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SUSTAINABLE PRACTICE AMONG UNIVERSITY STUDENTS

ZURONI MD JUSOH & THAN HUI YAN

ABSTRACT

The purpose of this study is to examine the differences between gender and faculty related to the level of sustainability knowledge and sustainability perception, to study the relevance level of sustainability knowledge and sustainability perception in relation to the commitment to participate in the practice of preservation among UPM students. A total of 268 students from University Putra Malaysia has been selected by stratified random sampling and simple random sampling. The data were analyzed using descriptive analysis while the hypothesis was tested using the T-test, ANOVA and Pearson correlation test. The results showed that the level of sustainability knowledge among UPM students was at a moderate level; majority of the respondents have positive sustainability perception and have a moderate commitment to participate in sustainable practices. There was no significant difference between gender in relation to the degree of sustainability knowledge level but there was a significant difference between gender related to sustainability perception. In addition, the results show that there is a significant difference between the faculties associated with the level of sustainability knowledge but there is no significant difference with sustainability perceptions. Meanwhile, the findings also show that there is no significant relationship between sustainability knowledge level and commitment to participate in sustainable practices but there is a positive relationship between sustainability perceptions and the commitment to participate in sustainable practices (r= 0.265**, p=0.000). In conclusion, to promote sustainability, sustainability knowledge level and sustainability perception are found to be associated with commitment to participate in sustainable practices. The necessary actions and changes can be taken by individuals, universities, governments and non-governmental organizations (NGO) to promote sustainable practices in the future.

Keywords: *Sustainability, Knowledge, Perception, Practice*

ABSTRAK

Tujuan artikel ini adalah untuk mengkaji perbezaan di antara jantina dan fakulti berkaitan dengan tahap pengetahuan kelestarian dan persepsi kelestarian, untuk mengkaji hubungan tahap pengetahuan kelestarian dan persepsi kelestarian berkaitan dengan komitmen untuk menyertai dalam amalan kelestarian dalam kalangan pelajar UPM. Seramai 268 pelajar dari Universiti Putra Malaysia telah dipilih secara persampelan rawak berstrata dan persampelan rawak mudah. Data dianalisis dengan menggunakan analisis deskriptif manakala hipotesis kajian telah diuji dengan menggunakan Ujian-t, ANOVA dan ujian korelasi Pearson. Hasil kajian menunjukkan bahawa tahap pengetahuan kelestarian dalam kalangan

pelajar UPM adalah pada tahap sederhana; sebahagian besar daripada responden mempunyai persepsi kelestarian positif dan mempunyai komitmen yang sederhana untuk mengambil bahagian dalam amalan lestari. Tidak terdapat perbezaan yang signifikan antara jantina berkaitan dengan tahap pengetahuan kelestarian tetapi terdapat perbezaan yang signifikan antara jantina berkaitan dengan persepsi kelestarian. Selain itu, keputusan menunjukkan terdapat perbezaan yang signifikan di antara fakulti berkaitan dengan tahap pengetahuan kelestarian tetapi tiada perbezaan yang signifikan dengan persepsi kelestarian. Sementara itu, hasil kajian juga menunjukkan bahawa tidak terdapat perkaitan signifikan antara tahap pengetahuan kelestarian dan komitmen untuk mengambil bahagian dalam amalan lestari tetapi terdapat hubungan yang positif antara persepsi kelestarian dan komitmen untuk mengambil bahagian dalam amalan lestari (r = 0.265 **, p = 0.000). Kesimpulannya, untuk menggalakkan kelestarian, tahap pengetahuan kelestarian dan persepsi kelestarian didapati berkait dengan komitmen untuk mengambil bahagian dalam amalan lestari. Tindakan yang perlu dan perubahan boleh diambil oleh individu, universiti, kerajaan dan juga pertubuhan bukan kerajaan (NGO) untuk meningkatkan amalan lestari pada masa hadapan.

Kata Kunci: *Kelestarian, Pengetahuan, Persepsi, Amalan*

INTRODUCTION

In many instances societies have chosen the unsustainable paths of resource extraction and consumption. According to Magdalena and Debra (2008), humanity is facing enormous challenges that never been so obvious before. Many cultures have historically recognized the importance of establishing harmony between the environment, society, and the economy. However, "sustainability" in the context of our modern, industrialized society is a recent construct (Earl et al., 2003). In 1999, we were thinking and talking "environmental" but now is "sustainability" (Peter, 2004). The view of sustainability as an umbrella movement encompassing efforts towards improving the social, economic, and environmental position of all stakeholders, including companies, their employees, and customers, as well as the Earth, has recently become a focal point in academic and industry literature (Carew & Mitchell, 2001; Sheth et al., 2011). Sustainability has been defined in many different ways. According to the Brundtland Report, which provides a commonly accepted definition, it is that which "meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development [WCED], 1987).

The term sustainability was widely spread in the 1980s, when people became aware of the growing global problems that were infesting the world, for example the uncontrolled environmental pollution, scarcity of natural resources, overpopulation, climate change, drought and famine (Valentini, 2011). The often cited definition of sustainability proposed by the World Commission on Environment and Development (WCED) outlines social, environmental, and economic concerns with the goal of

preservation (WCED, 1987). The three pillars of sustainability are the powerful tool for defining the sustainability issues. This consists of environmental, social, and economic pillars. The three pillars are interconnected, that means, if any one pillar is weak, then the system as a whole is unsustainable.

A study by Jessica and Hyun-Hwa (2012) sought to specifically describe Generation Y consumers' general perception and knowledge of sustainability and environmental practices. The other two aspects of sustainability, economic longevity and social responsibility were not directly thematically present in the participant's survey results. Besides that, Kagawa (2007) found students' perceptions of sustainability frequently included environmental issues, followed distantly by the future and consideration of long term-effects, then by social and economic themes.

Nowadays, institutions, academics, individuals, and consumers are becoming aware of the important to shift towards sustainable ways of consuming. Consumers start to search for sustainability, considering it as a benchmark for high quality products and services, and accepting to pay higher prices for goods that guaranteed sustainable methods of production (Valentini, 2011). Universities have begun to promote strategies for creating sustainable campuses through education and design projects (Davis & Wolksi, 2009). According to Thaddeus et al., (2010), sustainability knowledge including recognition of system complexity and uncertainty, social robustness, acknowledgement of multiple ways of knowing and the incorporation of normative ethical premises. Many companies began to offer environmental friendly products, and they felt the urgency to communicate to their clients their new ecological offerings and their increased efforts for the environment (Valentini, 2011). Meanwhile, perception is the organization, identification, and interpretation of sensory information in order to represent and understand the environment (Schacter 2011). An individual's perception of social norms is one of the strongest predictors of behaviour (Fishbein & Ajzen, 2010). Sustainability perception means attitude and awareness towards sustainability or self-perception about their responsibility on sustainable. Brookfield (1969) claimed "decision makers operating in an environment base their decisions on the environment as they perceive it, not as it is".

Nowadays, our government still implements many mechanisms to protect the environment such as National Economic Policy (NEP), National Development Policy (NDP), and National Vision Policy (NVP) (Noranida & Khairulmani, 2014). Even though Malaysia has yet to achieve the title of "sustainable development nation", they have looked in-depth about their development plan without destroying their good environment quality (Noranida & Khairulmani, 2014).

The general objective of this research is to examine the different between gender and faculties affiliation in regards to the sustainability knowledge level and sustainability perception, to examine the relationship of sustainability knowledge level and sustainability perception in regards to the commitment to participate in sustainable practices among UPM students.

Hypothesis

HO1:   There is no difference between gender in regards to sustainability knowledge level among UPM students.

HO2   There is no difference between gender in regards to sustainability perception among UPM students.

HO3:   There is no difference between faculties affiliation in regards to sustainability knowledge level among UPM students.

HO4:   There is no difference between faculties affiliation in regards to sustainability perception among UPM students.

HO5:   There is no relationship between the sustainability knowledge level and the commitment to participate in sustainable practices among UPM students.

HO6:   There is no relationship between the sustainability perception and the commitment to participate in sustainable practices among UPM students.

LITERATURE REVIEW

Gender towards Sustainability Knowledge and Perception

According to Kagawa (2007), more male respondents claimed that they were more familiar with the terms sustainability and sustainable development than female respondents. In terms of familiarity with the terms, 40.5 percent of the male respondents answered "very familiar" while 29.3 percent of the female respondents choose "very familiar". Besides that, female respondents were less likely to declare themselves "very" or "quite familiar" with the term sustainability (male 83.7 percent; female 71 percent) and more likely to say that they are "not at all familiar" (male 9.6 percent; female 19.1 percent).There are more male than female respondents (male 45.3 percent; female 38.7 percent) who responded positively that they had previously experienced formal education addressing sustainability and sustainable development (Kagawa, 2007).

Sustainability can be reflected through some practices such as buying organic foods, purchasing green products and concerned about environmental issues. Mostafa (2007) observed that men are more environmentally concerned and initiated more green purchasing behaviours. According to Diamantopoulos (2003), all studies examining the relationship between gender and environmental knowledge found a significant relationship, with majority of the authors concluded that males tend to have higher and better knowledge about green issues than females.

However, there are many studies that have contrary findings. Some feminists argued that there is a natural or essential connection between women and nature which gives an innate understanding of the ecosystem and environmental protection (Diamond & Orenstein, 1990; Shiva, 1988). The study of Morel (2012), found that women are close to agree to recommend eco-friendly products to their family friends, more than men and it is also the case concerning the attention that they give to green advertising. Based on the findings of Davies et al. (1995), the purchaser of organic foods is consistently shown to be primarily female. This finding

also supports the Mintel findings that females not only purchase organic food but are more likely to purchase more of it than their male counterparts. Mida (2009) also agreed that women are more sensitive when it comes to environmental issues.

Women, while less likely to have as high level of environmental knowledge compared to men, tend to be more emotionally connected to environmental issues and have a higher interest in making behavioural changes to avoid environmental destruction (Kollmuss, 2002). Women inherently have a better understanding of the importance of environmental protection (Diamond & Orenstein, 1990., Shiva, 1988). Earl et al. (2003) initially hypothesized females would possess a greater knowledge of sustainability than males. Analysis of survey response revealed that male students indicated a better knowledge of sustainability concept. However, majority of the male students surveyed provided poor written evidences to support their claims. Many male respondents provided definition that lacked commonality with our definition of sustainability or simply left the question's response space blank (Earl et al., 2003).

There are also findings showing that there is no difference between male and female in terms of sustainability. Iacovos and Eddie (2012), carried out a survey about what do final year engineering students know about sustainable development. From the results, they found that there is no significant difference when variable such as gender, was examined. The environment has primacy in this take on sustainability (Dave et al., 2003). Gender is a very important variable in this study. Thus, this study intends to determine the differences between male and female in regards to sustainable knowledge level and the perception of sustainability among UPM students.

Faculties Affiliation towards Sustainability Knowledge and Perception
The perception of sustainability is formed as thinking, values and attitudes are modified based on the acquired knowledge and result in actions (Dobes, 2001). According to Shriberg (2002), college and university faculties have been instrumental in discovering the growing ecological crisis facing the United States and the world. Students are often on the vanguard of the environmental movement, and have helped place environmental issues onto the national and international agenda through activism events such as Earth Day. Faculties, students and others involved in higher education are leaders in the environmental movement. Therefore, one would expect the colleges and universities which house these individuals to be leading society on a more sustainable path (Shriberg, 2002). According to Creighton (1998), students, faculties and administrators all contribute to an increase in the knowledge, awareness, technologies, and tools necessary to create an environmentally sustainable future.

In the research carried out by Kagawa (2007), the results show that only a small percentage (9.3 percent) of respondents from the Health and Social Work

Faculty declared themselves "very familiar" with sustainable development, while a high-percentage of students in this faculty opted for "not at all familiar". A lower proportion of respondents from the Arts and Science Faculties declared themselves "not at all familiar" (art 14.3 percent; science 13 percent) than respondents from other faculties. Similarly, respondents from arts (53.5 percent) and social science and business (48.3 percent) identified themselves as "quite familiar" with the term sustainability, compared with only 16.1 percent of social work students.

        More respondents from the Social Science and Business Faculty as against respondents from other faculties (social science and business 50.2 percent; sciences 46.9 percent; education 44 percent; arts 37 percent; technology 36 percent; health and social work 17.9 percent) responded positively that they had previously experienced formal education addressing sustainability and sustainable development (Kagawa, 2007).

        Australian and international engineering professionals are under increased pressure to practice a more sustainable engineering. In response to this pressure, the Institute of Engineering, Australia, has updated the procedure for accreditation of the engineering baccalaureate to ensure the inclusion of sustainability learning. In order to graduate, Australian engineering students must now "understand sustainability". Engineering academicians now have the responsibility of teaching their students about sustainable engineering (Carew & Mitchell, 2010).

        Besides engineering academic, there are journals that show the importance of teaching sustainability to business students. Having said that, if educators provide business students a more balanced view between both economic and relational impact, it can help students maximize their careers in business and minimize behavioural harm (Giacalone, 2004). We believe a critical step towards helping business students understand this balance is the teaching of ethics and social responsibility (Robert et al., 2009).

        Anda *et al.* (2015) conducted a research which aimed to examine how the perception of the importance of sustainability varies amongst faculty. The results reflect that there is a relationship between faculty and the perceived importance of sustainability. New Ecological Paradigm scale (NEP) is a measurement that primarily used to measure the differences in behaviour and attitude relative to underlying values and worldviews (Berkshire, 2012). Results show that there is a significant difference between the NEP scores of Faculty of Forestry and the Sauder School of Business. Besides that, there is also a difference between NEP scores of Forestry and all other Faculties which included Faculty of Art and Faculty of Science. This suggests that Faculty of Forestry has a better subjective rating on the importance of sustainability compared to other faculties to the NEP.

Sustainability Knowledge
There are several previous researches that defined and highlighted the importance of knowledge. According to Kwadwo (2008), knowledge can be referred to as

organized or processed information or data, and it is crucial in any innovation process. Knowledge is an essential component in development, and is extremely important in this challenging era. In the 21st century, knowledge accretion and application will drive development process (Azmariana *et al*., 2013). Carreon *et al*., (2011) noted knowledge as one of the potential impingement factors for sustainability.

Sustainability encompasses environment, economics, and society. People need basic knowledge from the natural sciences, social sciences, and humanities to understand the principles of sustainable development, how they can be implemented, the values involved, and ramifications of their implementation (Rosalyn, 2002). Sustainability knowledge has several characteristics including social robustness, recognition of system complexity and uncertainty, acknowledgement of multiple ways of knowing and the incorporation of normative ethical premises (Thaddeus *et al*., 2010).

Some scholars consider student's knowledge of sustainability as being crucial to the successful implementation of sustainable practices on college campuses (Eagan & Orr, 1992). Azapagic *et al.* (2005) highlights that student's knowledge about sustainability was strong in terms of environmental issues and they were relatively familiar with key environmental legislations, policies and standards, but a significant knowledge gap existed in terms of the social and economic aspects of sustainable development. By enhancing the student's knowledge of the concept of sustainability through education, steps can be taken to implement efforts that will help foster a more sustainable future (Earl *et al.*, 2003).

Azmariana et al. (2013) conducted a research on the relationship between attitude, knowledge, and support towards the acceptance of sustainable agriculture among farmers in Malaysia. They found that there is a positive relationship between farmer's knowledge and their acceptance of sustainable agriculture practices. Khoram et al. (2006) also agreed that knowledge is one of the major factors contributing to the recognition of sustainable agriculture; it is the key with respect to implementation and could improve sustainable practices and improve farmers' attitudes.

However, whereas information has created concerned for global issues, it is not necessarily related to real knowledge of the concept of sustainability (Bhaduri & Ha-Brookshire, 2011; Kagawa, 2007). Investigation of the specific knowledge of sustainability held by Generation Y consumers is very limited (Kagawa, 2007). Kollmuss and Agyemen (2002) pointed out that increasing knowledge by itself will not automatically facilitate individual's behavioural change. From the research done by Emanuel and Adams (2011), there is only a slight knowledge gap but a larger commitment gap with more Hawaii respondents than Alabama respondents indicating commitment to sustainability. Kim and Joy (2012) concluded that although knowledge may increase, there may not be a significant change in sustainable apparel purchasing behaviour. Students with high knowledge of these issues did not report more engagement in sustainable apparel-purchasing. This may be attributable

to the complexity of sustainable apparel-purchasing with many personal contextual barriers limiting engagement in the behaviour.

Sustainability Perception
The self-perception of 'being green', for example, having pro-environmental attitudes and behaviours is the primary driving factor which encourages participation. An individual's perception of social norms is one of the strongest predictors of behaviour: when someone perceives something as a 'normal' way of acting, that individual is more likely to pursue that behaviour (Fishbein & Ajzen, 2010). Various studies found that individuals work together towards environmental goals-thus creating norms of pro-environment behaviour, these individuals begin to behave in a more environmentally sustainable way (Hopper & Nielsen, 1991). Irvine and Kaplan (2001) also found that individuals were willing to change their unsustainable behaviours if the community members asked them to do so and explained the rationale.

There are many researchers such as Owen and Halfacre, 2006; Stafford, 2011; Emanuel and Adams, 2011 who perceived that institutions such as universities can serve as important vehicles in informing and educating individuals on environmental issues. These institutions can also implement various practical activities that enhance the concept of sustainability. The students' perceptions of sustainability is an under-researched field with very recent beginnings yet enormous potential. A majority of literature, primarily from surveys, concurs that students are generally well informed and aware of environmental concerns, and give positive feedback to sustainability as a concept and as an action. However, awareness does not necessarily equate to action, and this is the obstacle that requires further research (Sadusky, 2014).

The survey done by Kagawa, 2007 found that more than 90 percent of respondents held a positive attitude towards sustainability, identifying sustainability as 'good things' or declaring themselves as passionate advocates for sustainability. However, most students reporting giving little thought to their consumption and waste, and when confronted with issues of sustainability still find them either distant or impersonal or overwhelming (Ann, 2011).

Generation Y consumers, aged 18-35 in 2012, are especially socially concerned and aware of many global issues (Williams and Page, 2011). These consumers are a powerful market segment with disposable income, are characterized by information empowerment, causing both increased awareness of environmental, social, and economic ills (Kagawa, 2007, Bhaduri & Ha-Brookshire, 2011).

Sustainable Practices
According to Portland Metropolitan Association of Realtors, the definition of sustainable practices is living your life in a way that uses resources in a responsible way. This could mean buying a house with energy efficient features or buying a

home that has been renovated using non-toxic and/or recycled/salvaged materials. Both of these are examples of using resources in a more responsible way.

According to Franklin *et al*. (2003), the establishment of sustainable practices on campus and the demonstration of better management of practices that comply with sustainability rules, give higher education institutions the opportunity to use their campuses to educate the community at large about progressive models of development. In order to improve environmental knowledge and the attitudes and behaviour of both students and staff, many universities undertake a variety of sustainable activities and initiatives (Owens & Halfacre, 2006). Numerous colleges and universities are implementing sustainable practices on campuses regarding transportation, energy, food, water, landscaping, and waste (Earl *et al.,* 2003).

Sadusky (2014) found that, students are in fact aware of the importance of sustainability and largely support it. A majority (61%) of students even indicated willingness to pay a small fee ($5 or $10 annually) to help campus sustainability projects. In addition, campus community members often do not practice individual conservation behaviours but would be willing to accept collective conservation efforts such as motion-sensor lighting in hallways (Marans & Edelstein, 2010).

Kagawa (2007) found that there are dissonances in terms of student respondents' perceptions of sustainability and their reported behaviour determinants. Respondents tend to agree with critical or radical statements on behalf of environmental and social justice. For example, more than 80 percent of respondents strongly agreed or agreed with the statement, "We, as a society, should radically change our way of living to offset the danger of climate change". However, when it comes to personal behaviour changes, their proposed individual lifestyle changes do not necessarily align with their critical or radical "in principle" stances. Besides that, student respondents most frequently articulate actions addressing responsibility as consumer such as changing purchasing habits, recycling, saving energy and water, and changing forms of transport.

Besides universities, there are also researches who are concern on the factors that influence the acceptance of sustainable agriculture among farmers. According to Azmariana *et al.* (2013), there are three factors which included attitude, knowledge and support that drive the acceptance of sustainable agriculture. Farmers' attitudes have an impact on the acceptance of sustainable agriculture as a new technique to cultivate crops and rear livestock (Sadati *et al*., 2010). Farmers' knowledge is an important element in accepting sustainable agriculture practices.

METHODOLOGY

Sampling
The study location in this research is University Putra Malaysia (UPM), Serdang. UPM students from 15 faculties are the target population. This study uses survey

research through questionnaire and a total of 268 respondents were involved in this study. Stratified random sampling was used, which involves categorizing the UPM students into mutually exclusive groups, and they were categorized based on the faculty affiliation. An independent simple random sample was then drawn from each group. The data was analyzed using Statistical Package for Social Science for Windows (SPSS) version 22.

Instrumentation

This study used survey research through questionnaires. The number and constructs of questions are based on the research questions and the hypotheses. The instrument consisted of four parts. Besides Part A, the questions on the other three parts cover all three domains of sustainability which is environmental, social and economic. Parts A is about the demographic information such as age, gender, household income level per month, number of household and faculty affiliation. Although demographic information will be collected, respondents remain anonymous.

Next, Part B was form from 14 true or false questions which asked about the respondent's understanding and knowledge of sustainable. Part C involved 15 questions which asked about the respondent's sustainability perception. It will be provided using a five-point Likert-type scale from (1) strongly disagree to (5) strongly agree with a (3) neutral response option. Some of the questions on Part B and C are directly adapted from Zwickle et al. (2013) on their Assessment of Sustainability Knowledge.

Part D was form from 15 questions which ask about their commitment to sustainable practices. Respondents are required to indicate how often they practice the activities such as take public transit and buy organic foods per week. It will be provided using a five-point Likert-type scale from (1) Never to (5) Always. Respondents with higher scale scores in this part could be viewed as being high commitment to participate in sustainable practices. The survey took less than five minutes to complete via paper-and-pencil questionnaire administration.

Data Analysis

The data was analyzed using the Statistical Package for Social Science for Windows (SPSS) version 22. Descriptive statistic and inferential statistic were used to analyze the data collected in this research. Descriptive statistic was used to calculate the frequency and percentage of demographic information data, the sustainability knowledge level and sustainability perception.

Independent samples T-test was used for the first and second hypothesis (HO1 & HO2) to test the difference between gender in regards to sustainability knowledge level and sustainability perception among UPM students. If the value in the Sig. (2-tailed) column is above 0.05, it means that there is no significant difference between the gender with sustainability knowledge level and gender with sustainability perception.

ANOVA was used to test the third and fourth hypothesis (HO3 & HO4) about the difference between faculties affiliation in regards to sustainability knowledge level and perception to the sustainability among UPM students. If the value in the ANOVA table Sig. column is above 0.05, it means that there is no significant difference between the faculties affiliation with sustainability knowledge level and gender with sustainability perception.

For the fifth and sixth hypothesis (HO5 & HO6) which stated that there is no relationship between sustainability knowledge level and towards sustainability perception to the commitment to participate in sustainability practices among UPM students, Pearson correlation test was used to test both hypotheses. If the value in the Sig. (2-tailed) column is above 0.05, there is no significant relationship between the two variables. The sign in front of the r-value shows that the relationship is either positive or negative.

FINDINGS AND DISCUSSION

Respondents' Demographic Profile

The respondents' demographic profile is shown in Table 1. Among 268 respondents, there were 134 male and 134 female respondents. In UPM, there are a total of 15 faculties. On average, there were at least 18 respondents or equivalent to 6.7% from each faculty. Only the Faculty of Educational Studies and Faculty of Economic and Management had 17 respondents as compared to the other faculties which had 18 respondents respectively.

Table 1: Demographic Profile of Respondents

Variables		Frequencies (n)	Percentage (%)
Gender			
	Male	134	50.0
	Female	134	50.0
Faculty			
i.	Faculty of Agriculture	18	6.7
ii.	Faculty of Forestry	18	6.7
iii.	Faculty of Veterinary Medicine	18	6.7
iv.	Faculty of Economic and Management	17	6.3
v.	Faculty of Engineering	18	6.7
vi.	Faculty of Educational Studies	17	6.3
vii.	Faculty of Science	18	6.7
viii.	Faculty of Food Science and Technology	18	6.7
ix.	Faculty of Human Ecology	18	6.7

x.	Faculty of Modern Language and Communication	18	6.7
xi.	Faculty of Design and Architecture	18	6.7
xii.	Faculty of Medicine and Health and Science	18	6.7
xiii.	Faculty of Computer Science and Information Technology	18	6.7
xiv.	Faculty of Biotechnology and Biomolecular Science	18	6.7
xv.	Faculty of Environmental Studies	18	6.7

Respondents' Sustainability Knowledge

Table 2 shows the descriptive analysis of the respondents' sustainability knowledge. The respondents' sustainability knowledge level is considered high where out of these 14 questions, 11 questions were answered correctly which is more than 60%. For example, majority of the respondents (90.30%) know that global climate change refers to an increase in the earth's air and water temperature caused by greenhouse gases released into the atmosphere. 86.20% respondents know that turning off the computer instead of leaving it in sleep mode can save 40 watts of energy per hour. However, there were three questions that majority of the respondents answered incorrectly. For example, only 38.40% respondents know that ozone forms a protective layer in the earth's upper atmosphere which protect us from acid rain is a false statement. Similarly, there were 49.60% who answered the question 'Earth Day is an annual event which is not celebrated on April 20th'. The minimum score is 4 and the maximum score is 14. Knowledge is one of the potential factors that have impact on sustainability (Carreon *et al.*, 2011). By heightening the students' knowledge of the concept, of sustainability, steps can be taken to implement efforts that will help create a sustainable future (Earl *et al*., 2003).

Table 2: Descriptive Analysis of Respondents' Sustainability Knowledge

| Statement (n=268)	Correct answer	n (%)
*1. Ozone forms a protective layer in the earth's upper atmosphere which protects us from acid rain.	False	103 (38.40)
2. Plastics can be recycled without losing their quality.	True	180 (67.20)
3. Malaysia Green Building Confederation (MGBC), is a non- profit making organisation that promotes sustainable buildings in Malaysia.	True	229 (85.40)

4.	The primary benefit of wetlands is to clean the water before it enters lakes, streams, rivers or oceans.	True	224 (83.60)
* 5.	We cannot slow down the rate of climate change.	False	187 (69.80)
6.	Companies that are environmentally sustainable are more likely to be profitable in the long run.	True	211 (78.70)
7.	Global climate change refers to an increase in the earth's air and water temperature caused by greenhouse gases released into the atmosphere.	True	242 (90.30)
8.	Hazardous products such as motor oil and pesticides can catch alight at relatively low and produce toxic vapours.	True	227(84.70)
*9.	Only 30% of the materials used in a mobile phone can be recycled.	False	113 (42.20)
*10.	Earth Day is an annual event which is celebrated on April 20th.	False	133 (49.60)
11.	Climate change is responsible for rising sea tides and extreme weather patterns.	True	227 (84.70)
12.	Turning off the computer instead of leaving it in sleep mode can save 40 watts of energy per hour.	True	231 (86.20)
13.	Buying local food is good for the environment because less transportation is needed, so less fuel is used.	True	214 (79.90)
*14.	Every Saturday and Sunday is a plastic bag-free day in Selangor.	False	167 (62.30)

* Negative statement

Figure 1 shows the levels of respondents' sustainability knowledge in this study. The respondents' sustainability knowledge was categorized into three groups, namely low, moderate and high level. It depends on the points that respondents obtained from each correct answer. The score for low level is ranged from 0 to 5 points, 6 to 10 points for moderate level and 11 to 14 for high level. Figure 1 shows that there were only 1% of the respondents who have low level of sustainability knowledge. More than half of the respondents (56%) falls into the moderate to higher level which means that they were able to answer six to ten questions correctly. Lastly, there were 43% respondents who have a high level of sustainability knowledge. They were able to score 11 to 14 points in this sustainability knowledge

test. Overall, the result indicated that the sustainability knowledge level among UPM students were at a moderate to higher level.

Figure 1: Levels of Respondents' Sustainability Knowledge
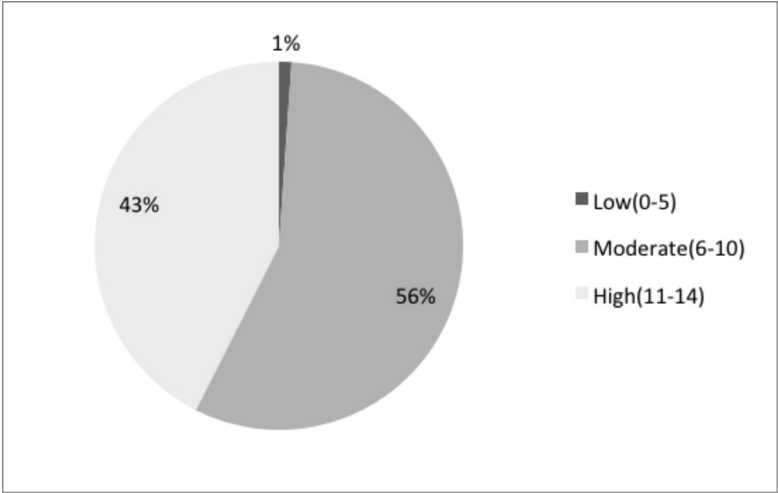
Respondents' Sustainability Perception

Table 3 shows the descriptive analysis of the respondents' sustainability perception. The statement which most of the respondents strongly agree about are reduce, reuse, recycle was the best waste management practice (33.2%). More than half of the respondents agree that by making minor changes to their daily routine, they can have a significant positive impact on energy reduction (54.10%). Less than half of the respondents (43.30%) have neutral perception about the responsibility to help make a difference on economic issue like unemployment, inflation, and local business/ local economy. There were 47.8% respondents who disagree that they were not really bothered about sustainability and 33.2% respondents disagree with the statement which stated that 'we should maintain a high and stable levels of economic growth, even if it disregards the environment'. Only 34.3% respondents strongly agree with 'it is a waste of time and effort to enhance sustainability'.

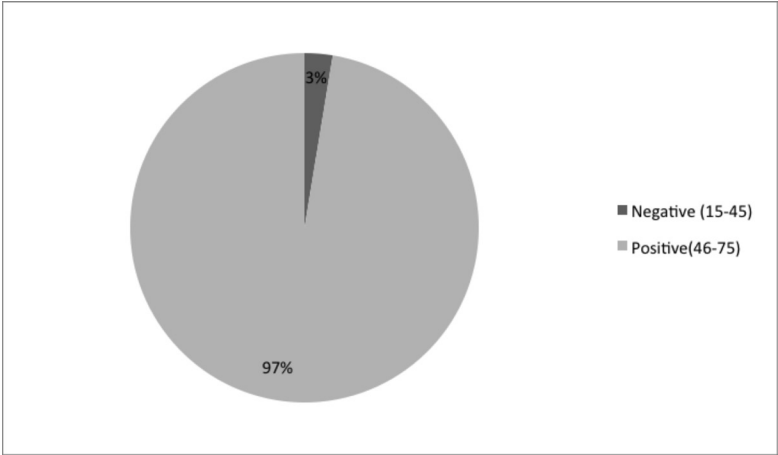## Table 3: Descriptive Analysis of Respondents' Sustainability Perception (Landscape)

Statement (n=268)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
	n (%)	n (%)	n (%)	n (%)	n (%)	Mean
1. I have a personal responsibility to help make a difference on environmental issues like waste, resource consumption, and water usage.	6 (2.20)	21 (7.80)	65 (24.30)	110 (41.00)	66 (24.60)	3.78
2. I have a personal responsibility to help make a difference on social issues like safety and security, education, and wealth and wellness.	1 (0.40)	22 (8.20)	89 (33.20)	113 (42.20)	43 (16.00)	3.65
3. I have a personal responsibility to help make a difference on economic issues like unemployment, inflation, and local business/ local economy.	1 (0.40)	13 (4.90)	116 (43.30)	114 (42.50)	24 (9.00)	3.55
4. I'm interested in learning more about sustainability.	2 (0.70)	15 (5.60)	97 (36.20)	115 (42.90)	39 (14.60)	3.65
*5. It is a waste of time and effort to enhance sustainability.	92 (34.30)	95 (35.40)	53 (19.80)	25 (9.30)	3 (1.10)	2.07
*6. I am not really bothered about sustainability.	63 (23.50)	128 (47.80)	58 (21.60)	17 (6.30)	2 (0.70)	2.13
7. We should radically change our way of living to offset the danger of climate change.	0 (0.00)	5 (1.90)	82 (30.6)	144 (53.70)	37 (13.80)	3.79
*8. We should maintain a high and stable levels of economic growth, even if it disregards the environment.	47 (17.50)	89 (33.20)	70 (26.10)	54 (20.10)	8 (3.00)	2.58
9. In my lifetime, I think that global climate change will be a major problem.	2 (0.70)	14 (5.20)	64 (23.90)	122 (45.50)	66 (24.60)	3.88
*10. For future generations, I think that global climate change is not a problem at all.	89 (33.20)	92 (34.30)	61 (30.00)	22 (8.20)	4 (1.50)	2.10
11. I am aware of the sustainability campaigns at UPM.	5 (1.90)	34 (12.70)	113 (42.20)	91 (34.00)	25 (9.30)	3.36
12. By making minor changes to my daily routine, I can have a significant positive impact on energy reduction.	0 (0.00)	7 (2.60)	52 (19.40)	145 (54.10)	64 (23.90)	3.99
13. Riding a bike to college can lower my carbon footprint.	5 (1.90)	11 (4.10)	74 (27.60)	125 (46.60)	53 (19.80)	3.78
14. Corporate Social Responsibility can be a platform for companies and brands to optimize performances and efficiencies.	1 (0.40)	10 (3.70)	106 (39.60)	120 (44.80)	31 (11.60)	3.63
15. Reduce, Reuse, Re-cycle is the best waste management practice.	6 (2.20)	4 (1.50)	37 (13.80)	132 (49.3)	89 (33.20)	4.10

*Negative statement

Figure 2 shows the category of respondents' sustainability perceptions in this study. The sustainability perception was categorized into two groups, namely negative and positive. The score for negative sustainable perception is ranged from 15 to 45 and positive perception is ranged from 46 to 75. Figure 2 shows that there were only 3% of the respondents have negative sustainability perception. Majority of the respondents (97%) had positive sustainability perception. Overall, the result indicates that most of the respondents have a positive sustainability perception.

Figure 2: Category of Respondents' Sustainability Perception

Respondents' Commitment to Participate in Sustainable Practices

Table 4 presented the descriptive analysis of the respondents' commitment to participate in sustainable practices. Based on the findings, only 0.4% of the respondents never turns off the lights when not in use and 1.1% rarely turn it off. 32.8% of the respondents double side copies and print jobs very often, which means 5 to 6 times per week. There were 33.2% of the respondents who took public transport and 33.6% of them were carpooling 3 to 4 times per week. However, results showed that there were 31% of the respondents who bought organic foods 1-2 times per week. There were 6.7% of the respondents who were never actively involved in sustainability-related community projects and 0.7% of the respondents never purchase energy-savings appliances whenever possible.

Table 4: Descriptive Analysis of Respondents' Commitment to Participate in Sustainable Practices (Landscape)

Statement (n=268)	Never (0 times per week)	Rarely (1-2 times per week)	Sometimes (3-4 times per week)	Very Often (5-6 times per week)	Always (7 or above per week)	Mean
	n (%)	n (%)	n (%)	n (%)	n (%)	Mean
1. Take public transport	13 (4.90)	38 (14.20)	89 (33.2)	77 (28.70)	51 (19.00)	3.43
2. Carpool	17 (6.30)	46 (17.20)	90 (33.60)	78 (29.10)	37 (13.80)	3.27
3. Bike/walk	16 (6.00)	50 (18.70)	68 (25.40)	56 (20.90)	78 (29.10)	3.49
4. Buy locally grown, seasonal products	20 (7.50)	64 (23.90)	97 (36.20)	61 (22.80)	26 (9.70)	3.03
5. Buy organic foods	18 (6.70)	83 (31.00)	96 (35.80)	54 (20.10)	17 (6.30)	2.88
6. Eat lower class of food in the food chain (less meat)	4 (1.50)	39 (14.60)	129 (48.10)	70 (26.10)	26 (9.70)	3.28
7. Purchase recycled or bulk products	15 (5.60)	72 (26.90)	120 (44.80)	52 (19.40)	9 (3.40)	2.88
8. Dispose rubbish according the designated recycle bins	9 (3.40)	54 (20.10)	113 (42.20)	78 (29.10)	14 (5.20)	3.13
9. Turn off the lights when not in use	1 (0.40)	3 (1.10)	66 (24.60)	98 (36.60)	100 (37.30)	4.09
10. Turn the heater down when not at home	4 (1.50)	4 (1.50)	71 (26.50)	95 (35.40)	94 (35.10)	4.01
11. Reduce/reuse/recycle	7 (2.60)	40 (14.90)	102 (38.10)	74 (27.60)	45 (16.80)	3.41
12. Double-sided copies and print jobs	2 (0.70)	27 (10.10)	86 (32.10)	88 (32.80)	65 (24.30)	3.70
13. Use green cleaning products	11 (4.10)	49 (18.30)	113 (42.20)	72 (26.90)	23 (8.60)	3.18
14. Purchase energy-saving appliances whenever possible	2 (0.70)	22 (8.20)	74 (27.60)	115 (42.90)	55 (20.50)	3.74
15. Actively involved in sustainability-related community projects	18 (6.70)	80 (29.90)	103 (38.40)	53 (19.80)	14 (5.20)	2.87

Figure 3 shows category of respondents' commitment to participate in sustainable practices. The commitment to participate was categorized into three groups, namely low, moderate and high. The score for low commitment level is ranged from 15 to 35, moderate commitment level ranged from 36 to 55 and the commitment level is considered high if the score ranged from 56 to 75. There were only 1% of the respondents who had low commitment to participate in sustainable practices. Majority of the respondents (81%) had moderate commitment and 18%

had high commitment to participate in sustainable practices. Overall, the result indicated that most of the respondents have a moderate commitment to participate in sustainable practices.

Figure 3: Category of Respondents' Commitment to Participate in Sustainable Practices
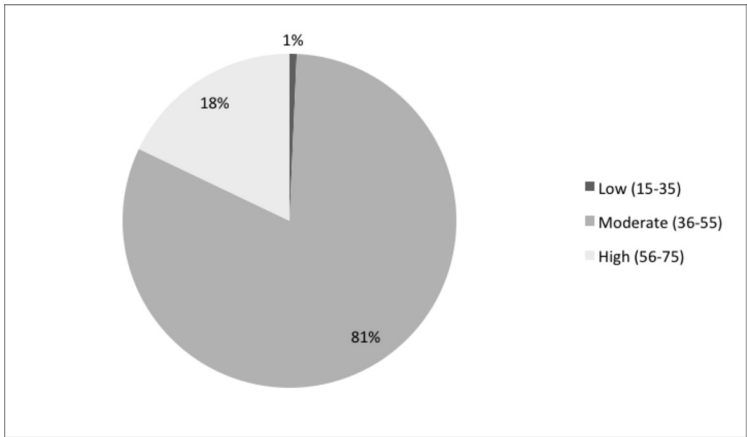
Statistical Analysis

Table 5 shows that there is no difference between gender in regards to sustainability knowledge level among the UPM students (p=0.875). This finding was supported by Iacovos and Eddie (2012) where they found that there was no significant difference in the sustainability knowledge when gender was examined.

Table 5: Results of the Differences in Sustainability Knowledge between Gender

Variable (N=268)		Sustainability Knowledge			
Gender	n	Mean	Standard Deviation	T	Sig. (2-tailed)
Male	134	10.05	1.713	0.158	0.875
Female	134	10.01	1.707		

Note: p>0.05

Table 6 shows that there was a difference between gender in regards to the perception of sustainability among the UPM students (p=0.006). The result was supported by Kollumuss (2002) who found that females tend to be more connected to environmental issues and have a higher interest in making behavior changes to avoid environmental destruction.

Table 6 : Results of the Differences in Perception of Sustainability between Gender

Variable (N=268)		Perception of Sustainability			
			Standard		Sig.
Gender	n	Mean	Deviation	T	(2-tailed)
Male	134	53.38	5.840	-2.750	0.006
Female	134	57.38	6.064		

**Note: p<0.05

Table 7 shows that there is a significant difference between faculties affiliations and sustainability knowledge level among the UPM students (p=0.001). This finding was supported by Kagawa (2007), who found that respondents from each faculty have different familiarity with the sustainability terms. Faculty of Modern Language and Communication had the highest mean (10.83), it indicates that this faculty had the highest sustainability knowledge, followed by Faculty of Forestry and Faculty of Design and Architecture (10.72), Faculty of Food Science and Technology (10.67), Faculty of Agriculture (10.61), Faculty of Medicine and Health Sciences (10.56), Faculty of Veterinary Medicine (10.44), Faculty of Computer Science and Information Technology, Faculty of Engineering (9.67), and Faculty of Economics and Management (9.59). Faculty of Science, Faculty of Human Ecology Faculty of Computer Science and Information Technology, Faculty of Biotechnology and Biomolecular Science with mean of 9.44 respectively. The lowest mean was Faculty of Educational Studies (8.94) and it shows that this faculty had the lowest sustainability knowledge level.

Table 7: Results of the Differences in Sustainability Knowledge between Faculties Affiliation

Variable (N=268)		Sustainability Knowledge			
			Standard		
Education Level	n	Mean	Deviation	F	Sig.
Faculty of Agriculture	18	10.61	1.539		
Faculty of Forestry	18	10.72	1.487		
Faculty of Veterinary Medicine	18	10.44	1.580		
Faculty of Economics and Management	17	9.59	1.734		
Faculty of Engineering	18	9.67	1.815		
Faculty of Educational Studies	17	8.94	1.952		
Faculty of Science	18	9.44	2.175		
Faculty of Food Science and Technology	18	10.67	1.328		

Education Level	n	Mean	Standard Deviation	F	Sig.
Faculty of Human Ecology	18	9.44	1.504	2.775	0.001
Faculty of Modern Language and Communication	18	10.83	1.383		
Faculty of Design and Architecture	18	10.72	1.320		
Faculty of Medicine and Health Science	18	10.56	1.294		
Faculty of Computer Science and Information Technology	18	9.94	1.798		
Faculty of Biotechnology and Biomolecular Science	18	9.44	1.504		
Faculty of Environmental Studies	18	9.33	1.815		

**Note: p <0.05   18

Table 8 exhibits the results of the differences in sustainability perception between faculties affiliations. Result shows that there was no significant difference between faculties affiliations as the p- value is bigger than 0.05 (p=0.117).

Table 8: Results of the Differences in Sustainability Perception between Faculties Affiliation

Variable (N=268)		Perception of Sustainability			
Education Level	n	Mean	Standard Deviation	F	Sig.
Faculty of Agriculture	18	54.39	2.873		
Faculty of Forestry	18	54.61	7.301		
Faculty of Veterinary Medicine	18	54.11	2.587		
Faculty of Economics and Management	17	57.88	5.578		
Faculty of Engineering	18	58.78	9.986		
Faculty of Educational Studies	17	58.59	8.412		
Faculty of Science	18	55.00	9.062		
Faculty of Food Science and Technology	18	56.56	4.768		
Faculty of Human Ecology	18	57.83	5.480	1.483	0.117

Faculty of Modern Language and Communication	18	55.67	3.181
Faculty of Design and Architecture	18	55.00	2.326
Faculty of Medicine and Health Science	18	55.00	3.068
Faculty of Computer Science and Information Technology	18	57.33	4.994
Faculty of Biotechnology and Biomolecular Science	18	57.00	5.881
Faculty of Environmental Studies	18	58.94	6.699

Note: p >0.05   18

Table 9 shows that there was no significant relationship between sustainability knowledge level and commitment to participate in sustainable practices because the p-value is more than 0.05 (p= 0.761). This is supported by the Kollumuss and Agyemen (2002) who pointed out that increasing knowledge by itself will not automatically facilitate individuals' behavioural change.

Table 9: Results of the Relationship between Sustainability Knowledge and Commitment to Participate in Sustainable Practices

Relationship with commitment to participate in sustainable practices	Pearson Correlation (r-value)	Significance (p-value)
Sustainability Knowledge	0.019	0.761

Note: p> 0.05

Table 10 shows that thereis a significant relationship between sustainability perception and commitment to participate in the sustainable practices (p= 0.000). The strength of the relationship was weak as r value is only 0.26 and this relationship was a positive relationship because there was no negative sign in front of the r value. This means that the more positive the sustainability perception is, the higher the commitment to participate in the sustainable practices.

Table 10: Results of the Relationship between Sustainability Perception and Commitment to Participate in Sustainable Practices

Relationship with commitment to participate in sustainable practices	Pearson Correlation (r-value)	Significance (p-value)
Perception of Sustainability	0.265*	0.000

*. Correlation is significant at the 0.01 level (2-tailed).

CONCLUSION

In conclusion, the study revealed that majority of the respondents have moderate to higher level of sustainability knowledge, positive sustainability perception and moderate level of commitment to participate in sustainable practices. The statistical analysis of the hypothesis shows that there was no difference between gender in regards to sustainability knowledge level. However, there was a significant difference between gender in regards to the perception of sustainability. It shows that female have more positive sustainability perception than male. Findings also show that there was a significant difference between faculties affiliations in regards to sustainability knowledge. However, there was no significant difference between faculties affiliations in regards to sustainability perception. In addition, there was no significant relationship between the sustainability knowledge level and commitment to participate in sustainability. This result indicates that higher sustainability knowledge level does not guarantee a higher commitment to sustainable practices. On the contrary, perception of sustainability was found to have positive relationship with the commitment to participate in sustainable practices. This indicates that the more positive the perception of sustainability, the higher the commitment to participate in sustainable practices.

This result is important to the Ministry of Higher Education Malaysia (MOHE). MOHE is responsible for determining the policies and direction of higher education in Malaysia. The location of this study is at University Putra Malaysia. Based on this result, MOHE can strive to develop and include sustainability in all the universities in Malaysia to encourage the growth of sustainability knowledge level and increases the commitment to participate in sustainable practices. In addition, universities especially those universities that want to differentiate their image as sustainable, green and ecologically friendly can use this finding as their reference. Universities are able to create public awareness of how sustainability can be integrated into everyday life (Jain & Pant, 2010). Universities must realize their important role in promoting sustainability. Based on the results, universities can focus on enhancing the students' perception especially for male students as the male's perception of sustainability is lower than that of the female and there is also a relationship between perception and commitment in sustainable practices. There is also a different between faculties affiliation and sustainability knowledge.

Universities may offer courses with themes related to sustainability in all faculties to increase their sustainability knowledge level because some scholars consider knowledge of sustainability as fundamental to the successful implementation of sustainable practices in college campuses (Emanuel & Adams, 2011). It can minimize the knowledge gap between each faculty.

There were also implications generated from this results that can be used by related authorities such as government and non-governmental organizations (NGO)s. Understanding the relationship between the knowledge and perception of sustainability towards the commitment to participate in sustainable practices, government can develop laws, regulations, ordinances and policies that can help address issues of sustainability and promote sustainability nationally and internationally. NGO in Malaysia such as Malaysian Environmental NGOs (MENGO) and Social-Economic & Environmental Research Institute (SERI) can used the empirical data or the findings to develop programmes or activities which help to promote sustainability.

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Profil Penulis

Zuroni Md Jusoh, Ph.D
Senior Lecturer
Faculty of Human Ecology
Universiti Putra Malaysia
zuroni@upm.edu.my

Than Hui Yan
Bac. Sc. Consumer Studies
Faculty of Human Ecology
Universiti Putra Malaysia