priority for organizations seeking ways to reduce costs. Research conducted by IDC (2007) supported this argument that IT organizations rate power efficiency of products and systems as their number one concern. Power reduction initiatives such as new data centre designs and architectures, consolidated facilities, consolidated servers, blade technology, and virtualization have led to environmental sustainability or "Green IT" benefits and reductions in carbon emissions. However, focusing merely on data centres will not be sufficient. A broadened approach has been deployed which also takes into account the entire lifecycle of IT equipment including acquisition, utilization, and retirement. The findings on Indonesian context show a higher maturity on Green IT technologies compared to other maturity levels. This result indicates that one strategy for reducing energy consumption has been deployed through "greener" technologies.

Stronger effort to broaden financial objectives to the other organizational objectives such as environmental objective (managing IT life cycle) as well as corporate social responsibilities (managing social impact with broad stakeholders) are required. Policies and practices to control organizational behaviour in reducing carbon footprint are suggested to be developed and deployed referring to the three objectives: financial, social and environmental sustainability. The next challenges will be monitoring and auditing the implementation of Green IT initiatives. Last but not least, commitment from the stakeholders is important. This commitment can be attempted by having a continuous dialogue among the stakeholders.

A limitation of this research is the small sample size. Therefore the findings will only be considered as a preliminary study and further data is required before conducted any generalization. Further research on wider geographical and industry samples is recommended. It is also suggested to conduct a similar survey within the same year in order to avoid any findings' difference due to the time line. This research can be repeated every year to keep abreast of the progress of awareness level in each country. Conducting online surveys might be considered in order to spread the questionnaire to other countries with the help and support of other universities or companies that have an interest in Green IT.

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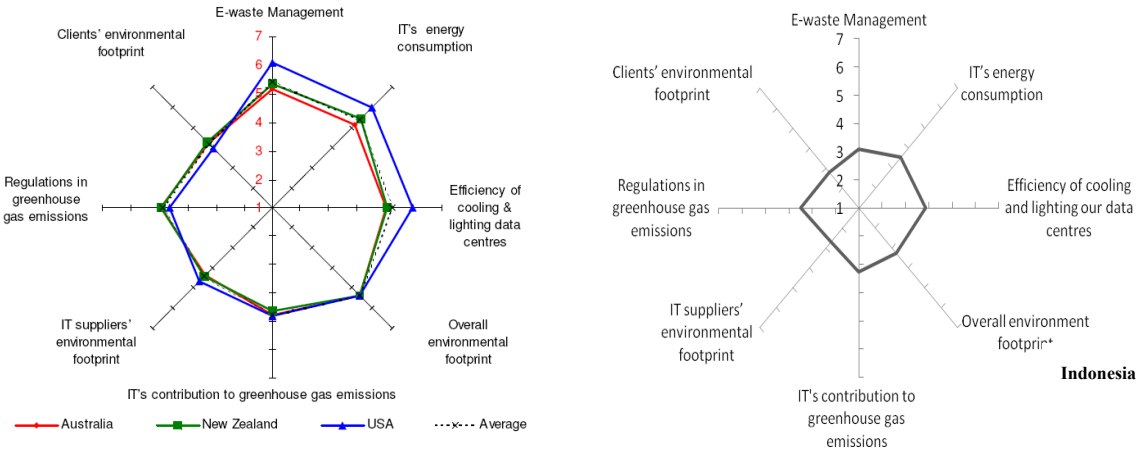
Minsani Mariani was born in Jakarta, Indonesia in 1966. She earned her bachelor degree in Electrical Engineering in 1991 from Bandung Institute of Technology (ITB), Bandung, Indonesia and her MBA degree in 2000 from University of Birmingham, Birmingham, United of Kingdom. Currently she is pursuing her doctoral degree in Strategic Management from University of Indonesia (UI), Jakarta, Indonesia. The area of study includes sustainability, technology acceptance, e-commerce and strategic management.

Karen Imam was born in Athis-Mons, France in 1978. She earned her bachelor degree in Business in 1998 from Insitute Universitaire of Technology, Montpellier, France and her Master degree in International Business in 2001 from ESG Management School, Paris, France. The area of study includes organizational behaviour, sustainability and cross cultural management.

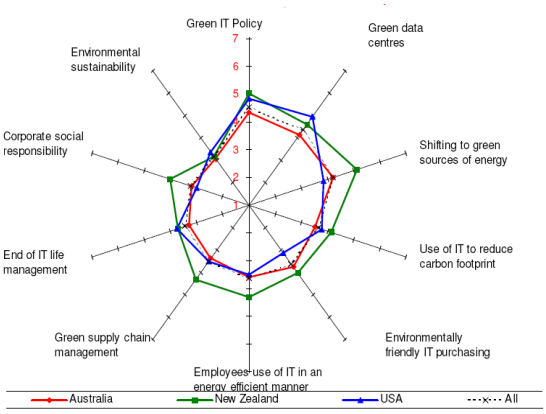
Table 1. The Green IT Reach-Richness Matrix (Molla et al., 2009)

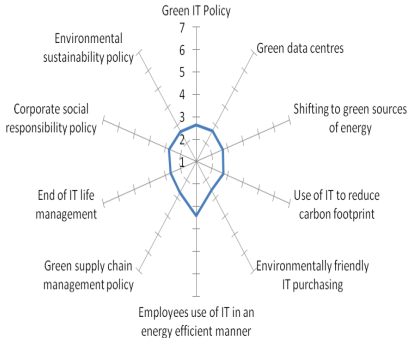
		Green IT Richness Dimension		
		Policies	Practices	Technologies and systems
Green IT Reach Dimension	Sourcing	The extent to which an organisation has articulated a guideline (s) for an Environmentally preferable purchasing of IT.	The practice of analysing the Green track record of IT hardware, software and services providers, incorporating Green considerations in IT procurement decisions.	Information systems that track, monitor and analyse the carbon foot print of suppliers such as supplier sustainability assessment tools.
	Operations	Encompasses the extent to which the services provided by the IT infrastructure support issues encapsulated in business sustainability. Some of the policy considerations include PC power management; policy on staff computer usage and Green data centres	Green IT operation practices refer to eco-considerations in operating the IT and network critical physical infrastructure in data centres and beyond and operational actions designed to improve the energy performance of corporate IT assets	New technologies and systems for (a) reducing the energy consumption of powering and cooling corporate IT assets (such as data centres) (b) optimizing the energy efficiency of IT assets (c) reducing IT induced Greenhouse gas emissions (d) supplanting carbon emitting business practices and (e) analysing a businesses total environmental footprint.
	Disposal	End of IT life management policy	Practices in reusing, recycling and disposing IT hardware	Information systems that track the disposal of IT in an eco-friendly way.



Source: Molla et al. (2009)

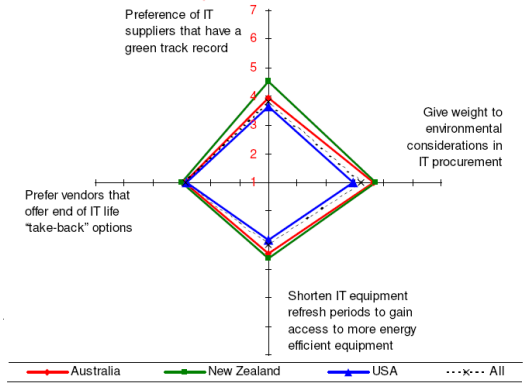
Figure 1. The Pervasiveness of Green IT Awareness in Indonesia compared with other countries

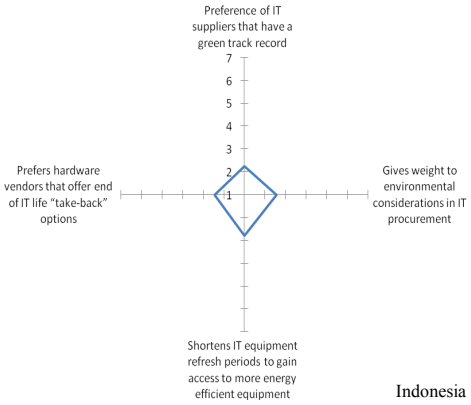




Source: Molla et al. (2009)

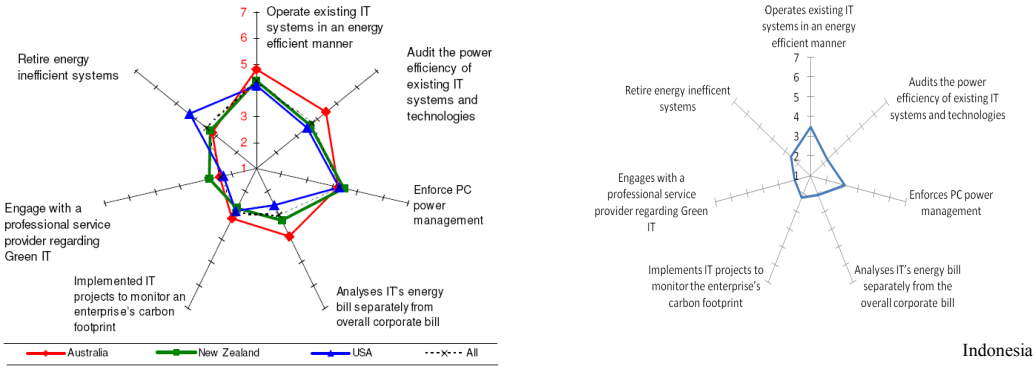
Figure 2. The Maturity of Green Policies in Indonesia compared with other countries





Source: Molla et al. (2009)

Figure 3. The Maturity of Green IT sourcing practices in Indonesia compared with other countries



Source: Molla et al. (2009)

Figure 4. The Maturity of Green IT operation practices in Indonesia compared with other countries

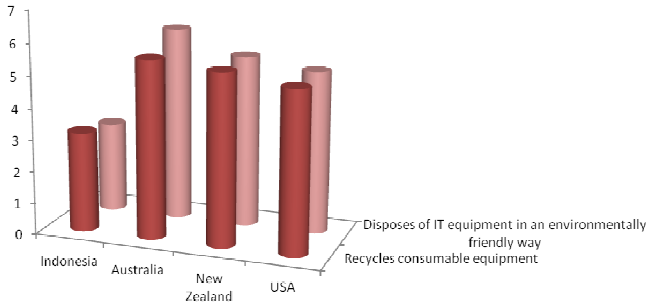
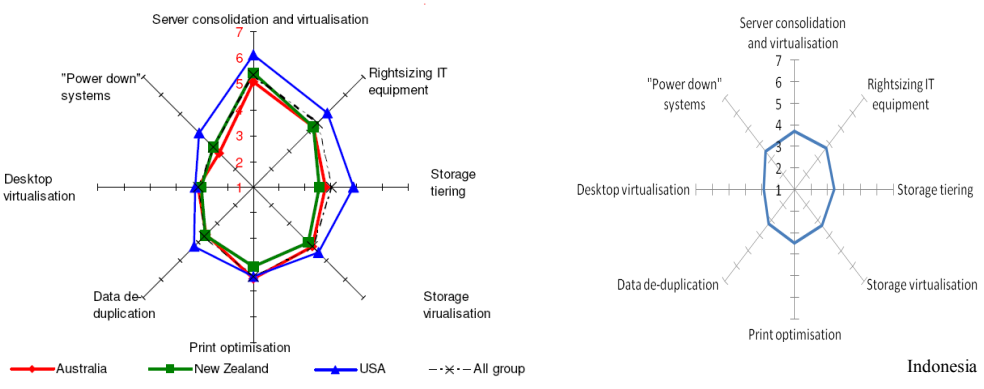
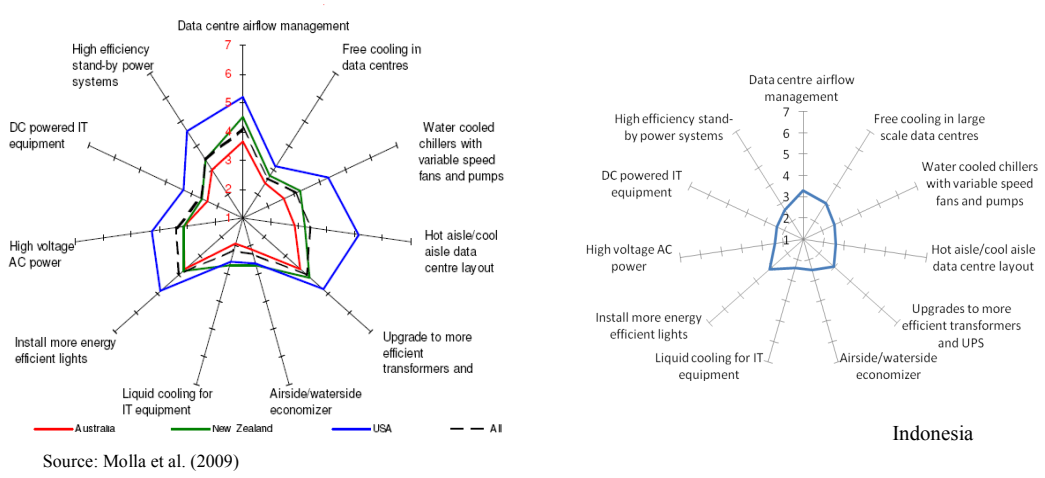


Figure 5. The Maturity of Disposal practice in Indonesia compared with other countries



Source: Molla et al. (2009)

Figure 6. The Maturity of Green IT Technologies in Indonesia compared with other countries



Source: Molla et al. (2009)

Figure 7. The maturity of Green Data Center Physical Infrastructure compared with other countries

Figure 8. Green IT governance in Indonesia compared with other countries