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To Recycle e-Waste or Not: Understanding Consumers' Intention from the Lens of Behavioral Theories

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Abstract: The study was conducted to explore and understand factors that determine consumers' intention to recycle e-waste from the lens of the Theory of Planned Behavior (TPB) and Behavioral Reasoning Theory (BRT). A cross-sectional survey was designed and data was collected from 339 respondents who used an extensive number of electronic devices. The findings suggest positive attitudes towards recycling; social norms and perceived behavioral control are significant to the intention to recycle e-waste. In addition, attitude is explained by two determinants; reasons for recycling and environmental value. Finally, environmental value is also significant in explaining reasons for and reasons against recycling. The study is important for theoretical and managerial implications in describing consumers' acceptance of e-waste recycling by considering the values that promote the act, and the risks that prohibit them from acting positively. Likewise, the findings would help in building an impactful environmental protection regulation for the sustainability agenda.

Keywords: *e-waste recycling, theory of planned behavior, behavioral reasoning theory, attitude and intention of recycling, factors of recycling acceptance*

1. Introduction and Background

One of the emerging concerns of the twenty-first century is activities linked to electronic waste (e-waste) (Li & Achal, 2020). e-Waste refers to damaged or unused electrical and electronic equipment that has the potential to be thrown away. In comparison to other unused items, e-waste is the fastest rising (George et al., 2019). e-Waste is projected to double in size by 2045 if current trends continue (Parajuly et al., 2019). The volume rise is attributed mainly to product availability and the rapid pace of technological innovation (Wang et al., 2019). Likewise, demands for electronic appliances are growing as consumers' purchasing power increases, and they are lured by the convenient features of the products (Lo et al., 2020).

Mismanagement of e-waste becomes a major pollution problem and causes dangers to global sustainability (Dhir et al., 2021). Untapping the problem will only set the e-waste issue to become a bigger concern. What alarms the environmentalists is the fact that electronic devices contain a large number of heavy metals in which their release into the environment will result in a significant increase in heavy metal concentrations in dust, sediments, plants, air, and soil (Fayaz, Abdoli, Baghdadi & Karbassi, 2022) that could harm human health.

Fortunately, recent development in waste management innovations has created opportunities to turn waste into gold. e-Waste is found to be very valuable and precious due to its metal components (Arya & Kumar, 2020). To curb e-waste problems and reduce the e-waste poll, recycling them has become one of the essential initiatives (Liang, 2021). Quite a number of projects have been implemented for inspiring environmental changes. For instance, the Royal Mint plant in South Wales processes UK-sourced circuit boards to retrieve precious metal to reuse in its coins, bars and other products (Royal Mint, 2021). Another example is the Tokyo 2020 Medal Project, which molded all medals from metal extracted from recycled consumer electronics. The project was supported by 1,300 educational institutions and 2,100 electronic retail stores across Japan (Tokyo 2020 the Medal).

However, while e-waste recycling is good for the environment and creates value for the earth, it was found consumers' reactions towards the initiative vary (Liang, 2021). In the contextual situation, reports from the Global e-Waste Monitor (2020) indicated consumers' reactions towards e-waste recycling in Malaysia are still low. It was further reported recycling activities were not keeping up with the e-waste amount. In addition, how consumers in Malaysia react and are willing to participate in e-waste recycling has not been fully studied despite its emerging concern (Shittu, Williams & Shaw, 2021; Arain et al., 2020; Rodrigues, Boscov & Günther, 2020; Zhang et al., 2019). Some efforts were made in understanding the intention and its factors, such as disposal direction (Ho et al., 2013), convenience of infrastructure and services, information, incentives, reminder and the recycling infrastructure,

perceived convenience and perceived policy effectiveness (Shaharudin, Said, Hotrawaisaya, Nik Abdul Rashid & Azman Perwira, 2020) and knowledge and attitude (Mahat, Hashim, Nayan, Saleh & Norkhaidi, 2019). Nevertheless, the findings have not addressed either the psychological motivations that will drive consumers to engage in e-waste recycling activities or the determinants that will shape the positive attitude toward accepting e-waste recycling. Understanding the attitude factors and the intention is important as each country has distinct values, norms, infrastructure availability and policy implementation that suit the cultural and societal context, and each consumer has a different interpretation of risks associated with e-waste recycling. Hence, it could be concluded that the limitations and the significance of e-waste impacts urge more efforts to be made to understand consumers' intentions and attitudes.

Therefore, the study was conducted to explore the key determinants of e-waste recycling intention by applying the psychological theories of the theory of planned behavior (TPB) and behavioral reasoning theory (BRT). While studies reported on the intention to recycle e-waste have commonly used the TPB, what factors determine the attitude was not exclusively investigated. As Clark et al., (2003) pointed out, a number of researchers have used environmental psychology to investigate internal (psychological) variables such as attitudes, norms or beliefs as underlying motivations for individual behavior. As a result, their policy recommendations typically include providing information, persuasion, or guilt instillation. On the other hand, consumers' lack of awareness about disposal choices, such as the location of appropriate facilities and concerns about personal data protection, is also important to be examined (Dhir et al., 2021). In addition, the study is also important to be conducted as the findings could help in designing strategies for reducing e-waste. Disposing of them in the right and safe manner is the responsibility of every single citizen.

The paper is organized into different sections. Section 2 reviews the theories; theory of planned behavior and behavioral reasoning theory, past related studies and develops the hypotheses. Section 3 explains the research methodology. Section 4 presents the analysis, the research findings and discusses the implications. Finally, section 5 provides the conclusions and recommendations for future research.

2. Literature Review

This section reviews the related literature on the circular economy and e-waste recycling as the initiative, the theory of planned behaviors, the behavioral reasoning theory and discusses past studies for hypothesis development.

e-Waste Recycling Intention and the Theoretical Background

Studies on e-waste recycling intention were developed from numerous psychological theories. One of them is the value belief norm (VBN) theory which was first proposed by Stern et al., (1999). Generally, VBN theory is related to pro-environmental behaviors of activism, non-activist public-sphere, and behaviors in an organization. Mainly, studies applying the VBN theory reflect a causal chain that originates with the values, beliefs and awareness of consequences. Among the antecedents, the personal norm is the strongest determinant of pro-environmental behaviors (Gkargkavouzi et al., 2019; Vanderploeg & Lee, 2019; Li et al., 2018). Additionally, some scholars extended the VBN theory by measuring individuals' pro-environmental behaviors as green trust, habit, self-identity and subjective norm (Gkargkavouzi et al., 2019; Choi et al., 2015). In addition, based on valence theory, Dhir, Malodia, Awan, Sakashita & Kaur (2021) evaluated consumers' decision to recycle e-waste. They concluded intention to recycle e-waste is affected by the value compatibility of environmental concerns and the perceived benefits of engaging in this behavior.

Theory of Planned Behavior

The theory explains the relationship between an individual's beliefs and actions (Ajzen, 1991). In this theory, three constructs are essential in determining behavioral intention. First is the attitude towards behavior, which is related to assessing one's behavior that is either favorable or unfavorable towards a subject. Second, is the subjective norm, which refers to the social pressure that an individual feels to adopt or vice versa on a particular behavior. Finally, intensity refers to one's ability to control perceived behavior based on previous experience and anticipated challenges. Attitude is the process of assessing behavior. Subjective norm is the action seen as desirable, while perceived behavioral control is defined as being based on how easy or difficult to believe in doing something. In other words, attitude, subjective norm and perceived behavioral control drive the individual intention and behaviors towards decisions.

A study conducted by Echegaray & Hansstein (2017) used TPB to explain people's actions relating to electronic waste recycling. Attitudes and social norms were found the most predictive factors of behavioral intention. Additionally, it was discovered that awareness of the issue affected an individual's intention to recycle. To sum up, social awareness can be used to promote the recycling of electronic waste. Raising awareness of e-waste recycling may encourage individuals to take action and reduce the impact of electronic trash. It has been established that TPB is a framework that links to identifying factors influencing people's behavioral intentions. Table 1 depicts selected studies on TPB and its application in e-waste studies. It could be concluded attitude is mostly studied and its role is the most significant. Comparing subjective norm and perceived behavioral control, the former was studied more extensively.

Table 1: e-Waste studies that use the Theory of Planned behaviors (TPB)

Authors	Attitude	Subjective norm	Perceived behavioral control
Tan et al., 2017	✓	✓	
Sulaiman et al., 2019	✓	✓	✓
Kumar, 2019		✓	✓
Afroz et al., 2020	✓		
Delcea et al., 2020	✓	✓	
Ngah, 2021	✓		
Aboelmaged, 2021	✓		
Li et al., 2021	✓	✓	✓
Zhang et al., 2021	✓	✓	✓

Behavioural Reasoning Theory (BRT): Behavioral reasoning theory (BRT) can be seen as an extension of Ajzen (1991) theory of planned behavior. This includes context as a significant influence on attitude and intention formation. In a word, BRT is a theoretical framework that enables scholars and practitioners to examine the relative influence of the reasons for innovation (Sahu et al., 2020; Westaby, 2005). In other words, it differs from other acceptance models or theories as BRT only considers the reason for engaging in any innovation (Sahu et al., 2020).

The theory further remarks reasons affect global motives and intentions. Theoretically, there are two significant sub-dimensions to reasons: 'reasons for' and 'reasons against' which are posited to influence a decision. The fact that BRT is a theory also allows investigating the relationship of the 'reason for' and 'a reason against' the intentions towards any innovation (Westaby, 2005). However, some studies have found rejecting innovations is not always the same as the reasons for accepting them; for example, recycling e-waste would benefit health. The value perception could be the reason for engaging in recycling, yet people may have been resistant to e-waste because of high expenses or inconvenienced reasons.

Factors affecting e-waste recycling intention

Attitude: Previous research indicates that a positive attitude is significantly associated with the willingness to engage in a given behavior (Tandon et al., 2020). Similarly, a positive attitude toward e-waste recycling is likely to be related to greater e-waste recycling intention. Hence, a positive attitude towards e-waste recycling is likely to be linked to increasing e-waste recycling intention (Dhir et al., 2021; Zhang et al., 2019). A study conducted by Claudy et al., (2015) concluded consumer value has a considerable impact on attitude. Therefore, the following hypothesis is offered:
H1: There is a significant relationship between attitude and e-waste recycling intention.

Social Norm: The concept of social norm refers to the individual's feeling of social pressure about whether or not to engage in a particular behavior (Azjen, 1991). In essence, it is how individuals perceive other people's attitudes about a particular behavior. Likewise, it is an influence of a reference group or system on an individual's thoughts, opinions, emotions, and judgments, whereby it comes from a variety of groups, including family, friends, colleagues or social members with whom individuals are strongly associated. Moreover, the extent of literature on recycling behavior also emphasizes social pressure determines an individual's intention to recycle waste. Positive subjective norms can lead to positive behavior intention among consumers (Tong et al., 2018). Similarly, it was discovered subjective norm encourages the intention to recycle agricultural waste in China (Jiang et al., 2018), and encourages the behavior of recycling and reusing waste in developing countries (Khan et al., 2019). Thus, the following

hypothesis is offered:
H2: There is a significant relationship between social norms and e-waste recycling intention.

Perceived behavioral control: Perceived behavioral control is concerned with people's perception of their ability to conduct specific behavior (Azjen, 1991). It is the perception of enacting a behavior, whether the possibility to act on certain behavior is easy or difficult to be done. This is because some behaviors are not within one's control. A prior study found that perceived behavioral control was significant to people's intention to develop pro-environmental behavior regarding food waste recycling (Russell et al., 2017). In addition, Coşkun & Özbük (2020) also found that perceived behavioral control is the strongest predictor of the intention to reduce food waste, while Kianpour et al., (2017) concluded behavioral control is a significant predictor of electronic devices' weekly household recycling intention (Kianpour et al., 2017). Thus, based on the discussion, the following hypothesis is offered:
H3: There is a significant relationship between perceived behavioral control and e-waste recycling intention.

Factors affecting attitude toward e-waste recycling
Concerning the particular behavior, it was observed that 'reasons for' acted as a stimulus in triggering positive attitudes among consumers. Existing literature has indicated 'reasons for' is a significant factor influencing consumer behavior in various situations (Sahu et al., 2020: Claudy et al., 2015). For example, 'reasons for' eating organic food was significantly related to consumer attitudes and intentions (Tandon et al., 2020). Thus, 'reasons for' e-waste recycling have a potential linkage to attitude and intentions to recycle e-waste. Therefore, the following hypothesis is offered:
H4: There is a significant relationship between reasons for and attitudes to recycling e-waste.

In explaining human behavior, 'reasons against' is seen as a controller that can generate negative insights toward engaging in a given act (Sahu et al., 2020). Scholars also proposed that rejecting is not always the same as the reason for adopting. Additionally, most consumers reflect the different risks based on the activity. Perceptions of risk are a substantial barrier to defining consumer behavior (Kaur et al., 2020). For example, the concerns of identity theft and misuse of confidential data could pose a negative risk barrier to the intention to recycle e-waste (Liu et al., 2019; Tan et al., 2018). Hence, based on the discussion, the following hypothesis is offered:
H5: There is a significant relationship between reasons against and attitudes to recycle e-waste.

Environmental concern refers to a person's awareness and readiness to resolve environmental issues (Paul et al., 2016) and significantly solve problems (Dunlap & Jones, 2002). Meanwhile, environmental value refers to individuals' fundamental attitudes toward their surroundings. Value is a critical factor in an individual's personal and professional decision-making. Prior research revealed that consumer value significantly influences attitude (Claudy et al., 2015). Furthermore, environmental values can significantly impact behavior indirectly through environmental attitudes. Thus, the following hypothesis is offered:
H6: There is a significant relationship between environmental value and attitude to recycle e-waste.
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Environmental value as a determinant of reasons for and reasons against e-waste recycling
Environmental value refers to people's underlying attitudes toward their surroundings. The term has been applied interchangeably with other ideas such as environmental attitudes, ecological worldview and environmental concern (Dunlap et al., 2000). The element of value could influence individuals' decision-making in their life, whether it consists of professional life or personal. Research conducted by Wang et al., (2016) reported environmental awareness influenced Chinese residents' intention to recycle e-waste. In addition, Kushwah et al., (2019) concluded environmental concern has a positive impact on consumers' readiness to participate in e-waste recycling. Thus, the following hypothesis is offered:
H7: There is a significant relationship between environmental value and reasons for recycling e-waste.

Azjen and Fishbein (1975) in their discussion of expectancy-value theory, described people's views are about anticipating the outcome and the value of such outcomes that significantly affect the motivational process. While 'reason for' share a positive outcome, 'a reason against' assumes a negative association with the attitude (Tandon et al., 2020). Kushwah et al., (2019) suggested people with higher environmental value would place a greater concern on pro-environmental intention and vice-versa. Consumer value significantly impacted attitude (Claudy et al., 2015). However, prior research has empirically shown that 'reason against' is negatively linked with consumer attitudes and intentions. Therefore, the following hypothesis is offered:

H8: There is a significant relationship between environmental value and reasons against recycling e-waste.

3. Research Methodology

Instrument Development

The instrument was developed by first reviewing the literature. To ensure the best possible item reliability and validity, we adopted existing construct items from past studies. The items and their sources are in Appendix 1. All items were measured on a 5-point Likert scale (1 = 'strongly disagree' to 5 = 'strongly agree'). The respondents were also asked to provide their demographic profiles of gender, age, and work status. The variables 'reasons for' and 'reasons against' were measured as a higher-order model. The dimensions reasons are environmental benefits and personal benefits. On the other hand, reasons against were measured as risk barrier, value barrier, image barrier and usage barrier.

Before the data was collected, the instrument and the items were validated and pre-tested. A pre-test is a procedure that will require responses and feedback from a small set of respondents from the population. For face validity, the constructs and the items were checked and examined by three faculty members who were experts in the field. The procedure was performed as a strategy to ensure each item represents the meaning of the construct, to indicate the content of the research was related to the dimensions and variables, and to ensure no bias on the e-waste recycling initiative was presented. A pilot test was also conducted to assess the quality of the instrument, the degree of understanding of the statement, and the measure of the item's internal consistency score. Thirty undergraduate students participated in the pilot test. Ursachi et al., (2015) mentioned a general acceptance rule: Cronbach alpha of 0.6 – 0.7 indicates an acceptable level of reliability, and 0.8 or greater indicates an excellent level. The results of the internal consistency score show that all scores are within the acceptable values.

Data collection: sample and procedures

In determining the sample size, various strategies could be adopted. One of them is to use the sample-to-item ratio (Gorsuch, 1983). Using this method, the recommended sample size would be 160. Next is to use the sample-to-variable ratio (Hair et al., 2017), and the recommended sample size would be 140. Another procedure is to use the power analysis calculation. The sample size is determined with the largest number of predictors. The inputs for the power analysis are power, effect size and significance level. We used G*Power for applying this procedure, and the recommended sample size was 119.

To collect the data, an online survey was designed using Google Forms and an invitation to participate in the study was sent through emails and WhatsApp applications. A total of 337 responses was received, and it meets the minimum number of a required sample size of 337 participants. The respondents consisted of 80 males (24%) and 257 (76%) females. The participants belonged to different age groups, with the largest percentage of 63% for 18 – 30 years and the remaining percentage for 31 years and above. For the educational background, 43% of the participants have earned a bachelor's degree. Fifty-eight percent of the participants were university students, and the remaining 42% were employed in various sectors.

4. Results

To examine the measurement and structural models, we followed the Anderson and Gerbing (1988) guideline, and we used SmartPLS version 3.3.2 for partial least square (PLS) modelling. The method is highly appropriate for theory building and hypothesis testing and also to predict the determinants (Hair et al., 2017). PLS modelling is an acceptable method that can accommodate a smaller sample size without a normality assumption (Chin et al., 2003).

Measurement model

The measurement items were tested for both convergent and discriminant validity. The results of the reliability convergent validity analyses are presented in Table 2. The convergent validity was assessed by the indicator loadings, composite reliability (CR) and average variance extracted (AVE). The loadings for all reflective items exceeded the recommended value of 0.600. The CR values exceeded the minimum value of 0.700, and the AVE exceeded 0.500 for all constructs (Hair et al., 2017). Thus, some evidence indicates an adequate convergent validity of the measurement model. For the 'reasons for' and 'reasons against' constructs, a higher-order calculation for assessing the CR and AVE was performed separately. The results also suggest for adequate measurement model. In addition, the results of all VIFs,

In addition, to address the issue of common method bias (also named common method variance), a collinearity test was conducted. According to Bagozzi and Yi (1991) and Podsakoff et al., (2003), common method bias is usually caused by a single measurement and data from the same source, and it can be ascribed to the measurement method, rather than the constructs. Based on the collinearity test, all VIFs are lower than 3.3. Hence, the model can be considered free of common method bias.

Table 2: Reliability and Convergent Validity

Variable	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Attitude	0.940	0.961	0.893
Environmental benefit	0.911	0.944	0.849
Environmental value	0.787	0.858	0.601
Image barrier	0.718	0.876	0.780
Intention	0.881	0.927	0.808
Perceived behavioral control	0.927	0.945	0.774
Personal benefits	0.876	0.942	0.890
Risk barrier	0.868	0.938	0.884
Subjective norm	0.892	0.925	0.755
Usage barrier	0.889	0.948	0.900
Value barrier	0.867	0.938	0.883
Reasons for		0.959	0.921
Reason against		0.872	0.629

The assessment of the discriminant validity was conducted by using the heterotrait-monotrait (HTMT) ratio of correlations based on the recommendation from Henseler et al., (2015). Kline (2015) suggested HTMT values less than 0.85 support a good discriminant validity. However, based on Gold et al., (2001), HTMT values less than 0.900 are acceptable. The results of the HTMT for discriminant validity assessment demonstrated that the measurement items are valid and reliable. Therefore, they can be used for testing the hypotheses in the structural model.

Structural model

For the structural model, we run the analysis for examining the relationships. The structural model was tested by assessing the t-values, p-values, path coefficients, explained variance (R^2) and effect size (f^2). A bootstrapping procedure with 5,000 resamples, and a one-tailed test with a significance level of 0.05, was run to derive a valid standard error for the t-value calculation. In testing for the hypotheses, we tested for the effects of attitude, social norms and perceived behavioral control on e-waste recycling intention. We tested for the effects of environmental value, reasons for and reasons against attitude. Finally, we tested the effects of environmental value on reasons for and reasons against it. The results are presented in Table 3.

Table 3: Hypothesis Testing

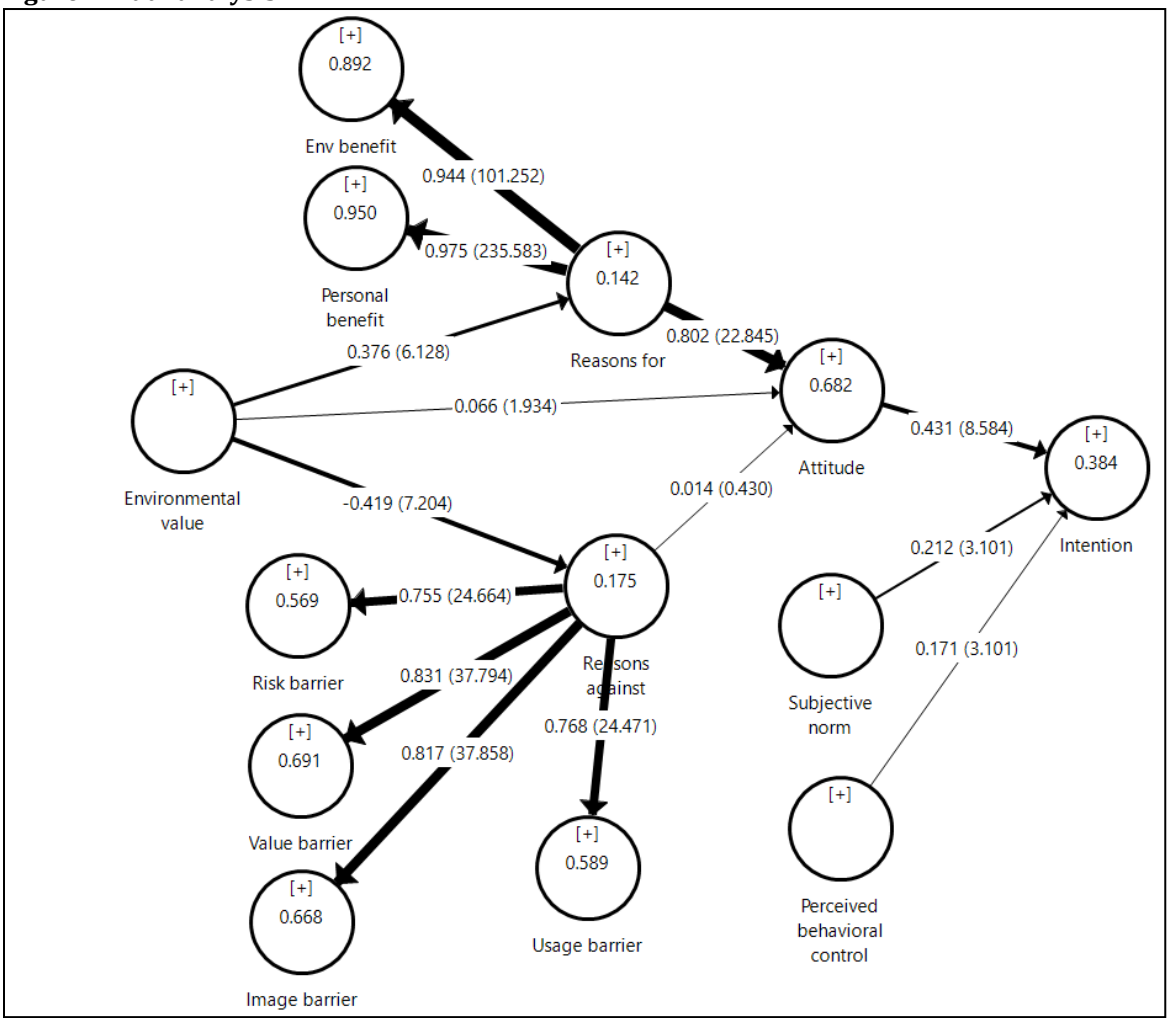
Hypothesis	Path Coefficient β	Standard Error	t-value	p-value	LLCI	ULCI	f^2
Attitude → Intention	**0.431**	0.052	8.367	0.000	0.345	0.511	0.281
Environmental value →Attitude	0.066	0.034	1.907	0.028	0.008	0.120	0.010
Environmental value → Reason against	-0.419	0.059	7.039	0.000	-0.502	-0.322	0.213
Environmental value → Reasons for	0.376	0.062	6.120	0.000	0.266	0.470	0.165
Perceived behavioral control → Intention	0.171	0.056	3.047	0.001	0.089	0.268	0.027
Reason against →Attitude	0.014	0.034	0.430	0.334	-0.038	0.066	0.001

Reasons for → Attitude	**0.802**	0.035	22.909	0.000	0.742	0.854	1.734
Subjective norm → Intention	0.212	0.069	3.076	0.001	0.105	0.317	0.040

R^2: Intention = 0.384, Attitude = 0.682, Reasons for = 0.142, Reasons against = 0.175
Q^2: Intention = 0.300, Attitude = 0.603, Reasons for = 0.112, Reasons against = 0.093

According to Fornell (1988), a Q^2 value above 0 indicates good predictive relevance. From the results, there is evidence that the Q^2 for intention, attitude, reasons for and reasons against are above 0. The results of the Q^2 variance for attitude is 60.3% and 30% for intention, hence they are indicative of good in-sample prediction accuracy. The results of the R^2 are presented in Table 3 and Figure 1. According to the rule of thumb, R^2 values between 0.02 and 0.12 is considered low, 0.13 to 0.25 are moderate and R^2 values above 0.26 are significant (Cohen, 1992). Following the suggestions, the reasons for and reasons against variances are considered to be moderate, while the intention and attitude variances are significant.

Figure 1: Path analysis



Looking at the hypotheses, all of them were supported, except for the relationship between reasons against and attitude ($\beta = 0.014$, $p > 0.05$). The strongest relationship is between reasons for and attitude ($\beta = 0.802$, $p < 0.001$), followed by attitude and intention ($\beta = 0.431$, $p < 0.001$), environmental value and reasons against ($\beta = -0.419$, $p < 0.001$), environmental value and reasons for ($\beta = 0.376$, $p < 0.001$), subjective norm and intention ($\beta = 0.212$, $p < 0.05$), perceived behavioral control and intention ($\beta = 0.171$, $p < 0.05$) and environmental value and attitude ($\beta = 0.066$, $p < 0.05$). The path model analysis is illustrated in Figure 1.

Discussion of Key Findings

The increased amount of unmanaged e-waste creates environmental issues. The study aims to address the environmental impacts by focusing on consumers' psychological behaviors and motivations based on the theory of planned behavior (TPB) and behavioral reasoning theory (BRT). Based on the findings, three key findings are discussed. The first is on the predictors of intention. Second is on the key determinants of attitude which is significant for building motivational strategies. Third is the role that environmental value plays in shaping the perception of reasons for recycling or reasons against recycling.

In this study, attitude, social norm and perceived behavioral control predict consumers' intention to recycle e-waste. Among the three determinants, attitude is the strongest factor. The findings are consistent with past research (Dhir et al., 2021; Zhang et al., 2019). Attitude is a very important factor that will shape one's movement through the intention. A positive attitude brings optimism and would bring constructive changes. Hence, to curb the e-waste problems, changing the attitude is very important. Next to attitude is the social norms and the findings are consistent with studies by Tong et al., (2018), Jiang et al., (2018) and Khan et al., (2019). Subjective norm suggests an individual's thoughts, opinions, emotions, and judgments could be influenced by others. In the theory of planned behavior, 'others' have always been measured as family and friends. However, as information technology evolves, communications between people to people and among people have evolved and enlarged. Hence, digital openness has also become one of how individuals could be influenced (McClure & Seock, 2020). In this study, social norms referred to both people around the subjects, and also programs and campaigns. It is not necessarily referring to friends and family members. Therefore, to increase the intention, taking a positive influence is a significant step, and social media is a significant influence in shaping one's decision (De Fano, Schena & Russo, 2022; Lewandowsky, Cook, Fay & Gignac, 2019). Finally, perceived behavioral control plays a role in determining consumers' intention toward e-waste recycling. It could be concluded that one's perceived availability to control and act depends largely on his perception of whether it would be easy or difficult. Likewise, the findings are consistent studies on the environment and e-waste (Zhang et al., 2021; Kianpour et al., 2017; Russell et al., 2017). Perceived behavioral control could serve as a proxy for actual control and contribute to the prediction of behavior (Azjen, 1971).

Next, in predicting the attitude towards e-waste recycling, the results affirmed reasons for and environmental value are the significant factors. Concerning a particular behavior, it was observed that reasons have acted as a stimulus in triggering a positive attitude among the consumers. Thus, reasons for e-waste recycling seem linked to a positive attitude and intentions towards e-waste recycling. Likewise, environmental value plays a significant role in changing to a positive attitude. How consumers value the environment could be reflected in how they act and behave. Examples of their actions related to the environment are signing an environment protection petition, donating money for environmental causes and putting a boycott against companies that they feel are harming the environment. This group of environmental supporters is essential for the sustainability agenda, and their voices could make a change in influencing more people to take part in circular economy activities.

However, even though the results of examining the relationship between reasons against and attitude are not supported, the findings indicate an important note. As the reasons against are measured as risks, consumers feel these risks would hinder their attitude. Even though environmental protection has gained significant global relevance today, the basic concepts of waste disposal are always overlooked. Perceptions of risk act as a substantial barrier in defining consumer behavior (Kaur et al., 2020). For example, the risk barrier is significantly negative towards the use of mobile payment systems and the issues of electronic equipment disposal. Also, the issues of theft of personal information and confidential data arose when consumers intended to recycle e-waste (Liu et al., 2019; Tan et al., 2018).

Finally, the study found a significant relationship between environment value and reasons for, and between environment value and reasons against. Consumers who are already acting on some environmental-related activities would perceive for positive benefits of e-waste recycling. For instance, they feel e-waste recycling is able to reduce the devices' health hazards, reduce accidental damage, protect the environment from toxic chemicals and cut down the greenhouse emissions.

Theoretical and Managerial Contributions

The study contributes to several theoretical implications. Understanding the intention to recycle e-waste is important, but having to determine the motivational factors that are significant in shaping a positive attitude is

equally important. Thus, injecting Westaby's (2005) beliefs and values, reasons for the behavior and reasons against the behavior add to the comprehensive motivational requirements. Furthermore, the findings establish a recent contribution from a waste management perspective since they address the gaps of previous limitations in looking for consumers' attitudes and intentions. Finally, the findings contribute as a source of reference in identifying other factors that will motivate the behavior or identifying dimensions and other measures of environmental value. Finally, as e-waste recycling in Malaysia has not received substantial acceptance among consumers, the findings will shed light on academic's views with potential identification of strategies to promote the behavior. Moreover, in view of the fact that little attention has been devoted to the role of environmental value in e-waste sustainability management, this study also contributes to the development of waste management literature.

Furthermore, the study is significant to managerial contributions where consumer awareness and preference during the disposal of e-waste are crucial factors in determining the future success of e-waste management. This evidence can lead to nationwide awareness in raising household e-waste recycling activities by teaching people how to recycle, reuse and dispose of e-waste. In brief, people will learn to behave more responsibly toward the environment.

5. Conclusion and Recommendations

Electrical and equipment devices have turned out to be essential in our everyday lives. E-waste has rapidly become a source of domestic waste. This is primarily due to shorter lifecycle products, frequent technological advancement, and shorter product life spans that comprise the significant reason for e-waste recycling. This study contributes to theoretical implications. First, it contributes to the theory-building in the area of e-waste and circular economy. Attitude, social norms and perceived behavioral control of the theory of planned behavior were found to be significant predictors to intention. Likewise, reasons for, reasons against and values from the behavioral reasoning theory was tested as the factors of intention. Examining how environmental value is important for the decision either to accept or to reject the idea of e-waste recycling is also another theoretical contribution of the study.

In addition, the study also contributes to the practical implications for policymakers, decision-makers and communities. The findings provide some reasonable suggestions on how to change the perception of e-waste and how to promote 0it for a greater cause. Based on the findings, it could be said utilizing social media and influencers is one of the strategies and people are easily drawn towards certain acts when the idols do so. In addition, how consumers could participate in e-waste recycling should be made easier and simpler. This is to encourage them to understand recycling e-waste is within their control. Furthermore, more awareness of the values of e-waste and circular economy should be created for all, regardless of the consumers' profiles and age. The environment is for all; hence the awareness is not only for the people but also for the collectors, producers, logistics providers and local agencies. Unquestionably, recycling is the key factor that needs to be considered to reduce e-waste. Tokyo 2020 Medal Project has proven to be a success in making waste to wealth a reality. The e-waste components contain precious metals such as gold, copper, palladium and silver, with high recycling value. Educating society across all ages about e-recycling, reusing, and the best appropriate methods for disposing of electronic and electric devices is key.

Finally, there are some limitations of the present study. First, the study did not consider the variations of the e-waste based on certain criteria such as types, size, models and others. The variation could help in making some comparisons to the acceptable behavior. In addition, the study did not consider the level of e-waste recycling awareness. Some people are completely aware, while others may be ignorant of its importance. Hence, by assessing the difference, more activities to influence them could be customized for greater concern. In addition, the variance of intention is less than 40 percent. Therefore, future research could consider looking at other variables other than individual characteristics. The study also did not rule out the effects of demographic and cultural variables. For this reason, it unlocks the opportunity for future research for further exploration. Besides that, the upcoming research may also consider qualitative methods to obtain more knowledge and findings related to e-waste in various contexts. Pertaining to the findings of this study, it can be suggested that future research can include potential moderating or control variables. The element of country, culture and perceptions or categories of electronic waste could be explored.

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Appendix 1: Item Measurement

Measure	Source	Item
Attitude	Dhir et al., (2021); Echegaray & Hansstein (2017); Wang et al. (2019)	ATT1: E-waste recycling is good for the environment ATT2: E-waste recycling is beneficial for the environment ATT3: E-waste recycling will make the living environment better.
Subjective Norm	Wang et al., (2019)	SN1: There are many people around me who choose e-waste recycling SN2: Many people recommend me to use e-waste recycling SN3: People around me support me to participate in e-waste recycling SN4: There are many programs and campaigns about e-waste recycling
Perceived Behavioral Control	Wang et al., (2019)	PBC1: It would be easy for me to send appliances to e-waste recycling center PBC2: I could locate the e-waste recycling center around my home PBC3: I know how to use the e-waste recycling facility PBC4: I could complete the e-waste recycling even if there was no one around me what to do PBC5: I could complete the e-waste recycling even if there was no reference to refer to.
Reasons for (*Environmental benefits and personal benefits*)	Dhir et al., (2021) *Environmental benefits*	EB1: Using proper e-waste recycling protects the environment from toxic chemicals EB2: Using e-waste recycling reduces the risk of polluting the environment EB3: Using e-waste recycling cuts down the emission of greenhouse gases
	Dhir et al., (2021) *Personal benefits*	PB1: Using e-waste recycling reduces the health hazards of electronic wastes PB2: Using e-waste reduces the chances of accidental damage at home
Reasons against *(Risk barrier, value barrier, image barrier and usage barrier)*	Dhir et al., (2021) *Risk barrier*	RB1: I fear that after the transfer of my electronic device for recycling, the stored information may be misused RB2: I fear that my electronic device may be misused by the collection center
	Dhir et al., (2021) *Value barrier*	VB1: I feel that the traffic expenses of e-waste recycling are high VB2: I feel that the handling charges of e-waste recycling are high
	Dhir et al., (2021) *Image barrier*	IB1: In my opinion, e-waste recycling is often too complicated to be useful IB2: I have an image that e-waste recycling is difficult to

Measure	Source	Item
		adopt
	Dhir et al., (2021) *Usage barrier*	UB1: In my opinion, it is not easy to find information on e-waste recycling UB2: In my opinion, it is not easy to find an e-waste collection center
Environmental Value	Dhir et al., (2021)	EC1: I follow developments related to the environment EC2: I have signed a petition in support of protecting the environment. EC3: I have donated money to an environmental group (e.g. NGO or global organization) EC4: I have boycotted or avoided buying the products of a company because I felt that the company was harming the environment
Intention	Wang et al., (2019)	INT1: In the future, I will prefer to recycle e-waste. INT2: I will use the e-waste recycling platform for future electronic waste disposal INT3: Whenever possible, I would intend to recycle e-waste