Factors Influencing Undergraduate's Intension on E-Waste Recycling

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Abstract

Recognizing the emerging and serious issue of Electronic waste, this paper has made an attempt to ascertain the intention on e-waste recycling among undergraduates of University of Kelaniya. The main objective of this research paper is to identify the influencing factors of e waste recycling in the selected respondents about e-waste. The data was collected from 50 respondents through the distribution of well-structured questionnaires. An insight into understanding the e waste management practices and key predictors in relation to e waste recycling intention are essential as they will lay the foundation for future effective e waste management. This paper reports a preliminary exploration of the construct of e waste Recycling intention among undergraduates of University of Kelaniya. The findings of the study revealed that respondents of undergraduates of University of Kelaniya, were having only considerable relationship in between perceived knowledge and willingness than other influencing factors.

Keywords: Intention, E-Waste Recycling

Paper type: Model Testing

Introduction

This study focuses on the factors influencing undergraduate's intention on e-waste recycling. E Waste is one of the most puzzling issues in present context. E-waste may be described as waste electrical and electronic equipment, in whole or in part from their manufacturing and repair process, which are intended for disposal (E-Waste Rules, 2011).

According to the Basel Action Network (2010) the world's fastest growing source of toxic waste comes from computers, cell phones, and other electronics frequently referred to as "e-waste". E-waste includes damaged electronic devices, such as personal computers, monitor, cellular phones and other household electronic devices. E-waste normally consists of two parts: chemical and physical. Both parts contain valuable and hazardous materials that must be

extracted by using special recycling method and handling procedure to avoid environmental contamination and pernicious human health. Electronic devices normally contain hundreds of components which are highly toxic and have detrimental effects on human health if not handled properly.

E Waste concern among the youth is becoming an interesting area. According to the Arora, R.(2008) suggests that increase in the end of life of electrical and electronic products depends on the economic growth of the country, population growth, market penetration, technology up gradation, and obsolescence rates. Besides that, due to the increase in affordability of new products and technological advancements, it is easy to purchase rather than repair outdated equipment.

Recycling is defined as the process of the conversion of waste as discarded material with no worth into a useful material. In this way, in the domain of e waste, recycling e waste does not only save the environment but can slow the depletion of essential resources.

In this research, research team empirically assessed the predictions of "Factors influencing undergraduate's intension on e-waste recycling". In a part of an academic research project, the importance of the study is emphasized through the following elements such as what are the influencing factors and how they impact on the undergraduate's e waste recycling intention. Research team statistically analyzed the relationship between the influencing factors and e waste recycling intention. The findings provide insights into undergraduate's e waste recycling intention of that can be influenced.

Literature Review

According to the Saoji, A.(2012) indicated that electronic waste or e waste is one of the rapidly growing problems of the world. E waste comprises of a multitude of components, some containing toxic substances that can have an adverse impact on human health and the environment if not handled properly. Often, these hazards arise due to the improper recycling and disposal processes used (Pinto, N. 2008).

Recycling is a process whereby materials that have been used previously are collected, processed, re-built and re-used (Rudnick, 2008). Despite the fact that more than half of all solid waste is recyclable, studies indicate that a considerable amount of recyclable waste is dumped into the garbage (Mancini et al., 2007). Carrus et al., (2008) also indicated in their study of emotional, habit, and rational choice in the case of recycling that the past behavior (as a representative of habit) significantly predicted intention to recycle. Knussen and Yule (2008) found that

lack of recycling habit made significant contributions to the variance of intention to recycle and moderated the attitude-intention relationship.

Awareness of e waste among the students was generally low. Students' awareness of e waste contamination of air and soil (effects) was higher than their awareness of acceptable e waste practices or environmental policy (Edumadzea. J et al., 2014). This study examined levels of awareness of e waste disposal among university students in Ghana, and their pro environmental decision making using two outcome variables as knowledge on environmental impact and policy issues (EIPI) and environmental behavior and sustainability(EBS). Reliability estimates (Cronbach's alpha) for the two outcomes variables were 0.91 and 0.72, respectively. The attitude of an individual is the combination of what he thinks, what he believes in, how he feels and how he acts (Sakalli 2001).

Xu F. et al (2014) adopt empirical research methods to analyze moderating factors and influencing factors on consumer participation to waste electronic products recycling. In this research the Theory of Planned Behavior (TPB) model provides the means to identify the driving forces behind recycling intention. Based on TPB model, a questionnaire survey focusing on consumers' behavioral intentions to take part in e waste recycling was carried out.

Several behavior change theories have been applied to explain the factors influencing recycling behavior, including Schwartz's Norm Activation model (Van Liere and Dunlap, 1978), the theory of reasoned action (Ajzen and Fishbein, 1980), and the theory of planned behavior (Ajzen, 1991).

In research on recycling, a number of studies have used this theoretical model for measuring recycling intentions, recycling attitudes, perceived social norms, and cost-benefit beliefs (Kok and Siero, 1985; Pieters and Verhallen, 1986; Pieters, 1989; Jones, 1990; Goldenhar and Connell, 1992-1993; Allen et al 1993; Thogersen, 1994). Most of these studies concluded that the intention to recycle depends on the attitude toward recycling, while social norms in most cases are either not significant or have substantially less influence than attitude.

Licy D. et al., (2013) have done an empirical study in relation this and the results showed out of one thousand students of a high school and higher secondary school from Thrissur City in Kerala, 300 were randomly selected. The data analyzed using student t-test showed, high school students are more aware about household waste management than the higher secondary school students. It is evident from this study that there is significant difference between awareness and practice. Further their study revealed the necessity of giving mass awareness to the impact of waste disposal practices from the beginning of school education.

Ho T. et al., (2012) report a preliminary exploration of the construct of e waste recycling intention among householders. The data was collected from 150 respondents in Malacca, Malaysia. The results from this study showed that all the six dimensions generated are reliable with high inter-correlation among the dimensions.

According to the Tyagi N. et al., (2013) hold the view that in their research paper they have identified the level of awareness in the selected respondents about e-waste recycling. Such study is based on data collected from primary source through close ended questionnaire and they were analyzed using SPSS software. The variables related to this research are as independent variables (Occupation, Age, Income, Gender) and the dependent variables (Equipment discard method, Condition of the discarded equipment, Health risk awareness and e waste disposal preferences.)

Saphores et al. (2006) study households' willingness to recycle electronic waste at drop-off centers and find that convenience factors such as proximity to the drop-off center increased recycling. Apart from behavioral aspects, numerous studies have also looked at the relationship between demographic and socio economic variables and recycling involvement. The most commonly examined variables are gender, age, education and income (Saphores et al., 2006).

Some studies find age to be a significant factor influencing recycling involvement (Vining and Ebreo, 1990; Gamba and Oskamp, 1994; Margai, 1997; Scott, 1999; Saphores et al., 2006), while some other studies do not (Werner and Makela, 1998; Meneses and Palacio, 2005). Contrary to common expectation that younger people are likely to be more involved in recycling, some researchers conclude that middle aged and older people are more likely to recycle (Vining and Ebreo, 1990; Meneses and Palacio, 2005; Saphores et al., 2006).

The relationship between education and recycling is ambiguous. Saphores et al. (2006) find that higher education increases the willingness to recycle, but several other studies report that education has no significant effect on recycling behavior (Vining and Ebreo, 1990; Oskamp et al., 1991; Gamba and Oskamp, 1994; Meneses and Palacio, 2005). Some studies find a positive relationship between income level and recycling involvement (Vining and Ebreo, 1990; Oskamp et al., 1991; Gamba and Oskamp, 1994), but a study by Scott (1999) finds no statistically significant relationship.

Methodology - Research Design

Correlation analysis was carried out to identify the relationship between Influencing Factors and Undergraduate's Intention. Here the Attitude, Perceived Knowledge, Awareness of Consequences, Subjective Norms and Perceived Convenience as the independent variables and Willingness is the dependent

variable which would lead to the undergraduates intention. From these independent and dependent variables, the following relationship is formulated.

Critical constructs considered in this research

H_1:   There is a positive association between Attitude and Willingness.

H_2:   There is a positive association between Perceived Knowledge and Willingness.

H_3:   There is a positive association between Awareness of Consequences and Willingness.

H_4:   There is a positive association between Subjective Norms and Willingness.

H_5:   There is a positive association between Perceived Convenience and Willingness.
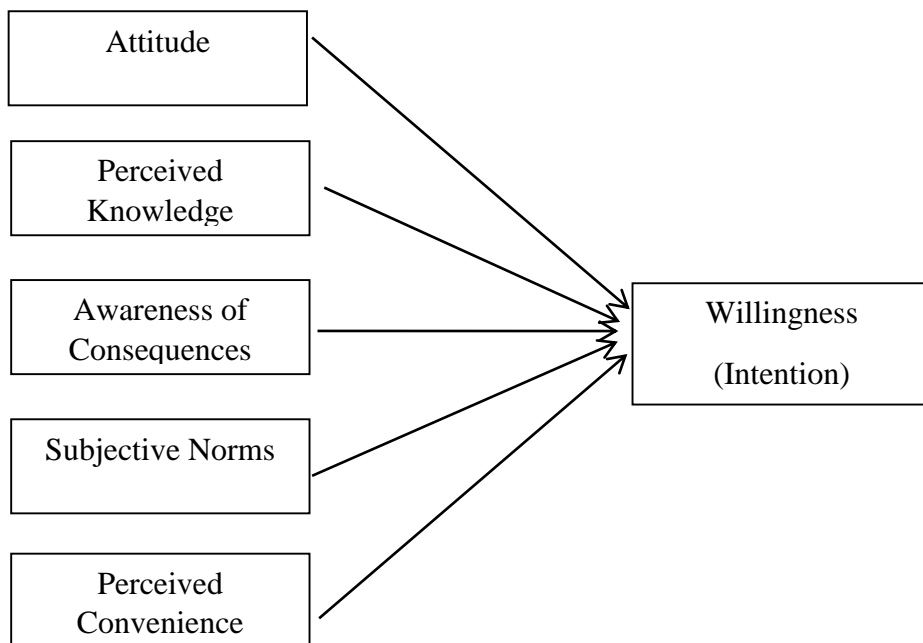
Sample Design

According to Jankowicz, (1994) generalization about the population from data collected using any sample is based on probability. In order to be able to generalize about the research finding to the population, it is necessary to select samples of sufficient size. Furthermore Saunders, Lewis and Thornhill (1996) this argument is also point out that the larger the sample size, the lower the likely error in generalizing the population. However according to Cohen (1988), sample

size should be determine by the expected power to reject the null hypothesis. According to Cohen, effect size (Small, Medium and Large), Expected power (normally 80% in behavioral sciences), number of predictors and alpha level need to be considered when calculating the sample size. When considering large effect size ($f2=35$), desired power level 80%, number of predictors 5 and .05 alpha level, required sample size for multiple regression was 43 (obtained from online priori sample size calculator). Hence the sample of the study consisted of 50 undergraduates collected regardless of the year of study and the faculty.

Data Collection

The present study used primary data for the analysis. Primary data is originated by a researcher for the specific purpose of addressing the problem at hand. As mentioned above in the sample size, specifically a questionnaire was given to 50 undergraduates selected randomly from a group and the study was carried out at the University of Kelaniya premises. The purpose and method of the study was explained to the respondents to get their consent. The instrument of research was a validated, printed and self administered questionnaire. The questionnaire was designed to assess respondents' attitude, perceived knowledge, awareness of consequences, subjective norms, perceived convenience and willingness on e waste management at home. The questionnaire included thirty four questions related to such variables.

The questions are posed and targeted which factors influence the intention on e waste recycling behavior of the undergraduates and how, but also the experience, or characters, of the e waste recycling behavior of multicultural respondents. The strategy for investigation was a questionnaire using qualitative research methods as well as quantitative methods. The survey also included a set of questions assessing the respondent's attitudes towards recycling. In answering these questions, respondents were read statements and asked to indicate the extent to which they agree or disagree with the statements on a seven-point likert-scale ranging from strongly agree to strongly disagree. Furthermore, scholarly articles from academic journals, relevant text books on the subject and the internet search engines were also used.

Initially, the questionnaire was given to 50 respondents of the university proved with Cronbach's alpha for the variables of the study. This shows that the responses given by the respondents were highly reliable as the Reliability Coefficient is closer to 1 (One). To identify the significant determinants of undergraduate's intention the researcher used multiple regression analysis and to test the hypotheses stated the researcher practiced t-test. Since the study was limited to four faculties in the University of Kelaniya, Sri Lanka, the respondents are randomly selected.

Model of Analysis

The quantitative research approach is employed to find out the findings of the research study. Since primary data is used, quantitative approach is considered to be a suitable approach for the study. According to Leavy (2004), "statistical analyses are used to describe an account for the observed variability in the data". This involves the process of analyzing the data that has been collected. Thus the purpose of statistics is to summarize and answer questions that were obtained in the research.

The data obtained from the survey were coded, processed, and then analyzed using analytical tools and Regression model to explore the influence factors on e waste recycling and behavior of respondents in the survey area. The results in two categories were evaluated. The data was analyzed by descriptive statistics and t-test using SPSS (version 20).The upper level of statistical significance for hypotheses testing was set at 5%. All statistical test results were computed at the 2-tailed level of significance. Statistical analysis involves both descriptive and inferential statistics.

Results and Data Analysis

Quality of Data

The research group asserts their data reliability through the measurement of Cronbach's alpha values defined bellow. It is considered to be a measure of scale reliability. This shows that the responses given by the respondents were highly reliable as the Reliability Coefficient is closer to 1(one). The internal consistency of question dimensions was measured by Conbach's alpha coefficient which indicates the degree to which a set of items measures a single unidimensional latent construct, values from 0 to 1. Values above 0.7 indicate a good internal consistency (Cronbach, 1951).

Variables	Chronbach Alpha
Attitude	0.917
Perceived Knowledge	0.850
Awareness of Consequences	0.839
Subjective Norms	0.890
Perceived Convenience	0.632
Willingness	0.787

Source: Research Data

		Willingness
Willingness	Pearson Correlation	1
	Sig. (2-tailed)	
	N	50
Attitude	Pearson Correlation	.168
	Sig. (2-tailed)	.245
	N	50
Perceived Knowledge	Pearson Correlation	.396**
	Sig. (2-tailed)	.004
	N	50
Awareness of Consequences	Pearson Correlation	.032
	Sig. (2-tailed)	.824
	N	50
Perceived Convenience	Pearson Correlation	.000
	Sig. (2-tailed)	.999
	N	50
Subjective Norms	Pearson Correlation	.092
	Sig. (2-tailed)	.527
	N	50

Source: Research Data

Pearson Correlation Analysis

Correlations – Attitude Factor

Attitude is defined as a favorable or unfavorable evaluative reaction toward something or someone exhibited in ones beliefs, feelings, or intended behavior (Myers, p. 36). In this research, research group affirms the Pearson correlation of attitude towards the willingness of e waste recycling is around 0.168. So the research group believes that there is no any significant association in relation with e waste recycling intention.

Correlations - Perceived Knowledge Factor

In the domain undergraduates of the University of Kelaniya, research group affirms that only recognized relationship in between the intention factor (Willingness) and perceived knowledge is 0.396.

Correlations - Awareness of Consequences

No significant difference has been observed in awareness of consequences and willingness factor among the different category of respondents. (Pearson Correlation regards willingness factor 0.032)

Correlations - Perceived Convenience

No significant difference has been observed in perceived convenience and willingness factor among the different category of respondents and it is almost zero.(Pearson Correlation regards willingness factor 0.000)

Correlations - Subjective Norms

No significant difference has been observed in subjective norms and willingness factor among the different category of respondents. (Pearson Correlation regards willingness factor 0.092)

Discussion and Conclusion

This research was mainly conceptualized the factors influencing undergraduate's intention on e-waste recycling. According to the researchers' conceptualization, they suggested that positive association of perceived knowledge with the willingness which will lead towards the intention factor and other variables such as attitude towards the e waste recycling, awareness of consequences, perceived convenience and finally subjective norms did not indicate sound association towards undergraduate's e waste recycling intention. Ultimately, the researchers satisfied with one of all hypothesis of the study.

Under the notion of perceived knowledge respondents are assessed through 6(six) questions in the questionnaire which comprise the about toxic contains, best disposable method of e waste, what is to be recycled, knowledge span of e waste recycling, where and how to recycle effectively so on. Each belief connects the result to a certain outcome, which is already valued in two extremes. Moreover the perceived knowledge will associate with the intention on e waste recycling which is indicating the willingness component. Behold that the attitude, awareness of consequences, perceived convenience and subjective norms have no considerable association with willingness factor in this research.

According to the observations of the study, the research group affirms that perceived knowledge, affect significantly towards the undergraduates intention within the selected undergraduates of the study.

In general, the variables related to this research are divided into the six groups in question are very homogeneous with respect to their variable characteristics, because no significant differences were identified with regard to attitude,

awareness of consequences, perceived convenience and subjective norms of the undergraduates. The only significant difference identified was in the perceived knowledge of the respondents.

This study has a few limitations and unresolved questions that should be addressed in future work. Given its focus on assessing undergraduate's intention on e-waste recycling, the sample size for the general undergraduate's questionnaire is quite small. However, beyond the sample size, the findings here may be applicable to other undergraduates in Sri Lanka.

Expanding the scope beyond undergraduates of University of Kelniya, it would be very valuable to begin comparative studies between universities across Sri Lanka to understand variations in factors influencing undergraduate's intention on e-waste recycling on a national scale.

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