

A STUDY ON GREEN IT AWARENESS AMONG UNIVERSITY MALAYSIA PAHANG STUDENTS

ALAA TAISEER FARGHALY

Faculty of Computer System and Software Engineering

University Malaysia Pahang

26300, Kuantan, Pahang, Malaysia

alaataiseer22@gmail.com

MAZLINA ABDUL MAJID

Faculty of Computer System and Software Engineering

University Malaysia Pahang

26300, Kuantan, Pahang, Malaysia

mazlina@ump.edu.my

Abstract: This current study Investigate and Assessment the awareness of Green IT Practices Among University Student. Green IT acts as a fundamental vector that can contribute greatly towards productivity. Its sectors have been greatly responsible for energy consumption, waste generations and gas emissions. Green IT approach can seriously answer these problems and improve organizational sustainability by increasing environmental performance. There are many practices has been done to achieve sustainability, the most practiced of these are reduce, reuse, and recycle. The aim of this study is, to assess the green IT awareness among UMP students through survey method, and to develop a green IT website for rising the awareness of green IT concept. This study finds that the awareness of Green IT Practices Among UMP Students is low. So that this study develops a green IT website for rising the awareness of green IT concept.

Keywords: Green IT, Green campus, sustainability, green IT sustainable development.

I. INTRODUCTION

The information technology (IT) industrial development is facing a phenomenal improvement in the performance and efficiency. However, the price is still affordable for a wide range of consumers, which led to consumption increment and economic growth. Yet, this has numerous environmental implications on different levels (Plepys, 2002). each stage of the IT lifecycle from manufacturing to usage and disposal can pose environmental damages (Elliot & Binney, 2008). and as the consumption of energy and electricity by IT services is increasing, which made IT equipment are important source of greenhouse gases (Harmon & Auseklis, 2009). The implementation on eco-sustainability, green IT and green computing need to be embedded with every phase of IT development and deployment phases (Molla et al 2009). Green IT acts as a fundamental vector that can contribute greatly towards productivity. In general, it focuses on designing, manufacturing, using and disposing of computer, servers and associated subsystems efficiently and effectively with minimal or no impact on the environment (Bose & Luo, 2011). Its sectors have been greatly responsible for energy consumption, waste generations and gas emissions, it also improves organizational sustainability by increasing environmental performance. It is a fact that, sustainable development can be achieved by improving IT and IT related amenities(URSĂCESCU, 2011).

An environment like a university contain thousands of students consuming thousands of IT equipment, Matthews et al (2017)said that Universities of the 21st century are almost powered by IT. The students spend a huge amount of time using their own IT devices or the one provided by the university, which raise the electricity bills costs and the environmental hazards (Murugesan, 2008). A report for the JISC (Joint Information Services Committee) in 2008 stated that universities and colleges in UK used around 1,458,000 computers, 249,000 printers, and 240,000 servers; which consumed around 512,000 MWh of electricity annually, with the expectation that it will cost around £121 million (193,600,000 USD) in 2009 for the electricity bills, the CO2 emissions from the electricity used was estimated to be around 500000 metric tons. Students can

play an important role in resolving these problems, only if they were aware of it (Ahmad et al., 2013 2013).

Green IT directly contributes in decreasing expenses, creating good corporate image and mitigates the climate change. In some cases, green IT are still not that prevalent. Young generations can help to cope with green IT related problems. Therefore, by studying the green IT awareness among university students, the extent of knowledge on green IT can be assessed based on three major constraints or indirect variables in the system. Such as, environmental, social and economic sustainable green ICT as per (Thongmak, 2012).

Vast number of articles about green campus have been reviewed, only few were focusing on green IT, even fewer were found to directly examine the student awareness about green IT. Each university got its own way to achieve the green campus, some has tried to reduce the consumption (Rahim et al., n.d.), while other worked on air pollution reduction (Bakhsh et al, 2015). This research has been started due to the lack of awareness about green IT among the students. With the believe that students can be the seed that implant the green IT practices in the society. More attention should be payed to students 'awareness and practices to establish green university campuses in the future.

II. LITERATURE REVIEW

Unhelkar, (2011), has discussed some implementations to apply green IT which are, using a software that automatically turn off the devices when it's not in use, using smart meters that measures the emissions and encourage efficient use of equipment to reduce it, efficient usage of printers by printing double side and recycling ink cartridges, replacing the old devices with low-power-consumption and low-carbon-emitting one, and raising awareness among user groups of environmental sustainability and green IT through basic training.

This literature has reviewed two studies that examined the students' awareness. The first, explored the awareness of green computing among Malaysian university students. They gathered a sample of 224 student enrolled in ICT and non-ICT related field of study, They developed a questionnaire consisting of three sections (A, B, and C), section A is on personal information,

section B is about measuring the awareness of green computing vocabulary (heard about it or not heard about it), section C is about rating the degree of familiarity with the issues related to the topic. The author found that most of the students were unfamiliar with the terms, issues and vocabulary that related to green computing (Ahmad et al., 2013).

The second University of technology, Mauritius has adopted similar way of measuring awareness of their students about green computing. They have developed a survey questions of three sections (A, B, and C). section A personal questions, section B about the way student use their computers. Section C was observational questions, the questions were designed to monitor the student's behavior toward the environment and measuring their intent to practice green computing. The finding in this study showed that the students got some knowledge about green computing terms and practices, which has been reflected on their practice. However, there were lack in some other practices which showed lack of awareness in the related issues. (Dookhitram et al, 2012)

III. METHODOLOGY

A. *Sample*

The respondents were 110 students randomly sampled from University Malaysia Pahang. Exactly half of the respondents were female (50%) and the other half were male (50%). The majority of the students were from faculty of computer system and software engineering (78%), and the remaining 22% were from other faculties such as, faculty of chemical engineering, civil engineering, industrial management etc.

B. *Instrument*

Questionnaire was the main and lone instrument for data collection because kind of population literate person; (2) Most of the population difficult to find opportunity and time for an interview, and (3) The increasingly expensive nature of alternative tools of data collection. The data is to be collected through questionnaire a survey alongside a personally administered approach and one method of questionnaire distribution was used namely:

google forms. this method is believed to be the most convenient way to collect data in this type of research.

The questionnaire has been divided into four sections (A, B, C and D) with a total of 20 items. Section (A) asks about background information pertaining to the respondents, including gender, educational level and field of study. The objective of this section is to provide information about important characters of the students that facilitate in identifying similarities and differences between the sampled students. Such identification is an essential factor for successful analysis and interpretation / explanation of the analysis results. Section (B) addresses the scale items related to Green IT environmental sustainability. Section (C) addresses the scale items related to Green IT social sustainability. Section (D) addresses the scale items related to Green IT economic sustainability.

C. Data Analysis

Analyzing the questionnaire is done by using Microsoft Excel software. Microsoft excel is one of the most widely used software for analytical purpose, it used because of the ease of controlling the software which can generate accurate result for the research.

IV. RESULT

Table 1 shows that 39% of the students were agreed that Usage of green IT devices reduces air pollution, and the remaining 61% disagreed. Slightly more than half of students (58%) were agreed to the statement Implementation of green IT concepts helps reduce the e-waste (electronic waste), and 42% were disagree. Only 29% of the students agreed that IT devices contribute in causing global warming, while 71% disagreed. Almost half of the students (55%) agreed that Green IT help recycle wastes, and the other 45% disagreed. Around 58% of the students agreed that Recycling and reusing help reducing the consumption of resources, and 42% disagreed. About 52% of the students agreed that Green IT increase the quality of social life, and 48% disagreed. About half of the students (52%) agreed that Implementing green IT is a social responsibility, and 48% disagreed. 52% of the students agreed that Green IT Atmosphere improve social commitment, and 48% disagreed. Only 45% students agreed that Applying Green IT is a priority, and 55%

disagreed. 61% of the students were agreed that Green IT awareness can create sustainable development, and 39% disagreed. 56% student were agreeing with the statement Green IT help in developing university financial efficiency, and 44% disagreed. 59% of the students agreed that Green IT practices reduces electricity bills, and 41% disagreed. 62 of the students agreed that Adoption of green IT practices by university students will enhance the economic efficiency of the university on the long term, and 38% disagreed. Only 43% of the students agreed that Green IT atmosphere have negative economic impact, and 57% disagreed. 67% of the students agreed that Green IT help in employment growth and Economic innovation, and 33% disagreed.

Table 1*Result*

No		Result	Percentage
1	Usage of green IT devices reduces air pollution	Not knowing	39%
2	Implementation of green IT concepts helps reduce the e-waste (electronic waste)	Knowing	58%
3	IT devices contribute in causing global warming	Not knowing	29%
4	Green IT help recycle wastes	Knowing	55%
5	Recycling and reusing help reducing the consumption of resources	Knowing	58%
6	Green IT increase the quality of social life	Knowing	52%
7	Implementing green IT is a social responsibility	Knowing	52%
8	Green IT Atmosphere improve social commitment	Knowing	52%
9	Applying Green IT is a priority	Not knowing	45%
10	Green IT awareness can create sustainable development	Knowing	61%
11	Green IT help in developing university financial efficiency	Knowing	56%
12	Green IT practices reduces electricity bills	Knowing	59%

13	Adoption of green IT practices by university students will enhance the economic efficiency of the university on the long term	Knowing	62%
14	Green IT atmosphere have negative economic impact	Knowing	43%
15	Green IT help in employment growth and Economic innovation	Knowing	67%

V. DISCUSSION

D. The Impact on Environment

Green IT impact on environment was the lowest in term of awareness level. The average of awareness level was 0.48 (48%). This elucidate that students are unconscious that IT life cycle has many environmental implications. As well that Green IT helps in reducing this implication.

E. The Social Impact

the average awareness level on the social implications is near to half by 0.52 (52%). A question was asked about the necessity of Green IT application by societies got 45% agreed responds. Some student thought that applying green IT practices by individuals is not a must, oblivious to the fact user phase in IT life cycle in the most dangerous phase to the environment.

F. The Impact on Economy

This section reached the highest level of awareness with the average 0.57 (57%). Most of the respondents were agree with the statements in this section, showing a higher level of awareness about the economic implications.

VI. CONCLUSION

In this research we focused on green IT and its contribution to make a green campus. creating awareness about green IT will generate an atmosphere of commitment towards the IT devices and the way it is being used. It important to determine the students' level of awareness as they are the majority of the consumers in the campus in order to achieve the green IT campus. By understanding the level of awareness among the students and determining how much they are

green, the top management can create awareness programs that provide the list of green practices to improve the campus sustainability. Lecturers and student council can take the result of this research and organize talks that talk about IT and its effect on the environment, economy and society and how these implications can be avoided by implementing green IT. Having aware and practicing students can create not only a green campus but also an organizational efficiency. However, the green campus and organizational efficiency cannot be achieved only by the students' practices. The organization itself need to follow the green way to manage its institutions.

To obtain the green IT campus in UMP, this study is very important to improve students' behavior towards the environment. UMP need to pay more attention on organizing green programs and events at the same time encouraging the students to follow the green IT practices. The simplest way to be green is by practicing it in the correct way, thus students' practices are very important.

REFERENCES

- Ahmad, T. B. T., Bello, A., & Nordin, M. S. (2013). The Social Networking Sites (SNS) Facebook and OpenStudy as Student Learning Forum. *GSTF International Journal on Education (JEd)*, 1(2), 33–37. <https://doi.org/10.5176/2345-7163>
- Bakhshi, M., Othman, N., & Wahab, M. H. Bin. (2015). Green Campus in Promoting Green Open Spaces in University Technology Malaysia Kuala Lumpur Campus. *International Joint-Conference SENVAR-INTA-AVAN*, (November), 90–103. Retrieved from <https://www.researchgate.net/publication/291974303%0AGreen>
- Bose, R., & Luo, X. (2011). Integrative framework for assessing firms' potential to undertake Green IT initiatives via virtualization - A theoretical perspective. *Journal of Strategic Information Systems*, 20(1), 38–54. <https://doi.org/10.1016/j.jsis.2011.01.003>
- Dookhitram, K., Narsoo, J., Sunhaloo, M. S., Sukhoo, A., & Soobron, M. (2012). Green Computing : An Awareness Survey among University of Technology , Mauritius Students. *International Conference on Higher Education and Economic Development, Mauritius*. Available from <Http://Tec. Intnet. Mu/Pdf% 20downloads/Confpaper/Confpaper091224. Pdf.>, (SEPTEMBER), 1–8.
- Elliot, S., & Binney, D. (2008). Environmentally sustainable ICT: Developing corporate capabilities and an industry-relevant IS research agenda. *12th Pacific Asia Conference on Information Systems (PACIS)*, 2004, 1–12.
- Harmon, R. R., & Auseklis, N. (2009). Sustainable it services: Assessing the impact of green computing practices. *PICMET: Portland International Center for Management of Engineering and Technology*,

The International Conference on E-Learning (ICOEL2019)
Proceedings, (May), 1707–1717. <https://doi.org/10.1109/PICMET.2009.5261969>

Matthews, V. O., Osuoyah, Q., Popoola, S. I., Adetiba, E., & Atayero, A. A. (2017). *C-BRIG : A Network Architecture for Real-Time Information Exchange in Smart and Connected Campuses. I*, 7–10.

Molla, A., Cooper, V. a., & Pittayachawan, S. (2009). IT and Eco-sustainability : Developing and Validating a Green IT Readiness Model. *Icis*, 1(Paper 141), 1–17. <https://doi.org/10.13140/2.1.5004.1124>

Murugesan, S. (2008). Harnessing Green IT : Principles and Practices. *IT Pro - IEEE*, (February), 10. <https://doi.org/10.1109/MITP.2008.10>

Plepys, A. (2002). The grey side of ICT. *Environmental Impact Assessment Review*, 22(5), 509–523. [https://doi.org/10.1016/S0195-9255\(02\)00025-2](https://doi.org/10.1016/S0195-9255(02)00025-2)

Rahim, A. A., Fizri, F. F. A., Koshy, K. C., Othman, M., Nor, N. M., & Sibly, S. (n.d.). *Sustainability-led Institution : Case of Universiti Sains Malaysia , Penang*.

Thongmak, M. (2012). Green Icts ? Awareness and Adoption : a Case Study of. *European Conference on Information Systems (ECIS)*.

Unhelkar, B. (2011). Green IT: The next five years. *IT Professional*, 13(2), 56–59. <https://doi.org/10.1109/MITP.2011.25>

URSĂCESCU, M. (2011). GREEN IT-THE RELATIONSHIP BETWEEN IC&T AND SUSTAINABLE DEVELOPMENT. *Quality-Access to Success*.