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Research paper

The Transformation of Byod Practices to Support Green Computing in Malaysia Public Sector

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Abstract

Bring your own Device (BYOD) is currently heightened as an approach towards green computing. With the current usage of mobile devices such as the smart phones, tablets, and laptops as the necessity in the working environment, the concept of BYOD went beyond personal use towards workplace. This study explores the BYOD practices and the contributions to support green computing in Malaysia public sector. Theoretical in this study were tested through a study in selected ministry in Malaysia. Qualitative research approach is used in the study with the main data collection method of interviews and document analysis. The study discovered two models of BYOD approach in the Malaysian public sector, which are the personally owned devices model and the organization owned devices model. This study concludes that both models can support green computing in Malaysia public sector; however no policy related to processes procedure of BYOD that can be used as guideline for green IT practices.

Keywords: *Bring your own device, BYOD, Green computing, Malaysia, Public sector*

1. Introduction

Nowadays, in the era of technology, an information technology-based device has become one of the essential requirements in our daily activities. With organizations relying on information technology (IT) for process efficiency resulted in the impact towards the environment. Mingay (2007) expects Information communication technology (ICT) sector and IT products will be contributing to at least 2% of global greenhouse gas emissions. The concern on the impact of IT usage leads to the green computing initiatives. Green computing or green IT can be defined as the study and practice of efficient and effective in a very minimal impact on the environment through the design, manufacture, use, and disposal of computer equipment (Murugesan, 2008). The term 'green' has become the current trend to identify the environmental impact from product development through the use of the product until the disposal process.

Until now, most studies focused on practical emphasis on standard operating procedures (Saha, 2014), design architecture (Garg & Buyya, 2012), software reusability (Haron, Ibraheem, Aljunid, & Bakri, 2015) and raw material (Saha, 2014). However, no detailed and comprehensive studies on the use of IT device owned by the end-user to support green computing have been done. BYOD optimized the IT device through the use of the same device for both personal and office work. According to Song (2014), BYOD is the new approach to optimize the use of IT device, and to use a product efficiently (Roy & Bag, 2009). Furthermore, the ICT device has a high potential to improve a conductive environment through economic and social sectors (Kounatze, 2009).

BYOD guideline consist of three general process which are bringing own device, use organization resources and multiple use of the own device for business purpose (Forrester Research, 2012; Loose, Weeger, & Gewald, 2013; Niehaves, Köffer, & Ortbach, 2013). Based on the review of the implementation of BYOD by Lee & Son (2013), the interest in BYOD has increased in both the daily work due to the increasing individual terminals such as smartphones, laptops and tablet PC (Lee & Son, 2013). In fact, many people will prefer to use their own equipment in the workplace as regards ownership is a key feature towards improving the quality of work and performance in the workplace (Niehaves et al., 2013; Choudhary, 2014).

Chua & Oh (2011) found that public sector play an important role in the implementation of green initiatives in Malaysia. Malaysia government as a policy maker is already aware and supports the green initiative in Malaysia. Malaysia government has started the green initiative in Malaysia under the Rancangan Malaysia ke-11 (RMK-11), which has highlight green technology as one the strategy towards advanced nation by 2020. In the efforts to implement green computing, National Green Technology Policy (NGTP) was launched by Ministry of Energy, Green Technology and Water (KeTTHA) to promote and increase public awareness to support and use of green ICT (KeTTHA, 2009). This study aims to understand how BYOD practices are being implemented in the Malaysian public sector as an initiative towards green computing.

Issues and Challenges of Implementing BYOD to Support Green Computing

BYOD implementation in the Malaysia public sector requires an intense observation since it involves the information security. The Malaysian Administrative Modernization and Management Planning Unit (MAMPU) in their Strategic Plan 2013-2015 was recognized BYOD as one of the transformation agenda for Malaysia (Malaysian Administrative Modernization and Management Planning Unit (MAMPU), 2013). Currently, MAMPU has developed guideline for public sector. However, MAMPU guidelines only concerned on the security issues, especially from threat and data leakage issues in BYOD (OpenGov, 2014). There is no guideline on BYOD usage and implementation in providing IT support in terms of technology alignment between device and organization infrastructure; and operational procedure that can support green computing. Since the current critical issue for BYOD is the security, confidentiality of data and intellectual property to an organization that saved in the mobile device or computer which is belongs to the workers, it is important to include the security aspect in the process of transformation the current BYOD practices which can support green computing.

The most important thing for an organization to implement BYOD is that he or she must provide a computing platform that is efficient, safe and friendly portable devices. BYOD platform should include the entire infrastructure of an organization's information technology such as the Internet, computer networks, information systems, hardware, software, databases, operating systems and data. Currently, there is no IT support and operational procedure to implement BYOD to support green computing, thus creating challenges in providing IT support in terms of technology alignment between the devices brought by the employees with the organization infrastructure (Aruba Networks, 2012; Choudhary, 2014; Reddy et al., 2012)

Benefit of BYOD

BYOD has been growing rapidly since the mobile device was an important tool in everyday living around the world. All the new mobile devices are provided with more updated features and mobilize compared to personal computer. Research carried out by the WMware Asia Pacific (2013) found that 85% of Malaysians use their own device in the workplace. According to Forrester survey, 200 million users of 360 million users in 2016 will be using their own personal devices for work related tasks (Schadler & McCarthy, 2012).

Since it is become trends, BYOD has been seen as positive impact, with many benefits for user, employer and organization. Benefits include saving cost (Golia, 2012; Franklin & Zainul Abeeden, 2015; Boon & Sulaiman, 2015), robust connection (Golia, 2012), flexibility (Airwatch, 2012; Golia, 2012), productivity (Yun, Kettinger & Lee, 2012; Franklin & Zainul Abeeden, 2014; Alleau & Desemery, 2013; Boon & Sulaiman, 2015), reduce training time, efficiency (Franklin & Zainul Abeeden, 2015), maximized employee performance (Airwatch, 2012), greater employee contentment (Airwatch, 2012; Alleau & Desemery, 2013), simplified IT infrastructure (Airwatch, 2012), improved employee convenience, greater workforce mobility and employee retention (Alleau & Desemery, 2013), and improving employee's morale (Boon & Sulaiman, 2015).

2. Methods

Qualitative Study

In achieving the objectives of the study, qualitative method was applied. Data are collected through semi-structured interviews and document analysis. In this study, the respondent was selected specifically based on the scope of this study which involved the respondents who in the best position to provide the information needed. All respondents were interviewed based on their knowledge; experience and current practice of the organizations that have direct knowledge of bring devices practices. In this study, the target respondents were those from IT department which consist of management group and technical group.

The first group of interview is the management groups which are also the officers that involved in the decision making for IT department. Since every policy and planning of IT department should get confirmation from top management, officers from the management group play an important roles in new planning. This includes introducing the concept of BYOD in the organization and how BYOD will affect the IT infrastructure of the organization.

The second group is the technical group who involved in support and also user who was using the IT device at the organization. Technical person is a key pillar in the implementation of BYOD in the organization who responsible for providing technical support and at the same time is a major consumer of IT device. Use of IT device also affects work processes and performance of the IT department. This is due to technical group will always use the IT device at all times to ensure that any IT problems from the employees can be solved.

In this study, the case study that was chosen is a ministry that is responsible for green IT initiatives. Green computing is one of the initiatives of the IT department in realizing one of the ministry's policies of green technology. This organization has successfully implemented the Green Data Center at public sector (Mohd Razali, 2014).

Green ICT Framework

In order to understand how BYOD can be contributing towards green computing, Green ICT Action as Table 1 is used based on The Connection Research-RMIT Green ICT Framework (Philipson, 2010). This framework was developed to define Green ICT and to categorize many aspect of Green ICT. Each of area will contains five component know as Green ICT Action. Green ICT action will be described the different approaches to the green initiative.

Table 1; Green ICT Action

No	1	2	3	4	5
Green ICT Action	Attitude	Policy	Practice	Technology	Metrics/Governance

3. Results

BYOD Practices

For this study, findings show that there are two different approaches for BYOD, which are personally owned device and organization owned devices as shown in Figure 1.

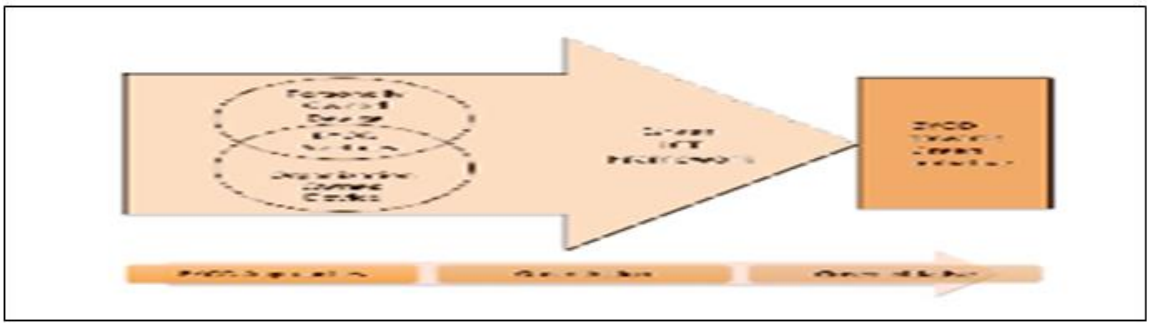

Figure 1: Conceptual framework of BYOD classification

The findings result of interview and document analysis is shown in Table 2.

Table 2*: Green ICT Action for BYOD Component to Support Green Computing*

No	1	2	3	4	5
Green ICT Action	Attitude	Policy	Practice	Technology	Metrics/ Governance
Component	Device specification	Virtualization	e-waste	Device choice	Security

Personally Owned Device

Personally owned device is the IT device owned by the user and it is belong to end-user. One of the leading practices in the IT devices is to bring personal owned devices to the organization. This practice was common practice done by employees for personal use or business. Bringing personal IT devices has become trends in public sector when the IT devices owned by the employee has better specification compare to the IT device supplied by the organization.

The practice of bringing their own device is the best method for organizations to ensure uninterrupted work performance as well as to meet consumer demand. Accordingly, the IT Department has implemented two methods based on the basic specifications from the IT Department's policy to allow employees to bring their own devices into the workplace.

For the first method, every employee who wants to bring their own equipment required to ensure that the specifications of every computer in accordance with the basic specification set by the organization. It is important to highlight that device specification is an important component to support green computing through selection of green device that can reduce power consumption and carbon emission. For security purpose, any equipment must also be equipped with preventive systems to ensure that no virus threat occurred while accessing the organization's network. By using the own device for BYOD, it also can reduce IT support and at the same time reduce the maintenance, which the ownership of device will take fully responsible for their device. These findings are in line with methods from education practitioners as one to one program (Stavert, 2013) and also introduced in Locked Down model (Sweeney, 2012). According to Alberta, the decision of the specification was based on vision, technical considerations, training, content and affordability (Government, 2012).

For the second method, all the employees in public sector are allowed to bring any IT devices as long as they must be registered with the IT department. All the latest devices is affordable to all the users with consist of latest operating system, support virtualization, more thin, less power consumption and less hazardous material that comply green standard to support green computing. This meant that any IT devices used will be recorded and registered for monitoring purposes. This is because hardware used by the employee will use electricity and network resources provided by the organization. These findings are in line with BYOD practice 'bring your own connects to the Internet whatever' model (Dixon & Tierney, 2012).

Besides that, the organization has also introduced the concept of virtualization. The concept of virtualization is using sharing folder and virtual PC to access data from organization network for business purposes. This is one of the approaches towards BYOD using technology. Every employee that has their own device can access their virtual PC using the organization's network. The devices that have access to organization network will be standardized to support existing system and application that will reduce procurement cost in terms of license purchasing. However, this organization had to provide big data storage to ensure data and information can be reached without any problems. It also causes them to have to spend the high cost of this implementation.

Organization Owned Device

The second approach is organization owned devices. Organization owned devices is devices that owned by the organization. Based on the existing policy of the organization, every employee will be provided with a computer for work purposes. Therefore, the IT department needs to make the procurement of computer and provide the computer equipment for their use.

Based on IT department practices, every 5 years or when computer equipment was obsolete, the disposal process will be done by the IT department. IT department will dispose their old computer devices by using e-Waste procedure that to make sure the entire device will be disposed follow the Green IT Guideline for public sector. Due to it, employees are also given the opportunity to get the old IT device after certain of time as rewards. Some computers that can still be used will be provided to employees through the process of disposal with the help of a third party.

Besides, some of the employees are entitled for purchasing any IT device that can be integrated with organization network that provided by IT department. These concepts are in line with methods called stipend models (Dhumal, Faley, & Rodgers, 2012). By having positive attitude towards green understanding from decision maker, employees will be provided with a sum of money to buy their own device which can be used for both personal and work activities. As a return, the organization owns any and all corporate data on the device and the employee owns the device. The concept was same by replacing employee's owned devices to introduce flexibility and choices to employees to select what the best for their working environment.

In addition, each employee who is assigned on outstation will be supplied with a broadband unit. At the same time, they are

encouraged to bring their own laptops for tasks that involve long periods. This is because there is an office location or site visits are in the rural areas or the lack of IT infrastructure that can bother them to perform the task. Some of the employees said that it would help them to respond and work effectively with other employees. In terms of accessing the data, this may be integrated through the identification of various basic sets of applications such as productivity suite and e-mail client among others which may be resident on the devices to reduce time installation that can reduce power consumption.

The success of the implementation of new technologies is dependent on the cooperation whether the user is willing to use it or not. Based on the interview, 50 percent expect to adopt BYOD soon and only 12 percent know that there are already using BYOD. BYOD is still not a new approach for the green computing since the study of BYOD still lack of process on how it can contribute to reducing the environmental impact.

4. Conclusion

This study focused on identifying the different approaches for BYOD practices in the Malaysian public sector as an initiative towards green computing. In the following practice, two type model of own device has been discussed which are used to classify BYOD practice in public sector as an initiative towards green computing. These types are personally owned device and organization owned devices. The first model is applied based on the employee jobs scope that will bring their own device within the permission from IT department. The second model is currently applied at the organization that is fully adopted for technical purposes.

Based on the results of a survey conducted by interview and document analysis, it can be concluded that the organization was aware of the concept of BYOD thru personally owned device and organization owned devices but have yet to understand the implementation of BYOD to support green computing. In practice, the organization has implemented a BYOD concept in performing work activities in the organization.

This study highlights several concerns about user acceptance and policy model for future research. First, we identified that BYOD practices are still new and at infancy stage at public sector. Second, we found that the concept of BYOD is already exists in public sector but there is no policy related to BYOD that can be used as guideline in green IT practices. Third, awareness is already exist where BYOD can be contribute towards green IT but still lack of BYOD model that can assists organizations to implement green BYOD.

There are several further suggestions for future research that can be expanded to different area. Since the BYOD approach model identify practices based on existing BYOD in organization, future research should focus on additional scope, which is outside the organization that affect the practice of BYOD for green initiative. Moreover, we recommend exploring the component of BYOD that would increase green contribution and employees' intention to adopt BYOD with different organization.

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