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Motivational Antecedents for Reverse Logistics: E-waste Recycling Among Mature Consumers

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Abstract

Purpose: This study examines how mature consumers recycle their e-waste by investigating the role of environmental values and gender in their behaviour. The study contributes towards the promotion of sustainable e-waste management and reverse logistics. **Research design, data, and methodology:** A cross-sectional online survey with 210 valid responses was obtained, consisting of respondents aged between 40 and 70 years who recycle e-waste. The data were analysed using Partial Least Squares Structural Equation Modeling, where measurement reliability and validity, path analysis, and multigroup analysis were conducted. **Results:** Environmental values emerged as a key predictor in shaping mature consumer attitudes in e-waste recycling. While environmental values significantly influence both genders, structural pathways vary. A gendered effect was evident, where female consumers exhibit a more positive attitude. Finally, the pathway to e-waste recycling behaviour stems from perceived behavioural control rather than behavioural intention. **Conclusions:** Policymakers should leverage both public and private reverse logistics networks such as recycling centres, mobile apps, retailers, and waste service providers to increase e-waste recycling rates. Using gender-sensitive messaging, communication programs targeting women and men should also deliver distinct messages. For females, emphasise benefits of recycling, and for males, communicate e-waste recycling centre locations and services.

Keywords : Theory of Planned Behaviour, E-waste Recycling, Gender, Mature Consumers, Environmental Values, Reverse Logistics, Distribution Channels

JEL Classification Code : M31, Q01, Q53, Q56, D10

1. Introduction

The electronics and electrical industries have expanded significantly due to urbanization (Borthakur & Govind, 2018). The volume of electronic waste (e-waste) or Waste Electrical and Electronic Equipment (WEEE) (Parajuly et al., 2019) has increased substantially since the early 2000s. This rapid growth has caused an impending global e-waste crisis whereby e-waste generation surpasses formal recycling by a factor of five due to higher consumption and shorter product lifespans (Baldé et al., 2024). From 2010 to 2024, e-waste experienced a growth of 82% and will

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continue to rise by 32% by 2030 (UNITAR, 2024). As it stands, 62 million tonnes of e-waste were produced in 2022, equivalent to 7.8 kg per capita. From this total, only 22.3% of e-waste was managed in a responsible and environmentally sound way (Baldé et al., 2024).

E-waste requires specialized procedures to remove harmful components safely. Materials such as lead, mercury, and other heavy metals, which may be toxic to living organisms (Alabi et al., 2020; Lin et al., 2022), need to be processed properly. Allowing e-waste materials to be exposed to the environment using rudimentary processing causes environmental pollution and health hazards (Ilankoon et al., 2018). Lead, in particular, is a common element released into the environment when processed using basic techniques (Widmer et al., 2005). Thus, e-waste poses serious health risks and environmental damage, making it a crucial issue for waste management, particularly due to the toxic substances in electrical and electronic components. While many countries have invested in infrastructure and waste management systems for e-waste, only 20% of e-waste is formally processed. The remainder is either stored at home, discarded with household waste, or sold to informal recyclers (Dixit & Badgaiyan, 2016; Zhang et al., 2021). As a result, only a small fraction of consumers actively participate in e-waste recycling. As electronic devices become outdated and lose value, consumers face difficult decisions regarding their disposal (Dhir et al., 2021).

E-waste recycling or the disposal of end-of-life electronics in a sustainable manner can also be interpreted as reverse logistics. For end-of-life electrical and electronic goods, the proper management of the broader supply chain can contribute towards minimizing waste and optimising resources (Singh et al., 2025). Reverse logistics in this context can act as a missing link between end-of-life electronics and material circularity, ultimately contributing to sustainability. While reverse logistics and the distribution network (i.e., government-run and private entities) for the e-waste management exists in Malaysia, poor rates of participation mar the effectiveness of these initiatives. Thus, further analysis of consumers' motivational decision-making is needed to understand how to encourage consumers to recycle their e-waste.

The literature suggests that the Theory of Planned Behaviour (TPB) has been widely used in understanding pro-environmental behaviour (Yuriev et al., 2020), especially in recycling research. Existing literature on e-waste recycling examines various factors influencing e-waste recycling intention, including the most common factors—convenience (Kochan et al., 2016; Laeequddin et al., 2022; Michael et al., 2024; Mohamad et al., 2022; Shaharudin et al., 2023), habit (Aboelmaged, 2021; Sabbir et al., 2023; Vijayan et al., 2023), and awareness of consequences (Kochan et al., 2016; Koshta et al., 2022; Kumar, 2019; Mohamad et al., 2022; Wang et al., 2016)—with TPB serving as the main theoretical framework. Previous literature indicates that only a few studies have investigated the role of environmental values in e-waste recycling (Ang et al., 2023; Ofori & Opoku Mensah, 2022; Sari et al., 2021), despite personal values being motivating forces that act as guiding principles for individual lives (Schwartz, 2012). Personal values act as a guiding principle, influencing choices, behaviours, people, and events (Feather, 1995), and can encourage the consumer towards greener behaviour or otherwise. Therefore, based on the limited attention given to environmental values in e-waste recycling behaviour, it would be helpful to obtain a deeper understanding of its role as a motivating force (Ofori et al., 2022).

Thus far, moderators used in TPB-based e-waste recycling studies include infrastructure (Nduneseokwu et al., 2017), economic incentives (Nduneseokwu et al., 2017), privacy concern (Zhang et al., 2021), information security risk perception (Chang et al., 2023), cost of recycling, infrastructure, and environmental consciousness (Abdul Waheed et al., 2023), and government initiatives (Sabbir et al., 2023). The role of gender as a moderator in e-waste recycling (in TPB) has not yet been explicitly investigated. Moreover, in Malaysian households, women aged 30 and above possess more autonomy in influencing household decision-making, with autonomy increasing with income and education (Ang & Lai, 2023). Consistent with this assertion, the role of gender will also be examined in this study given the inconclusive evidence observed so far (Mutang & Haron, 2012; Oates & McDonald, 2006; Puzzo & Prati, 2024). Furthermore, Oztekin et al. (2017) and Puzzo & Prati (2024) also recommend the need to explore gender as a moderator in e-waste recycling.

Additionally, the study seeks to investigate the antecedents influencing the intention to recycle e-waste and provide a more comprehensive understanding of the phenomenon for mature consumers (40 years old to 70 years old) due to the limited attention given to this age group, even though they exert influence on household waste management practices. Moreover, Malaysia is projected to demographically shift towards an ageing population, where aging citizens are expected to constitute 14.5% of the population by 2040 (United Nations Development Program, 2024). Thus, the role of mature Malaysian consumers in e-waste recycling should not be overlooked, especially since the amount of collected recyclable household waste has tripled from 2018 to 2021 (Ng et al., 2023). As a final point, this research aims to understand e-waste recycling using TPB by incorporating environmental values and investigating the effect of gender on e-waste recycling in mature consumers aged 40 to 70 years old.

2. Literature Review

2.1. Theory of Planned Behaviour

Ajzen (1991) introduced TPB as an extension of the Theory of Reasoned Action (Ajzen & Fishbein, 1980), including Perceived Behavioural Control. TPB seeks to understand behaviour performance through the individual's intention to engage in specific behaviour. The application of TPB requires explicit identification of the target, action, and context of behaviour. Once behaviour is specified, the identification of motivational factors that influence that behaviour then corresponds to it (Ajzen, 2020). Focusing on motivating factors that shape behavioural intentions, it has been posited that stronger motivation to engage in behaviour leads to greater intention to perform it (Ajzen, 2020). However, behavioural intention can only be accurately measured if the behaviour can be voluntarily performed, meaning individuals must have control over their choice to perform the behaviour (Ajzen, 1991). TPB outlines key determinants of intention, which are attitude towards behaviour, subjective norms, and perceived behavioural control. Attitude refers to positive or negative beliefs individuals hold about particular behaviour, while subjective norms concern how significant others (such as family, friends, or peers) view behaviour. Finally, perceived behavioural control relates to an individual's assessment of whether they have the necessary resources and opportunities to successfully perform behaviour, indicating ease or difficulty of carrying it out (Ajzen, 1991).

The major categories of green behaviours studied using TPB include recycling, travelling, and commuting; general pro-environmental gestures (e.g., time and money contribution toward ecological causes, environmental activism, sustainable activities); and other related green behaviours (e.g., toilet flushing, turning off taps) identified by Yuriev et al. (2020) in a scoping review of 126 journal articles. Furthermore, given the procedural nature of recycling (performed in sequential steps), TPB components have been able to explain personal recycling (Khalil et al., 2017; Rosenthal, 2018). Previous studies on recycling have investigated contexts such as college students, households, company employees, and even farmers while focusing on household waste, construction waste, and e-waste (Ma et al., 2023).

In recycling, a meta-regression study involving 57 studies across 25 different countries compared the effectiveness of relationships between constructs (Ma et al., 2023). The study reported the highest statistical significance for relationships between attitude and recycling intention, as well as recycling behaviour. This implies that a more positive attitude towards recycling leads to a stronger intention to recycle and, therefore, a more likely recycling behaviour will occur. However, in the same meta-regression, subjective norm and perceived behavioural control were observed to have poor predictive ability for recycling intention and behaviour. Poor performance of subjective norm is attributed to lack of specificity in capturing normative groups, while perceived behavioural control is suggested to be multidimensional rather than unidimensional (Kraft et al., 2005; Trafimow et al., 2002). Thus, the applicability of TPB in the recycling context is supported by empirical evidence, even though further modification of constructs may be encouraged. It is also important to note that differences in the significance of constructs in TPB have been attributed to demographic variables (Li et al., 2019), collection service (Du Toit & Wagner, 2018), cultural differences (Ertz et al., 2017), and policy (Wan et al., 2014). There remains an inadequate understanding of differences in TPB in this domain (Ma et al., 2023).

Based on bibliometric analysis carried out by Newaz & Appolloni (2024), e-waste recycling studies used TPB in various contexts, including young consumers (Aboelmaged, 2021; Islam et al., 2021), households (Koshta et al., 2022; Wang et al., 2016), and end-of-life mobile phones (Najmi et al., 2021). Key predictors differ in varying contexts – for example, attitude and habit were important predictors for young consumers while perceived behavioural control and subjective norms did not appear consistently significant (Newaz & Appolloni, 2024). However, in household e-waste recycling behaviour, perceived benefits, behavioural costs, disposal subsidy, perceptions of informal recycling, and perceived social acceptance played a significant role (Newaz & Appolloni, 2024). Other variables were also incorporated in TPB, such as willingness to pay (Koshta et al., 2022), convenience (Wang et al., 2016; Otto et al., 2018), environmental awareness, and concern (Dhir et al., 2021a). In Malaysia, TPB has been used on several occasions to understand e-waste recycling among consumers (Ang et al., 2023; Mohamad et al., 2022; Shaharudin et al., 2023), where different variables emerged to be significant in accordance with different population samples, indicating nuance in e-waste disposal and recycling behaviour, reiterating observations made by Newaz and Appolloni, (2024) and Ma et al. (2023).

2.2. Environmental Values

Values are expressed as important motivators of behaviour, guiding human actions, goals, and shaping an individual's sense of identity (Schwartz, 2012). Values influence an individual's long-term behaviour and can do so across a wide range of situations (Sagiv et al., 2017). Ultimately, personal values are defined as broad, trans-situational, desirable goals that act as guiding principles in

one's life (Allport & Vernon, 1931; Rokeach, 1973; Schwartz, 2012). Values have been observed to influence pro-environmental behaviours such as sustainable lifestyles (Gatersleben et al., 2010), purchase of environmentally friendly technology (Caggiano et al., 2021), staying in green hotels (Verma et al., 2019), and recycling e-waste (Dhir et al., 2021a). Evidently, values motivate individual actions, whereby consumers consider the compatibility of behaviours with their values, prior experiences, current beliefs, and established needs (Saphores et al., 2012). Thus, values are expected to serve as intrinsic motivators for pro-environmental behaviours (Ofori, 2021).

Pro-environmental behaviour is seen to be motivated by self-transcendence (e.g., universalism, benevolence) and self-enhancement values (e.g., achievement, power) (De Groot & Steg, 2008) according to Schwartz's value theory (Schwartz, 2012). Another perspective to consider accounts for three values associated with pro-environmental behaviour comprising egoistic, altruistic, and biospheric values as proposed by Stern (2000). In this model, individuals who are oriented towards egoistic values consider the perceived costs and benefits to themselves. Alternatively, individuals who are oriented towards altruistic values consider the perceived costs and benefits to others. Furthermore, individuals who are oriented towards biospheric values consider the perceived costs and benefits to the ecosystem or biosphere (De Groot & Steg, 2009). Although all three values have the potential to motivate pro-environmental behaviour, egoistic values appear to be the least positively related to pro-environmental behaviour when compared to the others (Nordlund & Garvill, 2002; Stern & Dietz, 1994). Altruistic and biospheric values show greater consistency (Nordlund & Garvill, 2002; Stern & Dietz, 1994), with biospheric values seeming to be most strongly related to pro-environmental behaviour (De Groot & Steg, 2008).

In addition, individuals can hold multiple conflicting values at any given point in time and prioritize specific values over others (De Groot & Steg, 2008; Verplanken & Holland, 2002). Two conflicting values, self-transcending and self-enhancement values, compete when carrying out pro-environmental behaviour (Steg et al., 2014). This is because performing pro-environmental behaviour requires time and cost and may not result in large benefits, which may contradict self-enhancement values (De Groot & Steg, 2008). Thus, consumers who prioritize self-transcending values (altruistic values and biospheric values) are more likely to perform pro-environmental behaviour (De Groot & Steg, 2008).

Previous research has demonstrated that environmental values considerably influence environmental behaviour. Prior studies indicate that altruistic values influence green behavioural intention (Tan et al., 2021). By integrating the Value Belief Norm Theory (Stern, 2000), environmental values have been shown to affect e-waste recycling behaviour (Sari et al., 2021). Furthermore, Ofori (2021) found that altruistic values significantly affected re-use behaviour but not recycling participation. Consequently, Ang et al. (2023) observed environmental values to be a significant predictor of attitude — an observation consistent with Homer & Kahle's (1988) findings, in which values have been identified as an antecedent of attitude, forming the value-attitude-behaviour linkage postulated in the Social Adaptation Theory by Kahle et al. (1980). Therefore, this study examines the following hypothesis:

H_1: Environmental Values significantly affect Attitude.

2.3. Attitude

According to Ajzen and Kruglanski (2019), the positive or negative valence for a behavioural outcome influences the attitude of an individual. From an expectancy-value perspective, attitude is shaped by the individual's beliefs, which may have a positive or negative valence. Therefore, attitude is referred to as an evaluative response to a specific outcome or experience (Ajzen, 2020). In addition, attitude is directed specifically towards the behaviour under examination (Stark et al., 2025). Within the perspective of TPB, attitude acts as a predictor of behavioural intention whereby the more favourable the attitude, the more likely the intention to perform the behaviour and vice versa (Ajzen, 1991).

Rahman (2025) identified attitude as a significant predictor of intention across 86 recycling studies in a recent meta-analysis – a finding supported by empirical evidence in another meta-regression study conducted by Ma et al. (2023). Specifically, studies focusing on e-waste recycling have observed attitude to be a significant predictor of behavioural intention on numerous occasions (Abdul Waheed et al., 2023; Bhutto et al., 2023; Koshta et al., 2022; Vijayan et al., 2023; Xiang & Mangmeechai, 2023). However, in some cases, attitude did not appear significant (Mohamad et al., 2022; Park et al., 2020). In this specific geographical region, attitude was also observed to be a significant predictor of intention (Kassim et al., 2023). Consequently, the following hypothesis is proposed for this study:

H_2: Attitude significantly affects Behavioural Intention.

2.4. Subjective Norm

Subjective norm is defined as the perceived social pressure to either engage in or refrain from a particular behaviour (Ajzen, 1991). It reflects the social influence on behavioural performance. Individuals perceive that significant others may affect their behavioural intentions.

Therefore, people are influenced by the beliefs of relevant others regarding whether a specific behaviour should be performed, acting as an external motivator of approval in decision-making. Injunctive normative beliefs (i.e., referent individual or group approves of the behaviour) and descriptive normative beliefs (i.e., important others perform said behaviour) shape an individual's subjective norm evaluation (Ajzen & Kruglanski, 2019).

Previous studies have indicated that the subjective norm is a significant predictor of e-waste recycling intention (Ang et al., 2023; Ben Yahya et al., 2023; Kochan et al., 2016; Kassim et al., 2023; Nduneseokwu et al., 2017; Papaoikonomou et al., 2020; Shaharudin et al., 2023). It appears that in multiple studies, the influence of significant others is crucial to the formation of e-waste recycling intention, even though there is contradictory evidence that suggests otherwise (Aboelmaged, 2020; Kumar, 2019). Thus, the following hypothesis is proposed for this study:

H_3: Subjective Norm significantly affects Behavioural Intention.

2.5. Perceived Behavioural Control

Perceived behavioural control refers to the perceived ease or difficulty of performing a behaviour, reflecting past experiences and the anticipated presence of obstacles (Ajzen, 1991). It is assumed that the individual's perception of control focuses on factors that may enable or impede the performance of the behaviour. Thus, control factors may include the individual's ability and skill, availability of time, resources, or money, and the willingness of cooperation from others (Ajzen & Kruglanski, 2019). It can also be seen as the perceived effortlessness or challenges associated with behaviour performance. For instance, individuals who are familiar with the recycling process are more likely to participate in recycling (Tonglet et al., 2004).

Empirical studies have demonstrated that perceived behavioural control influences the intention to perform recycling within a household (Russell et al., 2017). Understanding the procedural steps involved in recycling has been found to positively affect recycling behaviour (Rosenthal, 2018). As such, recycling rates have been significantly shaped by perceived behavioural control (Ben Yahya et al., 2023; Kumar, 2019). However, the evidence for the role of perceived behavioural control appears inconsistent, with some studies suggesting that perceived behavioural control does not significantly impact e-waste recycling behaviour (Mohamad et al., 2022; Zhang et al., 2021). Therefore, this study posits the following hypotheses:

H_4: Perceived Behavioural Control significantly affects Behavioural Intention.

H_5: Perceived Behavioural Control significantly affects Behaviour.

2.6. Behavioural Intention

Behavioural intention is a central concept within TPB. Individuals form intentions based on motivational factors that influence a behaviour. Intentions are interpreted to represent how much effort individuals are willing to invest to perform a behaviour. Therefore, when individuals show strong intention, there is a higher probability for behaviour performance. However, intention is only a reliable indicator when the behaviour in question is volitional, where the individual can decide whether to perform the behaviour or not. The performance of a behaviour is thus dependent on intention and ability (behavioural control) (Ajzen, 1991). A meta-regression indicated that behavioural intention is a strong predictor of recycling behaviour (Ma et al., 2023). Similarly, behavioural intention influenced e-waste recycling behaviour repeatedly (Chang et al., 2023; Laeequddin et al., 2022). The following hypothesis is thus proposed:

H_6: Behavioural Intention significantly affects Behaviour.

2.7. Gender

In In the Malaysian cultural system, unpaid domestic work is predominantly shouldered by women across different ethnic families (Boo, 2021, 2024; Chelliah et al., 2023). In the past, it has been observed that men spent only a small amount of time on housework (DaVanzo & Lee, 1978; Noor, 1999). Women's prominent role in domestic work persists even when women are employed (Chelliah et al., 2023). Also, in private home-based activities, females have been shown to exhibit more environmentally friendly behaviour compared to their counterparts. Similarly, home recycling activities have been observed to be undertaken largely by women (Oates & McDonald, 2006). Women also tend to be more responsible when disposing of end-of-life goods (Bianchi & Birtwistle, 2010) perhaps due to their involvement in household care (Cruz-Cárdenas et al., 2016).

Previous studies have identified that in the context of household activities, females are more concerned and engaged in pro-environmental behaviour (Blocker & Eckberg, 1997; Ebreo & Vining, 2001; Goldenhar & Connell, 1993; Hadler & Haller, 2011; Xiao & McCright, 2014). Females were also more likely to recycle than their male counterparts (Hunter et al., 2004). While there is limited evidence for gender differences in e-waste recycling, previous recycling studies have shown that a key predictor for females is perceived behavioural control, while past behaviour shaped male intention (Oztekin et al., 2017). Furthermore, in a meta-analysis, attitude emerged as a significant pathway for females while perceived behavioural control proved to be the significant pathway for males (Ma et al., 2023).

Additionally, previous research has shown that the relationship between norms and intention to recycle (in TPB) was significantly greater in women than in men (Goldenhar & Connell, 1993). However, recently, men and women have also been shown to re-negotiate household responsibilities, in which women who earn more than the men now do less housework in comparison (Boo, 2024). One study observed that gendered behaviour was not apparent in household recycling in Malaysia (Mutang & Haron, 2012), while Mohamad et al. (2022) found that gender did not moderate the antecedents of e-waste recycling behaviour. Given the inconclusive observations, the following hypotheses are proposed:

- **H_{7a}:** Gender moderates the relationship between Environmental Values and Attitude, where the effect is different among females and males
- **H_{7b}:** Gender moderates the relationship between Attitude and Behavioural Intention, where the effect is different among females and males
- **H_{7c}:** Gender moderates the relationship between Subjective Norm and Behavioural Intention, where the effect is different among females and males
- **H_{7d}:** Gender moderates the relationship between Perceived Behavioural Control and Behavioural Intention, where the effect is different among females and males
- **H_{7e}:** Gender moderates the relationship between Perceived Behavioural Control and Behaviour, where the effect is different among females and males
- **H_{7f}:** Gender moderates the relationship between Behavioural Intention and Behaviour, where the effect is different among females and males

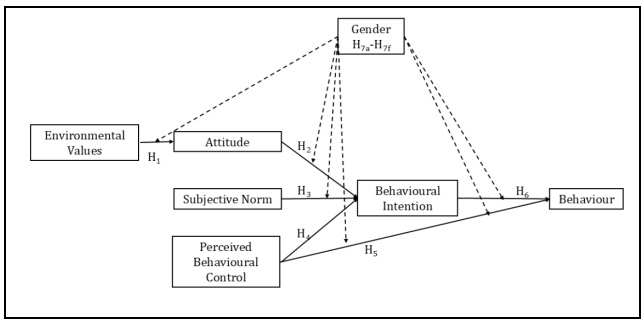

Figure 1: E-waste recycling behaviour

3. Research Methods and Materials

In this study, a quantitative survey was conducted using an online questionnaire. Using non-probability purposive sampling, respondents who recycle their e-waste between the ages of 40 to 70 years old were recruited, as this study focuses on mature consumers. Geographically, the respondents reside in Selangor, Kuala Lumpur and Putrajaya in Malaysia, an area with the densest infrastructure (distribution network) for e-waste recycling compared to other geographical areas. Based on an a priori power analysis using GPower, the minimum sample size was 55 based on an effect size of 0.15 and a power level of 80% for two predictors. Thus, the sample size for this study consists of 250 respondents. During data cleaning, replies with inconsistent responses and straightlining were removed, and a total of 210 respondents were retained for data analysis. Moreover, the survey instrument, consisting of attitude, subjective norm, and perceived behavioural control items, was adapted from Tonglet et al. (2004), while items for environmental values were adapted from Ofori and Mensah (2022). The variables were measured using the seven-point Likert scale ranging from 'Strongly Disagree' to 'Strongly Agree'. Given that the objective of this study was to evaluate causal relationships and examine the relationships between multiple latent variables (Becker et al., 2023; Sarstedt et al., 2021), Partial Least Squares Structural Equation Modelling (PLS-SEM) using SmartPLS 4 software was used to analyse the data using path analysis and multigroup analysis.

4. Results and Discussion

4.1. Descriptive Analysis

The demographics of the respondents are presented in the Table. It was observed that 60% of the respondents were female, while 40% were male. The largest ethnic group identified was Bumiputra, representing 61% of the sample. Those who identified as Malaysian Chinese comprised 26% of the respondents, and 12% identified as Malaysian Indian.

Table 1: Demographics

Demographics (n = 210)	Total	Percentage (%)
Gender		
Male	85	40
Female	125	60
	210	100
Ethnicity		
Bumiputra	128	61
Chinese	54	26
Indian	26	12
Others	2	1
	210	100
Income		
No income	22	10
Less than RM 1,000	12	6
RM 1,000 - RM 5,000	77	37
RM 5,0001 - RM 9000	58	28
RM 9,001 - RM 13,000	34	16

Demographics (n = 210)	Total	Percentage (%)
RM 13,001 and above	7	3
	210	100
Recycling duration		
Never	33	15.71
Less than 1 year	41	19.52
More than 1 year but less than 3 years	45	21.43
More than 3 years but less than 5 years	42	20.00
More than 5 years but less than 8 years	23	10.95
More than 8 years but less than 11 years	14	6.67
More than 11 years but less than 13 years	3	1.43
More than 13 years	9	4.29
	210	100.00

The most frequently observed income group in this sample earned between RM1,000 and RM5,000, accounting for 37% of the sample. The next most frequently observed income bracket included those who earned between RM 5,001 and RM 9,000, at 28%, representing the middle-income group in Malaysia. Additionally, 16% of the sample earned between RM 9,001 and RM 13,000. Approximately 41% of the sample have been recycling for more than 1 year but less than 5 years. The respondents who have been recycling e-waste for more than 5 years contributed approximately 23% of the sample. Overall, this indicates that a majority of the respondents are not novices in e-waste recycling.

4.2. Measurement Model Analysis

Table 2 presents the results of the reliability and validity analysis performed on the constructs based on the complete, female, and male groups, respectively. Based on the results obtained for Cronbach's alpha and composite reliability, construct reliability is confirmed, where the scores were above the 0.7 threshold value (Hair et al., 2022). Additionally, the outer loadings were above the threshold value of 0.70, indicating reliability for all items except EV1, EV9, PBC1, PBC2, and PBC5, which were then removed (Hair et al., 2022). Moreover, the average variance extracted scores are above 0.50 (Hair et al., 2022), indicating that convergent validity was achieved. Discriminant validity is observed according to the protocols defined by Hair et al. (2022), whereby the heterotrait-monotrait ratio method (HTMT) values are below 0.90 (Refer to Table 3); based on the Fornell-Larcker Criterion—the square root of AVE on the diagonal is higher than values of the inter-construct correlations; and based on cross-loadings—all items are highly loaded on their respective constructs (Appendix 1 and 2).

Table 3: HTMT

	Constructs						
Complete		Att	Beh	EV	PBC	BehInt	SN
	Att						
	Beh	0.164					
	EV	0.569	0.076				
	PBC	0.465	0.362	0.305			
	BehInt	0.335	0.276	0.550	0.530		
	SN	0.599	0.406	0.36	0.733	0.443	
Female	Att						
	Beh	0.231					
	EV	0.544	0.093				
	PBC	0.414	0.417	0.23			
	BehInt	0.418	0.389	0.657	0.534		
	SN	0.592	0.479	0.233	0.815	0.489	
Male	Att						
	Beh	0.145					
	EV	0.616	0.127				
	PBC	0.514	0.308	0.400			
	BehInt	0.236	0.143	0.404	0.526		
	SN	0.630	0.305	0.542	0.652	0.389	

4.3. Structural Model Analysis

The VIF scores (below 3.3) in Table 6 indicate that the data did not possess multicollinearity issues (Hair et al., 2022). Thus, for significance testing, the procedure included bootstrapping with 5,000 resamples (Becker et al., 2023) to ascertain significant relationships. For the complete dataset (n = 210), the results indicate significant relationships for all hypotheses H_1, H_4, H_5 and H_6 except H_2 and H_3. In the female dataset (n=125), only the relationship between SN and BehInt (H3) was not significant ($\beta = 0.067$, $t = 0.445$, $p < 0.05$). The remaining hypotheses - H1, H2, H4, H5, and H6 - were significant. Finally, in the male dataset (n=85), H_1, H_4 and H_5 were significant while H_2, H_3 and H_6 were not significant.

Effect sizes (Cohen, 2013) are divided into large (0.35), medium (0.15), small (0.02). The results indicate a large effect size was observed for EV → Att ($f^2 = 0.406$, $p < 0.05$) across the complete dataset, female dataset, and male dataset. The largest score observed was for the male dataset EV → Att ($f^2 = 0.516$, $p < 0.05$). In the complete dataset, PBC → BehInt ($f^2 = 0.115$, $p < 0.05$) and PBC → Beh ($f^2 = 0.068$, $p < 0.05$) were observed to have small effect sizes. In the female dataset, Att → BehInt ($f^2 = 0.054$, $p < 0.05$), PBC → BehInt ($f^2 = 0.098$, $p < 0.05$), PBC → Beh ($f^2 = 0.067$, $p < 0.05$), and BehInt → Beh ($f^2 = 0.050$, $p < 0.05$) exhibited small effect sizes. In the male dataset, another large effect size was also observed for PBC → BehInt ($f^2 = 0.159$, $p < 0.05$) while a small effect size was observed for PBC → Beh ($f^2 = 0.088$, $p < 0.05$).

Based on the R^2, it was observed in the complete dataset

that BehInt and PBC accounted for 13.2% of the variance in Behaviour in the complete dataset, 18.6% in the female dataset, and 10.9% in the male dataset. Also, Att, SN, and PBC accounted for 25.6% of the variance in BehInt in the complete dataset, 29.2% in the female dataset, and 25.6% in the male dataset. Finally, EV accounted for 28.9% of the variance in Att in the complete dataset, 26.5% in the female dataset and 34.0% in the male dataset. Additionally, based on the Q^2 predict scores (Chin et al., 2020; Shmueli et al., 2019), predictive relevance was established based on the scores obtained, which were greater than zero.

Table 2: Measurement Model Analysis

	Complete			Female			Male		
	Outer Loading	CR	AVE	Outer Loading	CR	AVE	Outer Loading	CR	AVE
Attitude		0.921	0.809		0.925	0.817		0.915	0.798
Att1	0.925			0.925			0.916		
Att2	0.955			0.955			0.948		
Att3	0.898			0.899			0.885		
Att4	0.832			0.832			0.818		
Behaviour		0.917	0.854		0.927	0.873		0.909	0.832
Beh1	0.935			0.938			0.939		
Beh2	0.904			0.926			0.871		
	0.934			0.939			0.925		
Environmental Values		0.942	0.744		0.944	0.754		0.943	0.745
EV1	d			d			d		
EV2	0.840			0.845			0.842		
EV3	0.779			0.745			0.851		
EV4	0.781			0.768			0.816		
EV5	0.891			0.906			0.871		
EV6	0.887			0.928			0.833		
EV7	0.924			0.928			0.919		
EV8	0.922			0.935			0.905		
EV9	d			d			d		
Perceived Behavioural Control		0.88	0.736		0.857	0.699		0.906	0.78
PBC1	d			d			d		
PBC2	d			d			d		
PBC3	0.848			0.81			0.891		
PBC4	0.806			0.768			0.846		
PBC5	d			d			d		
PBC6	0.891			0.878			0.902		
PBC7	0.884			0.882			0.892		
Behavioural Intention		0.94	0.892		0.933	0.882		0.949	0.907
BehInt1	0.953			0.945			0.964		
BehInt2	0.948			0.946			0.953		
BehInt3	0.932			0.926			0.94		
Subjective Norm		0.825	0.85		0.809	0.84		0.856	0.868
SN1	0.908			0.918			0.898		
SN2	0.936			0.915			0.964		

Note: Items labelled 'd' were dropped

Table 6: Structural Model Analysis

Complete									
	Std Beta	**Std Error**	**t-value**	**p-value**	**CI**	**VIF**	**f^2**	**R^2**	**Q^2**
H1: EV → Att	0.535	0.089	6.044	0.000	(0.381, 0.671)	1.000	0.406	0.289	0.272
H2: Att → BehInt	0.100	0.086	1.176	0.120	(-0.04, 0.241)	1.387	0.010		
H3: SN → BehInt	0.105	0.083	1.229	0.110	(-0.027, 0.250)	1.905	0.007		
H4: PBC → BehInt	0.377	0.092	4.141	0.000	(0.219, 0.521)	1.690	0.115	0.256	0.263
H5: PBC → Beh	0.288	0.071	3.945	0.000	(0.168, 0.402)	1.310	0.068		
H6: BehInt → Beh	0.138	0.070	1.915	0.028	(0.019, 0.248)	1.310	0.016	0.132	0.100
Female									
	Std Beta	**Std Error**	**t-value**	**p-value**	**CI**	**VIF**	**f^2**	**R^2**	**Q^2**
H1: EV → Att	0.518	0.097	5.316	0.000	(0.350, 0.668)	1.000	0.361	0.265	0.233
H2: Att → BehInt	0.225	0.100	2.263	0.012	(0.062, 0.392)	1.350	0.054		
H3: SN → BehInt	0.067	0.134	0.445	0.328	(-0.148, 0.291)	2.219	0.002		
H4: PBC → BehInt	0.362	0.136	2.68	0.004	(0.127, 0.573)	1.909	0.098	0.292	0.313
H5: PBC → Beh	0.275	0.082	3.24	0.001	(0.137, 0.409)	1.315	0.067		
H6: BehInt → Beh	0.229	0.09	2.58	0.005	(0.073, 0.369)	1.315	0.050	0.186	0.126
Male									
	Std Beta	**Std Error**	**t-value**	**p-value**	**CI**	**VIF**	**f^2**	**R^2**	**Q^2**
H1: EV → Att	0.566	0.135	4.323	0.000	(0.331, 0.767)	1.000	0.516	0.340	0.310
H2: Att → BehInt	-0.082	0.143	0.476	0.317	(-0.319, 0.156)	1.494	0.004		
H3: SN → BehInt	0.167	0.121	1.281	0.100	(-0.021, 0.375)	1.787	0.018		
H4: PBC → BehInt	0.419	0.129	3.352	0.000	(0.192, 0.614)	1.587	0.159	0.256	0.180
H5: PBC → Beh	0.341	0.134	2.408	0.008	(0.156, 0.520)	1.320	0.088		
H6: BehInt → Beh	0.035	0.139	0.108	0.457	(-0.19, 0.253)	1.320	0.000	0.109	0.061

4.4. Measurement Invariance Assessment (MICOM)

Multigroup analysis allows for the determination of significant differences between two groups (determined a priori) for an identical model (Matthews, 2017). According to Henseler et al. (2016), MICOM must be performed before MGA to confirm the differences are caused by the latent variables and not other factors. There are three steps outlined in MICOM for analysing the 1) configural invariance, 2) compositional invariance, and 3) the equality of composite mean values and variances. The first step involves generating groups based on the categorical variable of interest. In this study, both groups exceeded the minimum sample size of 55 based on the effect size of 0.15 and a power level of 80% for two predictors. The difference in sample sizes between females and males is also not 50% or more.

Step Two involves a three-step procedure to examine the measurement invariance of composite models and determine if there is no measurement invariance, partial, or full measurement invariance. The three steps assess configural and compositional invariance and the equality of composite mean values and variances (Henseler et al., 2016). In the first step, the results indicate compositional invariance has been demonstrated for all constructs. This conclusion is based on the original correlations being equal to or greater than the 5.00% quantile correlations (refer to Table 7). Next, for the two groups, according to the permutation test, the

correlation is significantly different from the empirical distribution (represented by 5.00%), indicating compositional invariance. Following this, compositional invariance is further supported because the mean and variance original difference falls between the lower and upper boundaries of the 95% confidence interval (refer to Tables 8 and 9). Therefore, the results suggest full measurement invariance. In conclusion, the different model estimation parameters are not the result of the distinct content or meaning of the latent constructs comprising the measurement model of any one group (Henseler et al., 2016).

Table 7: MICOM Step 2 Results Report

	Original correlation	Correlation permutation mean	5.00%	Permutation p value
Att	1.000	0.999	0.998	0.907
Beh	0.994	0.994	0.984	0.347
EV	0.999	0.999	0.996	0.647
PBC	0.998	0.998	0.996	0.287
BehInt	1.000	1.000	0.999	0.959
	0.994	0.997	0.989	0.140

Table 8: MICOM Step 3a Results Report

	Original difference	Permutation mean difference	5.00%	95.00%	Permutation p value
Att	0.209	0.008	-0.222	0.239	0.077
Beh	-0.015	0.008	-0.222	0.235	0.431
EV	-0.004	0.010	-0.223	0.228	0.452
PBC	0.107	0.010	-0.222	0.242	0.238
BehInt	0.043	0.004	-0.221	0.233	0.379
SN	-0.083	0.008	-0.210	0.252	0.263

Table 9: MICOM Step 3b Results Report

	Original difference	Permutation mean difference	5.00%	95.00%	Permutation p value
	-0.291	-0.008	-0.551	0.520	0.231
Beh	-0.121	0.019	-0.378	0.402	0.306
EV	0.010	0.001	-0.595	0.567	0.512
PBC	-0.329	-0.006	-0.363	0.346	0.068
BehInt	-0.127	0.008	-0.363	0.375	0.268
SN	0.012	0.002	-0.343	0.336	0.486

4.5. Multigroup Analysis

Multigroup The multigroup analysis was performed using four approaches comprising the permutation test (Chin & Dibbern, 2009), bootstrap MGA (Henseler et al., 2009), parametric test (Keil et al., 2000), and the Welch–Satterthwaite test (Henseler et al., 2016). According to Hair et al. (2023), the four tests assess the path coefficient differences between the two groups. In all four tests, significant differences are observed between females and males in the relationship between attitude and behavioural intention (p-value < 0.05) (Refer to Table 10). Thus, H7b is accepted. The females were observed to hold positive and significant attitudes towards e-waste recycling intention, while attitude was not a significant factor influencing the male recycling intention. The rest of the hypotheses, H7a, H7c, H7d, H7e, and H7f, were rejected, indicating a lack of a gendered effect.

According to Ajzen & Fishbein (2002), attitude, subjective norm, and perceived behavioural control determine the individual's intention to perform a behaviour. Over time, attitude, subjective norm, and perceived behavioural control can experience change given the evolving nature of an individual's perception of their behaviour, their environment, and important others' opinions. Even though each construct (i.e., attitude, subjective norm, and perceived behavioural control) is theorised to be a separate construct, each component can correlate with the others based on the individual's perception.

In turn, the individual may perceive the behaviour to also be favourable in the eyes of important others, thus increasing the likelihood with which the individual would want to perform the behaviour. The same is also expected with perceived behavioural control, whereby individuals who possess the capacity to perform a behaviour may develop a more positive attitude towards it (and vice versa). Additionally, Ajzen & Fishbein (2002) assert that in varying behaviours and populations, different TPB constructs can emerge as significant while others do not. When certain constructs arise over others, it indicates that those factors are revealed to be the important drivers of said behaviour in specific populations.

In the results for the complete study, attitude and subjective norm were not significant predictors of behavioural intention. This finding differs from the importance of subjective norm identified for Gen Z in a previous e-waste recycling study, where subjective norm was a significant predictor of behavioural intention (Ang et al., 2023). Furthermore, perceived behavioural control emerged as a key predictor for behavioural intention and behaviour. Based on these results, mature respondents in this study are influenced by control factors rather than attitude or subjective norms. Revisiting the construct of perceived behavioural control, Ajzen (2002) asserts that when individuals possess the required resources and opportunities (e.g., time, skills, money, and cooperation from others) and possess confidence in the ability to perform the behaviour and are able to overcome obstacles, they then exhibit a high level of perceived behavioural control. Thus, this indicates that these mature consumers have the ability, confidence, resources, and opportunity to perform e-waste recycling and can overcome any hindering obstacles. Based on the

respondents' duration of performing e-waste recycling, the evidence suggests that familiarity does contribute to the likelihood of recycling e-waste.

However, the effect sizes for perceived behavioural control for the complete, male, and female sets were observed to be small. Dias et al. (2023) argue that consumer behaviour is infrequently traced back to a single causal factor and many factors are regarded as non-obvious. Consequently, Dias et al. (2023) posit that small effect sizes are an indication of the field's maturity and thus, low effect sizes should be expected. Even when effect sizes are small, further research is needed to determine the importance and practical significance of the factor, as small effects can still have important implications in context.

Table 10: Multigroup Analysis

	Std Beta (F)	Std Beta (M)	Std Beta difference (F - M)	Permutation p-value	Bootstrap MGA p-value	Parametric p-value	Welch–Satterthwaite p-value
H7a: EV → Att	0.515	0.583	-0.069	0.384	0.333	0.333	0.337
H7b: Att → BehInt	0.226	-0.068	0.294	0.047	0.049	0.042	0.048
H7c: SN → BehInt	0.059	0.155	-0.095	0.275	0.300	0.310	0.299
H7d: PBC → Beh	0.267	0.322	-0.055	0.379	0.319	0.356	0.364
H7e: PBC → BehInt	0.364	0.433	-0.069	0.383	0.352	0.361	0.356
H7f: BehInt → Beh	0.232	0.015	0.217	0.074	0.088	0.084	0.095

In a meta-analysis by Ma et al. (2023) comparing TPB evidence in recycling, PBC was observed to produce the most frequent occurrence of mixed results when compared to attitude and subjective norm. PBC also exhibited low explanatory power in the TPB model. Previous studies propose two plausible explanations: firstly, it is possible that PBC consists of multiple dimensions (Cheung et al., 1999; Kraft et al., 2005; Trafimow et al., 2002), and secondly, the influence of PBC weakens when e-waste recycling facilities are unavailable (Kumar, 2019). Trafimow (2002) suggests that control and difficulty (in PBC) should be treated as two separate constructs. The conceptualisation of PBC would benefit from respondent elicitation to gain insight into the behaviour in its context. Therefore, future studies would benefit from the elicitation of factors contributing to understanding difficulty or uncontrollability in e-waste recycling behaviour. As a whole, even though the effect size for PBC was observed to be small, PBC remains an important factor to consider in practical terms, as it provides insight into behavioural barriers.

The results also indicate environmental values to be a significant predictor of attitude, suggesting that consumers may hold pro-environmental values even though it is not reflected through the attitude–intention pathway. Thus, even though attitude and subjective norm were not significant in shaping behavioural intention, this does not imply that the respondents lack pro-environmental values especially since the effect size for environmental values suggest that it is a key predictor in e-waste recycling.

Next, the multigroup analysis results show a gendered effect only in H7b for the relationship between attitude and behavioural intention. The results indicate that females possess a stronger positive attitude towards e-waste recycling compared to males. The significantly different relationship between attitude and behavioural intention (Att → BehInt) due to gender is consistent with evidence from a meta-analysis recycling study by Ma et al. (2023). When observing the female model, environmental values (EV → Att) emerged as the strongest predictor based on the large effect size. Female intention to recycle e-waste appears to be shaped by attitude and perceived behavioural control, while intention and perceived behavioural control lead to behaviour. However, for the male model, two of the most important variables include environmental values (EV → Att) and perceived behavioural control (PBC → BehInt). For males, perceived behavioural control plays a dominant role, leading to intention and behaviour performance. This gendered perspective suggests that e-waste recycling motivation pathways differ between males and females. Congruent with these findings, Fan et al. (2022) also found gender to influence identified, intrinsic, and external motivation to dispose of e-waste.

This observation could be understood through notable differences in female and male responsibilities within a Malaysian household. Women have been reported to spend more time on housework, childcare, laundry, and cooking, while men spend time on food shopping and maintenance. However, in rural Malaysian families, women appear to have the traditional role in household labour (Hossain & Madon, 2022). The differences in gender roles in household responsibilities may mean that throughout an individual's childhood, they may be exposed to attributes that define what appropriate behaviour in each sex is. The child then evaluates their adequacy with respect to their gender schema and matches it to their own personality, attitudes, and behaviours against these prototypes. Conceding to the gender schema then results in the individual regulating their behaviour to conform to the male or female prototypes in a self-fulfilling manner, as espoused in the Gender Schema Theory (Bem, 1981).

This study has some limitations - firstly, the assessment of environmental values was investigated on only one variable, which is attitude. Future studies can consider testing the effects of environmental values on other constructs, such as habit or personal norms. Secondly, PBC should not be measured by using a mixture of reverse and regular items but only unidirectional items (Suárez-Álvarez et al., 2018). Evidence suggests that psychometric properties worsen when reverse-coded items are used with regular items (Carlson et al., 2011; Hughes, 2009; Salazar, 2015; Suárez-Álvarez et al., 2018) and lead to respondent confusion (Sonderen et al., 2013). Additionally, the model fit and the unidimensionality of the construct can be compromised (Suárez-Álvarez et al., 2018). In this study, three PBC items were dropped due to a lack of reliability; however, the total items dropped from the model did not exceed 20% of the model and were within the allowable limit for analysis using PLS-SEM. Therefore, the item removal is regarded as a necessary refinement for model reliability (Hair et al., 2022). Thirdly, subjective norm was measured using only two items, which may affect the predictive validity of the construct. Diamantopoulos et al., (2012) assert that multi-item scales outperform single-item scales and further suggest the use of four items to avoid under identification. Future studies should consider using different operationalizing items to ensure robustness of the measurement. Fourth, the study is cross-sectional, and while it is adequate to capture insight at one point in time, a longitudinal study would be beneficial to ascertain if the perceptions and motivation of consumers change over time with the increasing urgency to address e-waste and reduce or contain the influence of waste debris and improperly treated waste in consumer lives.

5. Conclusions

This study investigates e-waste recycling among mature consumers. Mature consumers play a significant role in waste management practices within their homes, but are rarely the focus of e-waste recycling studies. In this research, the influence of environmental values and the moderating effect of gender were examined using TPB. The full model revealed perceived behavioural control to be a significant factor in shaping e-waste recycling intention and behaviour. The small effect size suggests that other factors beyond those in the TPB model could play an important role in e-waste recycling. While environmental values emerged as an important antecedent to attitude, both females and males exhibit different pathways to intention and behaviour. Females are more likely to develop a positive attitude towards e-waste recycling.

Changing consumer appetites for electrical and electronic goods call for the reevaluation of sustainable supply chains. Distribution channels promoting reverse logistics play an increasingly important role in material circularity. Consequently, it is of great importance to promote e-waste recycling behaviour among consumers to ensure that circular programs can grow and be sustained. At present, the e-waste recycling rates in Malaysia are dismal and needs further improvement. Therefore, based on the findings of this study, a number of practical suggestions are outlined.

Policymakers and local municipal councils could consider different strategies for both genders. Firstly, any communication and promotional messages encouraging the adoption of e-waste recycling through existing distribution networks (e.g., centres and mobile apps) should appeal to the audience's environmental values. This approach addresses both male and female mature consumers due to the significant influence of environmental values in both genders. Highlighting how small actions help to save the environment or contribute to the well-being of nature and natural spaces, or benefit the consumer themselves, would be effective to motivate them into action. Secondly, the full extent of the e-waste recycling distribution channels available to the consumer needs to be communicated more clearly. It is crucial that this information is reinforced repeatedly and widely. The message should focus on promoting participating recycling centres, initiatives and brands where consumers can easily identify and access the distribution network in a convenient manner, which is vital for mature consumers. For example, a regularly updated online site or map that aids the search for the nearest recycling centre or brands that accept end-of-life electronics would be advantageous. Moreover, careful attention needs to be given to highlighting private distribution channels that are more widely available compared to government-run recycling centres. In fact, these private services are a key complementary component in the e-waste recycling network. These private services possess the capacity to modify existing supply chains which may be important given changing consumer needs and shorter electrical device cycles. Specifically, recycling apps, reverse logistics (e.g., electronic shops), and independent waste companies provide essential channels that make recycling easy and convenient for consumers. Moreover, mature male consumers, would respond to having this information readily accessible due to their motivational pathway, which depends heavily on the ability to perform the act of recycling e-waste. Female consumers also respond to this messaging, and additionally, promotional messages emphasizing the benefits of recycling their e-waste and reminders to segregate and deliver their e-waste to recycling centres. The role of the female consumer should not be underestimated, given their prominent role in childcare and household

responsibilities.

Future research should consider looking into a design of a marketing communications campaign and the measurement of its impact by looking into platforms, key opinion leaders and tactics that work for different distribution channels. Specifically for private e-waste recycling distribution channels, investigation into 'loyalty' or repeat behaviour needs further attention which could prove to be a win-win solution for policymakers and consumers, alike.

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Declarations

Ethics Approval and Consent to Participate

Human subjects with IRB approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. This study was approved by the Institutional Review Board of Universiti Teknologi MARA (Approval Number: REC/07/2023 (ST/MR/170), Date: 7 Dec 2023).

Competing Interests / Conflicts of Interest

No conflicts

The authors declare that they have no competing interests.

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Author Contributions

YA: Conceptualization, Methodology, Formal analysis, Writing – original draft.
AF: Writing – review & editing.
All authors have read and approved the final manuscript.

Data Availability Statement

Available upon request

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

AI not used

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Appendixes

Appendix 1: Fornell-Larcker Criterion

Complete	Att	Beh	EV	PBC	BehInt	SN
Att	0.899					
Beh	0.166	0.924				
EV	0.537	0.062	0.863			
PBC	0.415	0.344	0.28	0.858		
BehInt	0.312	0.27	0.515	0.486	0.945	
SN	0.515	0.363	0.311	0.63	0.394	0.922

Appendix 2: Cross Loadings

Complete	Att	Beh	EV	PBC	BehInt	SN
Att1	0.92	0.135	0.529	0.313	0.269	0.447
Att2	0.951	0.179	0.549	0.373	0.303	0.493
Att3	0.893	0.138	0.449	0.392	0.238	0.499
Att4	0.828	0.141	0.388	0.432	0.312	0.415
Beh1	0.193	0.935	0.097	0.351	0.326	0.353
Beh2	0.060	0.904	-0.020	0.210	0.160	0.291
Beh3	0.169	0.934	0.061	0.352	0.222	0.346
EV2	0.467	0.071	0.84	0.221	0.49	0.304
EV3	0.414	0.078	0.779	0.201	0.383	0.222
EV4	0.375	0.113	0.781	0.256	0.482	0.329
EV5	0.508	0.045	0.891	0.258	0.471	0.287
EV6	0.47	0.073	0.887	0.293	0.419	0.274
EV7	0.491	0.003	0.924	0.245	0.439	0.251
EV8	0.501	0.011	0.922	0.219	0.436	0.225
PBC3	0.435	0.256	0.248	0.848	0.385	0.564
PBC4	0.24	0.259	0.162	0.806	0.36	0.453
PBC6	0.351	0.366	0.256	0.891	0.438	0.500
PBC7	0.392	0.287	0.281	0.884	0.474	0.64
BehInt1	0.288	0.256	0.479	0.483	0.953	0.403
BehInt2	0.327	0.232	0.505	0.477	0.948	0.364
BehInt3	0.266	0.278	0.475	0.416	0.932	0.346
SN1	0.55	0.29	0.331	0.537	0.33	0.908
SN2	0.413	0.373	0.250	0.620	0.392	0.936