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GREEN IT ADOPTION FOR ECO-EFFICIENCY: A CASE STUDY AT
KEMENTERIAN TENAGA, TEKNOLOGI HIJAU DAN AIR (KeTTHA)

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Report submitted in fulfilment of the requirement for the degree of Bachelor of
Technology Management (Hons) in Technology Innovation

Faculty of Technology Management and Technopreneurship
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DECLARATION

“I declare that this thesis is my own work except the citation and excerpts of each of which I have mentioned in the references.”

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Date :

DEDICATION

This Final Year Project is dedicated to my parents and family for their loves, endless support, encouragement, attention and prayers.

ACKNOWLEDGEMENT

Thanks God, give thanks to the divine mercy and enjoyable time, the life energy that was given to me that I can prepare Final Year Project from chapter one until chapter five to fulfil my Bachelor Degree in Technology Management in Innovation successfully.

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ABSTRACT

In recent years, everyone uses Information Technology (IT) to communicate and obtain the information on socialization, educational, businesses, and many others. Malaysia's pledge towards global GHG emission reduction through its roles supporting the vision of the Prime Minister of Malaysia, which is to reduce the carbon footprint of the nation by up to 40% by the year 2020. Green IT as green and sustainable practices is learning and practicing the use of IT efficiency and effectively with minimum impact on environment. Therefore, it is precise on two key concepts as a mechanism of successful implemented this project which is focus on the factors and process in adopting Green IT for eco-efficiency. Since that, the factors need to be considered in adopting Green IT are cost, regulatory and legal, enlightened self-interest, responsible business eco-system, new market opportunity, economy, technology, people, organizational, environment and power use of IT. However, the organization also arranged the process to be involved in adopting Green IT that emphasized on diagnose phase, plan phase, design phase, approval phase, enactment phase, implementation phase, and measure the performance of the process. In this case study, Ministry of Energy, Green Technology and Water (KeTTHA) was selected as responsible organization to investigate the factors and process involved in Green IT adoption. The respondents of this case study will be aim for 30 respondents from middle and executive through qualitative in-depth interview. At last, the innovative suggestion is recommended for future research significantly as development and dynamic improvement for the next academic research.

ABSTRAK

Sejak kebelakangan ini, setiap individu menggunakan IT untuk berkomunikasi dan memperolehi maklumat dalam sosial, pendidikan, perniagaan dan lain-lain. Malaysia berikrar ke arah pengurangan pelepasan kesan karbon terhadap global melalui peranan dalam menyokong wawasan Perdana Menteri Malaysia iaitu bagi mengurangkan kesan karbon negara sebanyak 40% pada tahun 2020. Teknologi Informasi Hijau sebagai amalan hijau yang latihan yang mampan merupakan amalan dan latihan dalam kecekapan dan kerberkesanan IT dengan kesan yang memberi impak yang minimum terhadap alam sekitar. Oleh itu, dua konsep utama sebagai mekanisme yang berjaya dalam melaksanakan projek ini ialah memfokuskan terhadap faktor-faktor dan proses berkaitan dalam pengambilan Teknologi Informasi Hijau yang membawa kepada eco-kecekapan. Antara faktor yang terlibat di dalam pengambilan Teknologi Informasi Hijau ialah kos, peranan dan undang-undang, pencerahan-kepentingan diri, tanggungjawab ekosistem perniagaan, peluang pasaran baru, ekonomi, teknologi, orang, organisasi, alam sekitar dan penggunaan kuasa IT. Walaubagaimanapun, organisasi juga telah mengatur proses yang terlibat dalam pengambilan Teknologi Informasi iaitu fasa diagnosis, fasa perancangan, fasa reka bentuk, fasa kelulusan, fasa enakmen, fasa pelaksanaan, dan mengukur prestasi di dalam proses. Dalam kajian kes ini, Kementerian Tenaga, Teknologi Hijau dan Air (KeTTHA) telah dipilih sebagai organisasi yang bertanggungjawab bagi menyiasat faktor dan proses yang terlibat dalam penggunaan Teknologi Informasi Hijau. Responden kajian kes ini disasarkan kepada 30 responden dari pengurusan pertengahan dan eksekutif melalui temu bual secara mendalam. Akhirnya, cadangan inovatif adalah disyorkan untuk penyelidikan masa depan dengan ketara kepada pembangunan dan peningkatan dinamik untuk penyelidikan akademik akan datang.

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LIST OF NOMENCLATURE

CSCI	= Climate Savers Computing Initiative
DAHLIA	= Data Hijau Lestari Program
EPEAT	= Electronic Product Environmental Tool
GDC	= Green Data Centre
IT	= Information Technology
KeTTHA	= Kementerian Tenaga, Teknologi Hijau dan Air
PUE	= Power Usage Effectiveness
UteM	= Universiti Teknikal Malaysia Melaka

CHAPTER 1

INTRODUCTION

1.1 Background of Study

In recent years, information technology is one part of people's life. Everyone uses information technology to communicate and to obtain information from education, businesses, socials, employment sectors, and many others. Parallel with the increasing in technology nowadays, Green IT should play an important role to ensure the information technology use with effective and efficiently way. Green IT or Green Information Technology is clarifies as initiative for individual or organizations able to take to reduce environmental footprint and use power more efficiently. Bose and Luo (2012) clarify that Green IT is the learn and practice of designing, engineering, using and disposing of servers, computers and connected subsystem excellently and efficiently with no impact on the environment. Furthermore, Green IT can be describe as two categories which is minimizing the harmful of IT to the environmental where the power consumption of IT equipment, waste disposal and associates utilities and the other categories is utilizing IT

resources to reduce the environmental harmful effect from other process (Zoysa and Wijayanayake, 2013).

Therefore, the Green IT is also interrelates for eco-efficiency. The eco-efficiency can be defines as reducing resources use and environmental impact all over product or service's life next generates more value through technology and process changes. Glavie et al. in Klemeš (2015) define eco-efficiency as in assessing and measuring environmental impact and sustainability. It is also a strategy of management to produce more products and services while using a smaller amount of resources and less waste and pollution. Hence, eco-efficiency is relates to Green IT which is as a way to reduce the environmental impact and reducing cost through more efficient usage of resources and energy (Government of Canada in Klemeš, 2015).

Since IT industry has begun to deal with change seriously, the international community has begun to emphasize the need for a speedy transition to a low carbon economy and green growth. Lee et al. (2013) emphasize that IT goods and services contribute for approximately 3 percent of global carbon emissions and the more trouble is IT power consumption is rising constantly at a speedy rate. This is caused by digitalization especially in developing countries. It is also caused by the increasing world-wide trend personalization of IT devices and overall increase in the use of IT product and services. Hence, the adoption of Green IT is important to bring eco-efficiency and reduce the carbon emission that made by individual and organizational.

Green IT is basically applying eco-friendly standards through the use of IT and it brings many benefits to the society and the environment. It is putting a positive example for employees that help to boost morale and company loyalty, improving efficiency and lowering operating costs and budget and providing a cleaner and better work environment at the same time reduce the energy consumption.

1.2 Problem Statement

In aspect of Green IT, Malaysia is lagging behind the developed countries such as USA, Japan, South Korea, Denmark and UK. Ministry of Economy, Trade and Industry of Japan (2011) states that it is proven where in Japan, they implemented Green IT as its future strategy that will reduce 7.8 billion CO₂tons from business as usual in 2020 by using Green IT. There is the gap between developing countries such as Malaysia and developed countries.

According to YAB Dato“ Sri Najib Bin Tun Abdul Razak (2012): *“Majority developed countries have taken stride begin new approaches Green ICT and cloud computing and Malaysia will not left behind in this regard and has initiated programs specifically designed to provide a comprehensive platform for the implementation of ICT in the Public Sector”*. In Malaysia, although the ASEAN Green IT Forum was conducted in 2010; the use of Green IT has not expanded nationwide. Hence, Malaysia is necessary breakthrough the gaps between our nation and developed countries.

1.3 Research Question

Based on the problem through Green IT, there are three research questions that concerned with this research. The researcher needs to identify the factors, processes and innovative solution that provided to the KeTTHA. The research questions are shown as below:

- i. What are the factors rendered the Green IT adoption?
- ii. What are the processes involved in Green IT adoption?
- iii. What are the innovative solutions to foster Green IT adoption for Eco-efficiency?

1.4 Research Objective

The objective of the study is to examine the factors rendered the Green IT adoption that implemented in KeTTHA. Besides, the study also determined the process involved in Green IT adoption. In additions, this study provides the innovative solution to foster Green IT adoption for Eco-efficiency. This research objective of this project is:

- i. To examine the factors rendered the Green IT adoption.
- ii. To investigate the processes involved in Green IT adoption.
- iii. To suggest the innovative solutions to foster Green IT adoption for eco-efficiency.

1.5 Scope and Limitation of Study

The research scope of this project is focus in green and sustainable practices. Firstly, the researcher needs to identify the factors rendered the Green IT adoption. Secondly, the research scope is focus on the process involved in Green IT adoption. Lastly, the research scope emphasizes in suggestion of the innovation solution to foster Green IT adoption for eco-efficiency. The study will conduct in Ministry of Energy, Green Technology and Water (KeTTHA) that conducted IT research and development.

There are two limitations are recognized in this research. Firstly, this case study will conduct in KeTTHA it could be generalized on the similar industry only. Secondly, this case study is only assumed respondents gave the honest answer during the interview session.

1.6 Research Significance

In research significance, this research is important to the organization of KeTTHA. In these categories, the researcher needs to consider for collecting data and obtain the comprehensive information.

i. Ministry of Energy, Green Technology and Water (KeTTHA)

Respondents in the KeTTHA focus on Department of Information Technology, which involves middle and top management. In Department of Information Technology, they are responsible to manage the uses of Green IT with effective ways. In addition, second groups of respondent are middle and top management such as Operation Management and Management Department, which tend to planning, designing, controlling the company project. The researcher need to identify the factors rendered the Green IT adoption. Other than that, researcher needs to investigate the process involve in Green IT adoption and give some innovative suggestions to the company to foster the Green IT for eco-efficiency. However, Green IT adoption not only focuses on the factors, but it is also required an efficient process to control carbon footprint and carbon emission.

1.7 Summary

As summary, Green IT is referring to the initiative to individual or organizations able to take to reduce environmental footprint and use power more efficiently. The problem is existed the gaps between developed countries such as USA, Japan, South Korea, UK, Denmark with Malaysia, nation able to develop a Green IT. The objective of this study is included to identifying the factors that rendered the Green IT adoption, to investigate the process involved in Green IT adoption, and to provide innovative solutions to foster Green IT for eco-efficiency. The research scope for this project is focuses on green and sustainable practices that will be focused on research objective. Furthermore, this research is conducted at KeTTHA to gain comprehensive and overall information to get the best practices from them.