

Assesment on e-Waste Management Awareness Among Young Adults in Malaysia

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Abstract This study assessed the e-waste management awareness and practice among young adults. The increase level of discarded electrical and electronic equipment (e-waste) generated worldwide is an environmental issue that need to be tackled with young adults considered to play important roles as they are among the highest consumer for electrical and electronic equipment. The study was conducted via survey on 351 respondents around Malaysia age between 15-30 years old. The questionnaire consisted of five parts, which are; (1) demographic, (2) awareness of consequences, (3) ascription of responsibility, (4) perceived behavioural control and (5) information publicity. The result demonstrated a high level of awareness (91%) but lack of responsibility (as low as 52%) and positive behaviour (as low as 38%) towards e-waste management with only 40% agreed that the information on e-waste management is easily available. Improving the accessibility of e-waste recycling along with the increase of publicity, are the way forward to educate young adults and culturing e-waste recycling habit among public; in order to address e-waste management for sustainable environment.

Keywords: *e-waste; awareness; young adults; recycling; e-waste management*

1. Introduction

Electronic waste or e-waste is the term used for electrical and electronic equipment discarded as waste without intent of reuse, which consists of many hazardous substances such as heavy metals, toxic chemicals and plastics. Approximately, 75% of e-waste is not recycled (Lakshmi *et al.* 2017). Though e-waste products are valuables, the lack of policy and legislation by the local authority applied lead to improper e-waste management. Most consumer electronic devices end up in landfill sites, as there is no segregation mechanism (Junaidah, 2010). The exposure of heavy metal, resulted from the e-waste mismanagement, could potentially cause brain damage, allergies and cancer (Pucket and Smith, 2002).

Therefore, there is an urge for assessing the knowledge and awareness of e-waste among young adults, as there are the agents of change in the community. Moreover, this research will be able to inspect the e-waste disposal practice by the young adults and the challenges on the disposal of the e-waste faced by them. This study is important to understand the level of knowledge on e-waste recycling among young adults as well as providing the platform to create awareness on the implication of e-waste mismanagement on the environment.

2. Research methodology

2.1 Sample and Population

Focusing on young adults in Malaysia as the population of this study, non-clustered random sampling method was adopted, targeting young adults (n=351) from secondary schools and universities (both public and private) around Malaysia age between 15-30 years old.

2.2 Instrumentation

This study was a quantitative study implemented based on questionnaire survey. The questionnaire used was designed based on Wang *et al.* (2018) with some modifications to tally with the research objectives. The dichotomous questionnaire consisted of five parts, which are; (1) demographic, (2) awareness of consequences, (3) ascription of responsibility, (4) perceived behavioural control and (5) information publicity. The questionnaire was prepared on Google Document and the link was sent through email. The data answered by the respondents were gathered in excel document and were analysed with SPSS statistical analysis.

3. Results and Discussion

The distribution of samples is focusing on the young adults ($\bar{x}= 23.55$ years) with 62% of respondents in the range of 21-25 years old. According to a study, young adults significantly contributes to the large proportion of consumers on electrical and electronic equipment (Kumar, 2019). The questionnaire also looks into age and area of living as demographic variables with the majority of respondents is female (63%) and living in the urban area (66%) respectively. Most of the samples has degree as the highest qualification which amounted to 42% with diploma (34%) followed. The education background for the remaining respondents are SPM (9%), STPM (6%) while the others (9%) includes certification, PhD and UPSR. The result of the survey is shown in Table 1 with item contents revealed in Table 1-A.

Table 1: Data analysis of the questionnaire items (n=351)

Constructs	Item	Percentage of respondents (%)		Mean, \bar{x}	SD
		Yes (value=1)	No (value=0)		
Awareness of Consequences (AC)	<i>AC1</i>	95	5	0.95	0.0526
	<i>AC2</i>	78	22	0.78	0.1917
	<i>AC3</i>	91	9	0.91	0.0843
Ascription of Responsibility (AR)	<i>AR1</i>	78	22	0.78	0.1917
	<i>AR2</i>	52	48	0.52	0.3445
	<i>AR3</i>	57	43	0.57	0.3261
Perceived Behavioural Control (PBC)	<i>PBC1</i>	38	62	0.38	0.3826
	<i>PBC2</i>	38	62	0.38	0.3820
	<i>PBC3</i>	34	66	0.33	0.3848
Information Publicity (IP)	<i>IP1</i>	40	60	0.40	0.3801
	<i>IP2</i>	58	42	0.58	0.3179
	<i>IP3</i>	95	5	0.95	0.0472

Table 1-A: Measurement items

Constructs	Items	Item contents
Awareness of Consequences (AC)	<i>AC1</i>	I realize the effect of my action on the environment
	<i>AC2</i>	I am aware of the term e-waste
	<i>AC3</i>	I am aware about the effect of e-waste on humans's health and environment
Ascription of Responsibility (AR)	<i>AR1</i>	I am willing to compromise the cost to afford the eco-friendly product
	<i>AR2</i>	I am willing to travel in order to dispose e-waste at the dedicated centre
	<i>AR3</i>	I am willing to pay the e-waste disposal fee
Perceived Behavioural Control (PBC)	<i>PBC1</i>	In the past, I have recycled e-waste
	<i>PBC2</i>	I have plenty of opportunities to recycle my household e-waste
	<i>PBC3</i>	Recycling e-waste does not consume space and time
Information Publicity (IP)	<i>IP1</i>	I found that the information on e-waste recycling is easily available
	<i>IP2</i>	I know what items of household e-waste can be recycled
	<i>IP3</i>	I think the relevant information for e-waste recycling is important

Awareness of Consequences (AC)

Based on table 1, this study shows high level of awareness on e-waste among young adults in Malaysia with 91% of respondents aware on the effect of e-waste mismanagement to human's health and the environment ($\bar{x} = 0.91$). This is in line with similar study conducted among youth in India and students of university in Philippines which resulted

in 86% and 78% of e-waste awareness respectively (Dhingra and Maheshwari, 2018; Navarette *et al.* 2018). Though there is a high awareness among developing countries, a study suggested that the drive for this pattern in developing countries is due to the perception of waste as valuable items unlike developed countries with recycling habit motivated by environmental concern (Borthakur and Govind, 2016).

Ascription of Responsibility (AR) and Perceived Behavioural Control (PBC)

A previous study reported that the high awareness of consequences (AC) could affects their e-waste management intentions, motivated for a better health and environment (Dhingra and Maheshwari, 2018). Unfortunately, in this current study, this positive result of awareness is not translated into the ascription of responsibility (AR) and perceived behavioural control (PBC) as previous study suggested; AR construct showed almost a balance of positive and negative feedback among respondents with the average value of AR constructs, \bar{x} is 0.62 while PBC construct received negative feedback ($\bar{x} = 0.36$). This contradict findings of high e-waste awareness with low willingness to recycle is not an isolated result as it is transpired in other similar study conducted in Kuala Lumpur (Afroz *et al.* 2013). A different study conducted recently on biomass waste management among residents in Subang Jaya, Selangor illustrates the same pattern of high awareness with lack of recycling practice (Kamaruddin *et al.* 2018).

This attitude towards recycling e-waste could be caused by several factors including economic, socio-cultural and infrastructural factor (Borthakur and Govind, 2016). Even though 78% respondents were willing to compromise cost for eco-friendly product, approximately half of respondents were not willing to trade off their time (52%) and money (57%) to travel and pay for e-waste recycling. This is in contrast to a study conducted in China with 70% respondents were willing to pay (Huang *et al.* 2006) though a similar local study obtained a consistent result of only 53% respondents were willing to pay for e-waste recycling (Afroz *et al.* 2013). Wang *et al.* (2011) suggested that the improvement of convenience of recycling facilities and services, residential condition, recycling habit and economic benefits could result in better prospect of e-waste recycling. This could positively impact the PBC construct among respondents in the future.

Information Publicity (IP)

Previous studies have highlighted the role of information publicity (IP) in influencing the behaviour intentions among public towards e-waste management (Wang *et al.* 2018). The IP construct from table 1 illustrates that respondents felt the e-waste information is not easily available (60%) and only 58% respondents know the e-waste that can be recycled. However, almost all respondents (95%) believe that e-waste recycling is important. This result potrays the insufficient amount of publicity could indirectly impact their willingness in recycling even though they are aware of its importance. The frequency of campaign and educational event should be increased in order to promote e-waste management among

public especially the young adults. As suggested by previous study, the publicity of e-waste hazards and recycling practice could significantly affect recycling attitude by stimulating the moral subconscious, forming positive recycling intention management (Wang *et al.* 2018).

4. Conclusion

The findings of this study revealed that majority of respondents are aware of the implication of e-waste on human's health and the environment; while willing to compromise the cost to afford the eco-friendly product. The paradox finding of high level of awareness (AC) but lack of responsibility (AR) and action (PBC) is a major concern. The limitation of e-waste publicity (IP) has contributed to the inadequateness on e-waste management among public especially young adults.

One way to promote e-waste recycling habit among young adults is via monetary reward. It has been established that monetary incentive could motivate young adults. Designing a business platform with monetary reward, exploiting the valuable metals in e-waste while managing the waste appropriately, could provide a sustainable recycling model which benefits young adults, the entrepreneurs, society as a whole and importantly, the environment. With government supports and monitoring, e-waste recycling business could increase the accessibility of recycling facilities to the community.

Taking the unwillingness to compromise the time and money into account, improving the accessibility of e-waste recycling along with the increase of publicity, are the way forward to educate young adults and culturing e-waste recycling habit among public; in order to address e-waste management for sustainable environment.

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