
NO TIME TO DISPOSE? A STUDY ON THE CORRELATIONS AND ITS CONTRIBUTING FACTORS AFFECTING UNIVERSITY STUDENTS' INTENTION TO PRACTISE E-WASTE

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ABSTRACT

E-waste is a serious environmental problem. This study examines the correlations and its contributing factors affecting the e-waste recycling intention level among university students. A cross-sectional design using a quantitative method was used in this research and out of 370 questionnaires distributed only 285 were useable for further analysis. Results showed that majority of the university students had an average level of e-waste recycling intention. The association between attitudes, environmental awareness, law and regulations, convenience of recycling facilities and service and e-waste recycling intention is significantly correlated with the e-waste recycling intention among university students. Findings showed that attitudes were the main factor affecting the e-waste recycling intention. Thus, this study contributes a greater understanding of e-waste recycling especially for university students as they are the educated community. As such, a proper e-waste recycling campaign is a collaborative effort to raise awareness on public as well as university students against the waste landing in landfills.

1. Introduction

Nowadays, the proliferation of technological advancement in the electrical and electronic industry has led to the development of sophisticated devices which results in the increment of the obsolete rate of the lower device which tends to be waste electrical and electronic equipment (WEEE) (Sabbaghi et al., 2015). Directing to the e-waste problem, this issue is a global concern as e-waste is a source for a load of toxic materials such as lead, cadmium, mercury, chromium and poly-brominated biphenyls. In addition, e-waste is a source of precious metals such as iron (Fe), copper (Cu), aluminium (Al), gold (Au), silver (Ag) and others (Madrigal-Arias et al, 2015). Furthermore, electronic waste contributed to the concentration of lead (Pb) to the landfills in the US (EPA, 2000). The United Nations estimated that e-waste production will triple by 2050, to reach approximately 11 million tonnes per year (United Nation University, 2019). The most probable explanation is that, due to our love of gadgets and devices, which are becoming more and more affordable.

The impact of improper e-waste management is discussed at the international arena. For instance, e-waste in the United States is now the fastest increasing municipal waste portion (USEPA, 2011). This is because most of the electronic devices have short lifespan and frequently replaced when they malfunction. The consequences of the issue are severe and cause various problems at the global level especially in a developing country (Suja et al., 2014). Meanwhile, Thailand has produced approximately 8,000 tons of e-waste annually that consist of about 20,000 tons per year of electrical and electronic goods. Thailand also face issues caused by low knowledge of consciousness on e-waste, incomplete databases, and inventories regarding e-waste, lack of environmentally sound management practices and lack of specific laws and regulation (Pariatamby & Victor, 2013). However, this problem could be solved by the correct method of disposal and raising public awareness on the importance of the e-waste management. As stated in the study of the case in Taizhou, China, economic benefit, and convenience of recycling are the main factors of choosing a better disposal method (Chi et al., 2014). As reported by World Economic Forum (2019) the situation is not helped by the fact that only 20 percent of global e-waste is formally recycled.

As Malaysia is envisioned to achieve the sustainable development goal (SDGs) by the year of 2030, the government initiatives on Household E-Waste Management by Department of Environment (DOE) under Natural Resources and Environment Ministry in Malaysia has focused on their effort to the management of both industrial e-waste and household e-waste issue. This was

mentioned under the E-waste Alam Alliance which was initiated in 2013. Its aims to develop an effective household e-waste collection, segregation, transportation and also provide e-waste collection point that is available in every state. Among others the objective is to raise the public awareness on e-waste recycling (DOE, 2021). In 1988, the Government of Malaysia had proposed the Action Plan for a Beautiful and Clean (ABC) Malaysia, proceeded by a recycling program in the following years. Although several policies and regulations have been put in place to cover e-waste, the situation has not improved to a positive outcome due to low responses from the public (Periathamby et al., 2009).

The above concern is not without evidence. Despite the initial efforts taken by the government, however, Malaysians still have a very low awareness on the importance of e-waste recycling. Dr. Tan Ching Seong who is an e-waste's expert claimed that no single local community in Klang Valley had implemented a proper way in handling e-waste. This implies that the awareness concerning towards e-waste are proportionately low among Malaysians. He further reported that mostly people in that area did not know how to manage their e-waste efficiently whether to store in the house as long as they could or sell the e-waste to the companies who are willing to buy that stuff (Abdullah, 2018).

Moreover, Malaysia is also not exempted of this worrying trend where e-waste has become significant waste today. Whilst the government may have the will and take the necessary action to change the way wastes are managed, the fact that e-waste growing statistics that 50 million tonnes of e-waste are produced each year and left unchecked this could more than double to 120 million tonnes by 2050. This is because, in every single electrical and electronic device and appliance that exists in this world, there would be various kinds of substances that can be harmful and may leave severe effects on the people (WHO, 2017).

Essentially, the objectives of this present study which are to examine level of students' intention to practice e waste recycling and the correlations between its antecedents. This study is also done to identify the main factors affecting the e-waste recycling intention. The methodology, discussion and conclusion at the end of this study are also discussed.

2. Literature Review

Theory of Planned Behavior (TPB) is a theory that explains behavioral intention of the individual created by Icek Ajzen. According to David (1997), volitional control refers to the degree to which

a person may conduct a specific act. According to Fishben and Ajzen (1975), the intention is a measure of the strength of one intention to perform a certain behavior. The concept that can be used is, the stronger the intention of a person to perform a particular behavior the higher the possibility to perform the action (Bruvold, 1990). The intention is significance belief or information about the degree of favorable action to perform a particular behavior that will lead to specific outcomes (Bruvold, 1990).

Intention also can be defined as an indication of how people are willing to try and the effort they plan to put in order to perform the behavior (Tolman, 2011). According to Correia et al. (2007), the behavioral intention is a subjective probability to either adopt or not adopt a certain behavior. Besides, the most positive attitude towards the behavior and the more significant a person to approve the behavior, the more likely he or she will intend to perform the behavior. Thus, the stronger the intention to perform the behavior, the more likely the person will perform the behavior.

Various researchers have found TPB is a powerful tool in explaining conservation behavior and illustrating the relation between theoretical concept (Kaizer et al., 2005). Previous studies have also shown TPB to be capable framework in an Eastern culture milieu, though with differing levels of predictive power for each determinant (Chaisamrej, 2006). However, there were also other studies that stated the unclear role of perceived behavioral control (Chaisamrej, 2006).

E-Waste Recycling Intention

There are many different views and studies related to recycling intention that aims to understand what people require to participate in recycling. It is shown that environmental awareness and attitude towards recycling attitude are the primary influencing factors in activating the e-waste recycling intention of residents towards formal collections and other factors such as laws and regulations exert the greatest influence on the behavioral intention of both men and women to recycle e-waste (Nguyen et al., 2018). The importance of convenience and familiarity with recycling was highlighted in another study. Recycling is less likely for people who live more than five miles away from the nearest recycling center. Confidence in recycling glass, paper, metal or plastics, on the other hand, boosts the willingness to recycle e-waste (Saphores et al., 2006).

Furthermore, a wide range of literature focuses on the impact of general environmental attitudes (Schultz & Oskamp, 1996), precise behaviors towards recycling (Ebreo et al., 1999), or

demographic parameters as the key indicators of the intention to recycle e-waste. Sometimes, financial cost also plays a major role in triggering the recycle intention but the result shows that recycling costs are not a barrier to prevent residents from recycling e-waste, it provides a meaningful reference for lawmakers who can follow the e-waste recycling model in other countries to develop effective laws and regulations that solve e-waste issues in Vietnam (Nguyen et al., 2018). Take Japan as an example, the Home Appliance Recycling Law implements the e-waste management system, which clearly defines the roles and responsibilities of relevant stakeholders, including manufacturers, retailers, and consumers. Meanwhile, consumers are responsible for properly discharging used home appliances, not being allowed to sell e-waste to informal collectors and the cost of collecting and recycling used home appliances.

Even though recycling has become a common behavior in some developed nations such as the United States of America, Japan, Australia as well as several European countries, explaining different populations cannot simply be generalized. In some developing countries, recycling information has not been adequately introduced in both rural and urban areas throughout the overall population. Consequently, in terms of resource conservation and environmental protection, the levels of awareness and concern about recycling are varied (Chaisamrej, 2006). The knowledge, awareness, and willingness of the public to pay for improving local environmental quality plays a vital role in implementing the law introduced by the government to combat the dumping of e-waste materials (Afroz & Masud, 2010).

Attitudes

Attitudes are the degree to which a person has an assessment of certain behavior that is beneficial or unfavorable (Fishbein & Ajzen, 1975). As stated, an attitude refers to the person's belief that the behavior will lead to certain outcomes and their assessment of those results (Fishbein & Middlestadt, 1987). Attitudes can be understood by evaluating the belief of the individual in certain behavior performance (Fishbein & Ajzen, 1975).

Nguyen et al., (2018) studied attitude towards recycling as the second strongest determinant factor effectively restricting the intention of the residents to recycle. It can be concluded that environmental knowledge and attitude towards recycling, referring to the attitude of residents about the environmental consequences of e-waste and obligation for the protection of the environment, made a strong contribution in leading to the growth of people's favor and satisfaction to participate in recycling. Indeed, by acknowledging the harmful effects of e-waste

on human health and the environment if treated incorrectly, residents can raise awareness and attitude towards recycling and, as a result, their intention to recycle will increase. However, information on how to recycle is just an explanation for the recycling behavior of people unless they are acquainted with recycling. In the event that people recycle routinely, information or knowledge does not help explain the behavior of recycling (De Young, 1989).

Similarly, Schultz et al., (1995) and De Young (1989) agreed that the more concerned the individual is about recycling, the more likely he or she will be involved in recycling plans. As found in the literature research on recycling behavior by Hornik et al. (1995), attitude is discovered to be the most important element anticipating recycling behavior (Hornik, et al., 1995). De Young (1989) found significant recycling attitude and information for the willingness of people to take part in a recycling program. Recycling interventions need to be moved away from the mistaken belief that people know all about recycling. How was it even more important than to inform people why recycling is important? The fewer people know which components are needed to separate, the more effort that can lead to dissatisfaction and disengagement in recycling plans especially relating to e-waste as which components are valuable or not (De Young, 1989). Thus, the following hypotheses are framed.

H1: Attitudes have a positive correlation with the intention to practice e waste recycling.

H2: Attitudes have a significant influence on the intention to practice e waste recycling.

Environmental Awareness

The environment includes water, air, land, and individual interrelationships, other living creatures, plants, micro-organisms, and soil (Banerjee & Das, 2011). Awareness is defined as the ability to directly know and perceive, feel or be conscious of events. More broadly, awareness is the state of perception of something. Another definition describes it as a state where a subject knows some information when that information is available directly to bear in the direction of a wide range of behavioral processes (Chalmers, 1996).

Awareness of the environment is a very difficult parameter to be objectively estimated. Most studies use subjective, questionnaire-based approaches or interviews such as the "Green Moral Index" (Berglund, 2008). It is based on the perception of certain environmental issues by individuals. It is also useful to identify 'willingness to sort' or 'willingness to pay' as an obvious sign of environmental awareness in this particular issue. Such tools provide interesting results, but it should not be confused with the actual recycling rate with the expressed willingness to sort and recycle

(Perrin & Barton, 2001). In a related study, Miranda and Blanco (2009) mentioned that environmental awareness can overcome the time and money difficulties to create the satisfaction of joining in recycling schemes, encourage participation and make the recycling program a success

In general, the environmental awareness is considered primarily through education and information. Studies have shown that recycling is about better-educated people, the more likely they are to commit to recycling and feel satisfied with their actions (Miranda & Blanco, 2009). Then motivation, environmental education, awareness campaigns, and optimistic examples are effective ways of improving people's behavior that is environmentally friendly (Pooley & O'Connor, 2000). Various channels such as press conferences and kits, television commercials, mainstream media broadcasts, newspapers, magazines, press releases, printed materials such as direct mail, newsletters, utility bill inserts, door hangers, posters, and car stickers could endorse environmental awareness (Levlin et al., 2009). In addition, environmental awareness in European countries is still the primary factor affecting recycling. The use of an expert panel to determine the environmental awareness of the various European nations has been shown to be a very useful technique of assessment with a very low rate deviation of panel responses (Miranda & Blanco, 2009). Therefore, the following hypothesis is formed.

H3: Environmental awareness has a positive correlation with the intention to practice e waste recycling.

Laws and regulation

In China, a country whose e-waste situation and government system are similar to those in Vietnam reported that government laws and regulations play a crucial role in influencing the recycling intention of residents (Hicks et al., 2005). It was demonstrated that the laws and regulations had a positive effect on residents' willingness to recycle e-waste (Yu et al., 2014). Increased environmental awareness among residents made them ready to recycle e-waste by promulgating and spreading laws and regulations publicly. In a nutshell, government-ruled laws and regulations clearly play a vital role in recycling e-waste (Wang, Guo & Wang, 2016). According to Tedre et al., (2019) many ICT users and professionals are unaware of e-waste management policies and regulations. Studies have consistently shown that e-waste rates in developing countries such as Tanzania are higher due to the lack of formal e-waste recycling systems, policies and laws (Sthiannopkao & Wong, 2013).

In addition, the regulations on electronic products and e-waste recycling management systems in other countries or regions especially in the European Union and its member countries, put considerable pressure on the Chinese export industry for electronic products (Yin, Gao, & Xu, 2014). According to several studies Khatriwal et al., (2009) and Gottberg et al., (2006), one policy is often proposed to boost e-waste recycling which is Extended Producer Responsibility (EPR). EPR, first suggested by Lindhqvist in 1992, states that distributors should extend their responsibility not only to the manufacture and sale of a product but also to the recovery and disposal of the end-of-life product (Lindhqvist, 1992). China recently enacted a number of specific WEEE laws in response to the e-waste issue. These laws, regulations, and policies have provided an excellent legal foundation for the healthy development of the Chinese electronic waste recycling industry (Chung & Zhang, 2011). Regulations and policies related to WEEE management can be designed based on socio-economic culture, understanding local characteristics and customs were not only adopting the best-practiced system elsewhere (Agamuthu et al., 2009).

Liu et al., (2006) discovered that the significance of the system for WEEE management is generally known in which formal progress in developing countries is fairly slow. The legal process includes law-making, the development of collection systems, and the installation of formal recycling plants. The proposed legislation will work by exchanging responsibilities for the producer, retailer, consumer and recycler management of WEEE (Islam et al., 2016). In the context of Chinese informal sectors, Orlins and Guan (2016) discovered that they lack in awareness of environmental protection during e-waste recycling. Hence, the law should then help residents understand that recycling via informal vendors is potentially harmful to the environment. However, in combination with the actual situation of Chinese e-waste recycling, law enforcement and regulation will increase resident environmental awareness and willingness to recycle e-waste (Wang et al., 2016).

According to Tran and Salhofer (2016), Vietnam has established the legislative and institutional groundwork for waste management to counter a rapid e-waste generation. It is considered to be the basic law applied to the discarded products, consisting of e-waste, for the EPR system. It also provides vital insights into improving Vietnamese e-waste management activities and supports the government to better control the flow of e-waste materials (Nguyen et al., 2017). In general, however, it is obvious that the laws and regulations and other recycling programs are still not well managed and have not yet met the e-waste management needs in third world countries (Tran & Salhofer, 2016). Therefore, the following hypothesis is formed.

H4: Law and regulation has a positive correlation with the intention to practice e waste recycling.

Convenience of Recycling Facilities and Service

According to Wang et al., (2011), a survey conducted in China found that the residential environments and economic benefits, recycling habit and convenience of recycling facilities and services played a significant role in influencing the willingness and behavior of Beijing residents in e-waste recycling (Wang et al., 2011). Basically, e-waste contains a dangerous mechanical and toxic fabric which could be detrimental towards human bodies, safety, and environment. Therefore, it cannot be handled through conventional waste management techniques like landfilling and incineration (Song, et al., 2012). Historically, the electronics industry has been recognized as a clean industry (Ellis, 2000), but in real life, it was assumed as one of the most polluting, with a number of hazardous chemicals, components, and processes used in the manufacture of Electrical and Electronic Equipment (EEE).

The Convenience of E-waste Recycling Infrastructure means improved accessibility to recycle fundamental. Several studies had illustrated that inconvenience of recycling infrastructure is one of the major factors reflecting to less participate in recycling effort (Saphores et al., 2012). This suggests that if many recycling facilities and services are created, it is intended to increase the rate of people joining into these activities (Sarath et al., 2015). Furthermore, any distance area or obstacle of recycling bins must be avoided to increase the participation of people (Amutenya et al., 2009). In a related study by Domina and Koch (2002), the convenience of recycling e-waste can boost the engagement of the household as it requires time, effort, money and space for the user.

The recycling behavior of the consumer is primarily driven by convenience. One of the key criteria in consumer recycling behavior is how often recyclers collect e-waste (Hornik et al., 1995). It also mentions the frequency of recyclable collection as one of the strong indicators of recycling behavior. A study by Oskamp (1995), claimed that recycling awareness is a reliable predictor of consumer recycling behavior. Consumers really need to be aware of the accessibility of recycling methods and equipment offered by the government and various entities. Besides, cost and convenience have a major impact on consumers and e-waste recycling behavior (Jenkins et al., 2003).

Based on the previous study conducted by Tee Sin Yee (2014), regarding the favored attributes of waste segregation behavior among the Malaysian campus community, the students' most preferred reachable range to the recycling bin is between 100 and 500 meters. In this context, the distance of more than 500 meters to e-waste recycling infrastructure such as recycling bin means that recycling bins should be available and accessible within a distance of more than 500 meters. Distance serves an important attribute to nurture the community and e-waste recycling behavior. The distances being more convenient to the community will empower them to recycle e-waste (Senawi & Sheau-Ting, 2016). There is no doubt that more convenience provided in the recycling program can reinforce the recycling intentions of consumers and increase the recycling intensity (Tonglet et al., 2004). These studies expose that the influence of the conditions of the logistic waste collection system, such as the physical proximity of containers or the provision of curbside collection, is significant in order to gain more public participation in recycling. If consumers perceive a lack of facilities, on the contrary, their recycling intentions will be diminished. In addition, the time and space needed are seen as the major disadvantages of improving recycling (Valle et al., 2005). Therefore, the last following hypothesis is formed.

H5: Convenience of recycling facilities and service has a positive correlation with the intention to practice e waste recycling.

3. Methodology

A cross-sectional design using a quantitative technique was used to accomplish the goal of this research. The cross-sectional study was used because at a specific moment, information collection was obtained to respond to all study goals (Sekaran & Bougie, 2009). This study examines the e-waste recycling intention level among students and the correlation between its contributing factors. In order to collect the students' responses, a set of the questionnaire was designed based on the studied variables. The constructs in this study were measured by using 5 point Likert scales. A self-administered questionnaire was conducted at one of public universities at the northern region over the course of two weeks.

Essentially, levels of intention towards e-waste recycling were adapted from Nduneseokwu et al., (2017) study. The students were asked to evaluate their level of intention based on the statements such as "I intend to drop-off my e-waste at collection centres to create space in the college." and "I intend to participate in a formal e-waste collection if I am satisfied with the collection measures by the government.". As for data analysis, descriptive analysis was carried out by looking at percentages and frequencies to investigate the profile of students. This was followed

by inferential statistics to look at the correlation between variables using Pearson correlation the Analysis. In addition to that, the data was performed to determine the main factors affecting the recycling intention using Multiple regression. The data were run and analysed using Statistical Package for Social Sciences (SPSS) version 23.

4. Results

4.1 Demographic Profile

Table 1 presents on the summary of students' background. Based on the reported result at Table 1, Female respondents were the majority participated in the study with 70.9 percent compared to male respondents at 29.1 percent. Most of the respondents are at the age of 21 - 23 years with the percentage of 57.9 percent. The remaining 21.4 percent respondents are 18 – 20 years old, 16.8 percent respondents at the age of 24-26 years old and another 3.9 percent respondents at the age of 27 years and above. Despite of the age of respondents, most of the respondents are Malay which represents 82.1 percent of respondents, 12.6 percent representing Chinese, 1.8 percent Indian and 3.5 percent represent other races. For the level of education, most respondents are taking Degree program which represent 85.6 percent of total respondent followed by 2.5 percent taking Foundation program, 1.4 percent for Diploma program and 10.5 percent taking Master level.

Besides that, in terms of religion, most of the respondents are Muslim which represent 84.2 percent followed by Buddhists 10.5 percent, Christians 4.9 percent and Hindu 0.4 percent of total respondents. Furthermore, most of the respondents have experience in recycling where 90.5 percent of the respondents voted 'Yes' compared to 9.5 percent of the respondent voted 'No' for their experience in recycling. In addition, most of the respondent have '2' electronics devices which represent 50.5 percent of total respondent and other 46 percent respondents have more than '2' electronic devices while other 3.5 percent respondent only have '1' electronic devices in their possession. Overall, total respondents who are aware on e-waste recycling are 55.1 percent and another 44.9 percent are not aware of e-waste recycling.

Table 1:
Profile of Respondents

Variables	Frequencies	Percentage
Gender		
Male	83	29.1
Female	202	70.9
Age		
18 – 20 years old	61	21.4
21 – 23 years old	165	57.9
24 – 26 years old	48	16.8
27 years old and above	11	3.9
Ethnic		
Malay	234	82.1
Chinese	36	12.6
Indian	5	1.8
Others	10	3.5
Current Academic Undertakings		
Foundation	7	2.5
Diploma	4	1.4
Degree	244	85.6
Master	30	10.5
Religion		
Islam	240	84.2
Buddha	30	10.5
Christian	14	4.9
Hindu	1	0.4
Do you have experience in recycling?		
Yes	258	90.5
No	27	9.5
How many electronic devices you currently owned?		
1	10	3.5
2	144	50.5
3	89	31.2
4	26	9.1
5	9	3.2
6	6	2.1
10	1	0.4

Are you aware about electronic waste recycling?

Yes	157	55.1
No	128	44.9

Descriptive and the Correlational Analysis among the Study Variables

Table 2 explains the Cronbach alpha values respectively. Cronbach alpha was employed to determine reliability. As the values are between 0.7587 and 0.857, the high reliability of each construct is indicated. Table 2 illustrates the level of students' intention to practice e-waste recycling and all the determinants: attitudes, environmental awareness, law & regulations and convenience of recycling facilities & service. Based on the reported result it showed that most students were found to have moderate level of intention to practise e-waste recycling (M= 3.86, SD= 3.08).

Furthermore, Table 2 shows the results from Pearson correlation analysis between the study variables. The researchers used the guidelines provided by Cohen (1998) in explaining the relationship between the study's variables by interpreting the coefficient values between the variables as shown in Table 2. The guidelines can also be used in explaining the relationship's strength between both independent and dependent variables. It was found that attitudes, environmental awareness, law & regulations and convenience of recycling facilities & service were significantly related to the level of intention to practise e-waste recycling ($r=.670, p<0.05$; $r=.575, p<0.05$; $r=.599, p<0.05$; $r=.456, p<0.05$ respectively). Therefore, it can be concluded that this study's second objective was achieved with all its developed hypotheses.

Table 2:
Summary of Mean(M), Standard Deviation (SD), Reliability Analysis Results & Correlational among the Study Variables

No.	Variable(s)	M	SD	Cronbach's Alpha	1	2	3	4	5
1	Level of e-waste recycling intention	3.86	3.08	.813	-				
2	Attitudes	4.19	2.54	.857	.670*	-			
3	Environmental Awareness	4.04	3.15	.823	.575*		-		
4	Law & Regulations	3.95	2.58	.798	.599*			-	

5	Convenience Recycling Facilities & Service	of	3.51	2.9	.787	.456*	-
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Main Factor Affecting E-Waste Recycling Intention among University Students

Multiple regressions are used to determine the main factor affecting e-waste recycling intention among university students. Preliminary analysis was conducted to ensure no violation of the assumption of ratio of cases independent variable, outliers, multicollinearity, normality, linearity, homoscedasticity and independence of residuals. Firstly, the required sample size to run regression is 82 cases and this study fulfil the assumptions. Next for the outliers, the value of mahalanobis to number of independent variables was fulfilled. Multicollinearity issues are only indicated when tolerance (TOL) value less than 0.1 and Variance Inflation Factor (VIF) value is greater than 10. In this analysis, for tolerance, the minimum and maximum values are between 0.411 and 0.796 indicating no violation of the assumption. For VIF, the minimum and maximum values are between 1.257 and 2.433 indicating no violation of the assumption. Preliminary analysis was conducted to ensure no violation of the assumption of normality, linearity, homoscedasticity and independence of residuals.

Based on the result, it shows that all independent variables can explain 52 percent of the variance (R square) in e-waste recycling intention. The F-value of 75.805 and P-value of 0.000, $p < 0.05$ indicate that the model is statistically significant. There are four factors identified as independent variables in this study which are attitude, environmental awareness, law and regulations and convenience of recycling facilities and service. Among these variables, only three factors were found to have significant influences namely attitudes $p=0.000$, law and regulations $p=0.000$ and convenience of recycling facilities and service $p=0.000$. The main factor affecting e-waste recycling intention is attitudes (beta std=0.399). Therefore, the following hypothesis H2 states that attitude has a significant influence on the e-waste recycling intention among university students is supported.

Table 3:
Main factors affecting e-waste recycling intention among university students

Variables	Beta Std	P-value	Decision
Attitudes	0.399	0.000 ($p < 0.05$)	Supported
Environmental Awareness	0.074	0.250 ($p > 0.05$)	Not Supported

Law Regulations	and	0.217	0.000 ($p < 0.05$)	Supported
Convenience of Recycling Facilities and Service	of	0.176	0.000 ($p < 0.05$)	Supported
R²		0.520		
F-value		75.805		
P-value		0.000		

5. Discussion

Firstly, based on the results, it is shown that most of the university's students had a moderate level of intention to practise e-waste recycling. Based on other study's findings, most of the respondents also had average level of intention to practise e-waste recycling. This finding is in line with the recent reported study by Shaharudin et al. (2020) among youth in Putrajaya where respondents similarly had average level of intention to dispose e-waste. However, these current results are not in line with the findings in Jakarta which reported by Siringgo et al. (2019) that found the e-waste recycling habits are still minimal and in the low participation rate. In fact, to date, as mentioned by Nguyen et al. (2019). there is no or very limited studies available which involve the public perception of e-waste recycling and management. They revealed that the intention is quite low as the consumers are not aware on the e-waste impact to environment. It was also supported by Nnorom and Osibanjo (2008b), as they mentioned the limited awareness in the society have risen such growing concern. In addition to the contradiction, a study in Universiti Kebangsaan Malaysia (UKM) by Chibunna et al. (2012), they finalised that UKM's e-waste management is still in its early stages. The level of awareness of e-waste is still low, which means that they do not dispose of their e-waste properly. It is implied that UKM employees and students' e-waste recycling activity was assessed by their willingness to participate in e-waste projects, their knowledge level, and e-waste disposal process.

Results showed that attitudes had a significant positive influence towards e-waste recycling intention. Both variables were also found to be positively correlated. This present result was in parallel with a finding by Nguyen et al. (2018) which reported that the attitudes towards recycling was the main contributing determinants towards the intention of the residents to recycle. Previously, as revealed by Hornik et al. (1995), they demonstrated that recycling behaviour

attitudes was discovered to be the most important element anticipating recycling behaviour. A similar finding conducted by De Young (1989) which found that there was a significant correlation between recycling attitude and information for the willingness of people to take part in a recycling program. It can be implied that the attitude towards recycling associates the residents about the environmental consequences of e-waste and obligation for the protection of the environment, made a strong contribution, leading to the growth of people's favor and satisfaction to participate in recycling.

In addition, the results also discovered that environmental awareness has a significant relationship with e-waste recycling intention among university students. As mentioned by Chalmers (1996), awareness is the ability to directly know and perceive, feel or be conscious of events. More broadly, awareness is the state of perception of something. In addition, it is a state where a subject knows some information when that information is available directly to bear in the direction of a wide range of behavioral processes. Apart from that, awareness of the environment is a very difficult parameter to be objectively estimated. Most studies use subjective, questionnaire-based approaches or interviews such as the "Green Moral Index" (Berglund, 2008). In a related study, Miranda and Blanco (2009) mentioned that environmental awareness in European countries is still the primary factor affecting recycling. The use of an expert panel to determine the environmental awareness of the various European nations has been shown to be a very useful technique of assessment with a very low-rate deviation of panel responses.

The next correlation findings were also reported a similar outcome. The law and regulations and e-waste recycling intention among university students was found to be correlated. Findings revealed that, in China, a country whose e-waste situation and government system are similar to those in Vietnam, government laws and regulations play a crucial role in influencing the recycling intention of resident (Hicks et al., 2005). Besides, Yu et al., (2014) also demonstrated that laws and regulations had a positive effect on resident's willingness to recycle e-waste. Another study illustrated by Tran and Salhofer (2016), Vietnam has established the legislative and institutional groundwork for waste management in the face of the problem of rapid e-waste generation. It is the basic law applied to the discarded products, consisting of e-waste, for the EPR system.

The last relationship was between the convenience of recycling facilities and service and e-waste recycling intention among university students. This study also supported by the previous research in China which among residential environments and economic benefits, recycling habit

and convenience of recycling facilities and services were also the major significant due to the willingness and behavior of Beijing residents in e-waste recycling (Wang et al., 2011). Apart from that, Saphores et al (2012) reported that inconvenience of recycling infrastructure being one of the major factors reflecting to less participate in recycling effort.

6. Conclusion

In this study, results showed that most of the students' intention to practise e-waste recycling was reported to be at the average level. Results revealed that most of the students' intentions to practise e-waste recycling were correlated with the attitudes, environmental awareness, law and regulations and convenience of recycling facilities and services. Interestingly, in this study, it was found that attitudes were the main factor affecting to the students' intentions to practise e-waste recycling. There were a few limitations in this study that limit its generalizability. Firstly, the study population only covered students from one public academic institution, The findings obtained were not as varied as other universities did not participate in this study. The results might not be representative to all university students studying in Malaysia. The second limitation was the study sample mainly comprised of undergraduate students. Further cross-sectional studies involving a balance composition of the undergraduates and postgraduates' group of students throughout the country are required to understand the broader trends in this particular issue. Lastly, the limitation occurred when performing this study was the required number of sample size targeted was not achieved. Specifically, this study targeted to get about 370 of sample size, but only 285 respondents had answered the questionnaire despite the distribution of the printed questionnaire done for over the course of two weeks.

There are several implications that can proposed as enhancement to the issue of e-waste recycling among community especially the university students. The intention of consumers can be enhanced by campaigns that emphasize on the obligation of individuals to practice environmentally friendly sorting and separating household waste and other behaviors in reducing household waste especially in term of electronics waste. It is crucial that the government embarks on campaigns of mass awareness aimed at improving the environmental awareness and values of consumers. These initiatives will emphasize the positive aspects of participation in a formal e-waste collection process, the social dimensions and value of community involvement, individuals' ability to participate, e-waste contamination, potential risks of illegal disposal and recycling in the backyard, and the advantages of organized recycling. Most of the students are engaged in the digital technology and therefore the DOE should work closely with the relevant government agencies to create a platform such as E-Waste Smartphone Application (Apps) to

ensure that they are well informed and aware about the location of the e waste collection centres around them.

Besides that, environmental education should be indoctrinated in school curricula from primary school to university level, all aimed at creating environmental principles that encourage resource sustainability, responsible use, and environmental preservation, which in result should continuously inspire consumers to participate in recycling behavior. Mass media use will be very instrumental within reaching the elderly, who often pay close attention to television and radio programs. In the awareness campaign and training, the informal collection and recycling market should not be left out. High environmental awareness among the informal collection sector would help to reduce informal disposal and minimal recycling.

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