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Behavioral Reasoning Theory Application on Electronic Waste Recycling and Reuse Decisions: Perspective of Savvy University Graduates in Uganda

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Abstract

The proliferation of electronic waste poses momentous environmental and health risks, particularly in developing countries like Uganda. The study employs the Behavioral Reasoning Theory to investigate the factors influencing electronic waste recycling and reuse decisions among savvy university graduates. The aim was to identify the "reasons for" and "reasons against" that shape electronic-waste recycling and reuse intentions among university graduates in Uganda.

Using a quantitative approach, 212 valid survey questionnaires were collected from savvy university graduates and assessed via Partial Least Squares-Structural Equation Modeling. End outcomes supported all hypotheses, indicating that electronic waste's environmental benefits, personal benefits, and environmental concerns are significant "reasons for" E-waste recycling and reuse. Conversely, electronic waste image barrier, electronic waste risk barrier, electronic waste usage barrier, and electronic waste value barrier are significant "reasons against".

The findings have significant policy implications for public universities in Uganda. Policymakers should focus on promoting green benefits, reducing green obstacles, and creating a supportive environment that fosters a positive attitude towards green adoption. By doing so, public universities can improve their sustainability and environmental performance, contributing to a more environmentally friendly future. The findings offer suggestions for policymakers, educators, and environmental stakeholders, stressing the necessity for tailored interventions that address contextual hurdles and leverage motivational drivers. Recommendations include investing in E-waste infrastructure, promoting awareness campaigns, and incentivizing recycling practices. The uniqueness of this analysis is rooted in its application of BRT to responsible E-waste processing in a developing-country context, offering insights for policymakers and practitioners.

Keywords: Electronic Waste, Behavioral Reasoning Theory, Reuse, Recycling

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Introduction

Electronic waste similarly denoted as e-waste, also waste electrical electronic-equipment (EEE) and digital waste is a leading rapidly expanding solid waste flows globally and endangers people and the planet if mishandled (Singh, 2025; Forti et al., 2020; Ly, Hong & Giao, 2025; Baldé et al., 2024; Chandel et al., 2025). Digital waste is electronic or electrical-related equipment permanently stored, discarded, damaged, spoiled, or no longer used. Electrical-electronic devices comprise several components that contain lethal substances like mercury, cadmium, lead, and even arsenic (Singh, 2025). Several studies have proved they are hazardous. Baldé et al. (2024) highlight that e-waste involves EEE, sub-assemblies, and devices that their holders have previously discarded. Inappropriate disposal of electronic waste through formal incineration or informal burning releases hazardous chemicals into the environment, which have been proven to be linked to cardiovascular and respiratory disease (Chandel et al., 2025). Electronic waste also poses severe threats to the environment whenever discarded in landfills, as substantial metal toxins and particulate matter leak and penetrate the pathway of 'the soil, crop and food', additionally impacting negatively on aquatic organisms (Chandel et al., 2025); and risking human health (Ly, Hong & Giao, 2025).

Meanwhile, recycling electronic waste effectively contributes to combating climate change, as fossil fuels and non-renewable energy are saved during the processing of reclaimed metals compared to virgin ore (Singh & Ogunseitan, 2022). Due to rapid technological advancement, the consumption of electronics has correspondingly increased, thereby raising global electronic waste generation (Chandel et al., 2025). Nguyen et al. (2020) projected that electronic waste would go beyond 50 million metric (MT) tonnes globally by 2030. In contrast, Forti et al. (2020) anticipate that digital waste expansion could surpass 75 million (MT) metric tonnes by 2030. However, in the context of developing nations, such estimates are inaccurate primarily due to unreliable base data (Chandel et al., 2025) and necessitate utmost attention.

To handle waste related management problems, several EEE producers in developed countries set-up digital waste scrap compilation and discarding facilities (Dixit & Vaish, 2013) intended for recycling, repair, reuse, or/and green electronic-tech disposals. Similarly, triggered by the related-challenges to E-

waste disposal (E-waste Policy and Guideline of 2012 and 2016), in 2020, the Uganda government embarked on an ambitious plan of establishing a national collection centre for E-waste to promote re-use and secondly facilitate the recycling of E-waste (NEMA, 2020). However, despite efforts to establish recycling E-waste collection centres, electronic consumers prefer dumping their digital waste in open spaces / landfills and storing and selling (Dixit & Vaish, 2013) to re-using the items.

These scenarios pose serious E-waste management challenges in the short and long run regarding human health and environmental deprivation. Moreover, it negatively impacts the attainment of Sustainable Development Goal 7 (SDG 7) and practices that emphasise social, environmental, and economic sustainability.

Prior studies have primarily captivated regarding grasping the reason in recycling E-waste in general terms environmental protection (Wang et al., 2020) and resource recovery (Sahu et al., 2022). In contrast, Sahu et al. (2022); and Dhir et al. (2021) delved into facilitators and inhibitors of E-waste recycling, and Zhong and Huang (2016) emphasized the person's reluctance to recycle E-waste. Accordingly, it's imperative to recognize the behavioral issues of users that are linked with E-waste recycling and re-use toward ensuring sustainable digital waste management like attitudinal barriers (Wang et al., 2020), lack of awareness around risks (Dixit & Vaish, 2013). As such, drawing from the BRT, the study examines the factors influencing electronic waste recycling and reuse decisions among university graduates.

Literature

Behavioral Reasoning Theory

Dhir et al. (2021) consider BRT an evolving user and consumer behaviour theory intended to broaden numerous behavioural and social aspects linked to consumer intentions. The aim was to identify the "reasons for" and "reasons against" (Westaby, 2005) that shape E-waste recycling and reuse intentions among university graduates in Uganda. BRT supports the relationship between values, typically representing the consumer norms and beliefs, reasons, characteristically defining the drive and restrictions involved, and attitude (Dhir et al., 2021). BRT examines the comparative effects of 'motives against' linked to resistance and 'motives for' that agree to acceptance of actions. Dhir et al. (2021) emphasize that BRT is vital in determining a consumer's cognitive processing behaviour and intentions to engage in an action. The 'motives against' linked to hesitance to E-waste scrap recycling and reuse include the four barriers of risk, usage, image, and value. Meanwhile, 'motives for' are linked to the acceptance of actions, which include environmental and personal benefits. Thus, the study applies the BRT to better understand the behaviours influencing e-waste recycling and reuse.

'Motives for' and digital waste recycling / reuse decisions

E-waste environmental benefits and digital waste recycling decisions

Espinoza et al. (2024) consider ecological advantages as a facet that boosts energy management and efficiency, enhances emission cutbacks, and helps support product lifecycle extensions. Sajid and Zakkariya (2023) state that recycling E-waste eliminates the need to produce unprocessed metals, consequently reducing environmental impacts with safe disposal. Kosarkar and Barthwal (2025) suggest that consumers concerned about environmental benefits often make choices that benefit the environment. Sajid and Zakkariya (2023) opined that E-waste recycling often enables material extractions and hazard mitigation, thereby providing environmental benefits. This will result in reduction in inappropriate disposal of noxious ingredients in electronic devices. Considering the surge, a significant issue surrounding digital waste is improper disposal, causing considerable environmental impacts (Quinto et al., 2025; Fawole et al., 2023), including the release of harmful materials into ecosystem. Indeed, salvaging in the unregulated markets is widespread, especially in emerging markets, and the processes mostly elementary, with non-stringent environmental statute (Borthakur, 2023). Socolof et al. (2005) conducted a study of 20 environmental effects across the life cycles of LCDs and CRTs in computer monitors. Zhong and Huang (2016) executed research to evaluate the ecological influences of electronic waste from processors and televisions, examining two situations: digital waste treatment with no end-of-life disposal and with post-use disposal in China.

Thus,

H1a: *The environmental benefits from electronic waste are positively related to intentions to recycle digital waste.*

E-waste individual benefits with E-waste recycling and re-use decisions

Digital waste comprises treasured metals that are reusable upon recovery through proper recycling (Fawole et al., 2023; Borthakur et al., 2019), resulting in economic gain and encouraging engagement in digital waste recycling. Economic gain remains widely researched in the context of changing customer intentions (Dixit & Vaish, 2013). The basis of recycling and reuse of electronic-waste remains to obtain valuable metals properly besides securely, dispose of unsafe constituents, and avoid environmental risks and improve personal health (Dhir et al., 2021). Undoubtedly, Borthakur et al. (2019) and Espinoza et al. (2024) noted that the likelihood of cash accessibility upon returning outdated electronic products, which can deliver economic benefits, is a clear, financially and lucratively rewarding factor. Moreover, waste

salvaging also associated with community impact, for example it fosters sustainable practices that generate employment (Forti et al., 2020). E-waste recycling remains essential, provided its conducted safely and standardized (Espinoza et al., 2024; Dhir et al., 2021). Digital waste should be restored and reused whenever possible instead of dismantled as a complete product. Hence, 'reasons for' benefits results in appropriate E-waste recycling and reuse. Therefore:

H2a: *The E-waste personal benefits are significantly linked through intentions to recycle Electronic-waste.*

H2b: *Electronic-waste personal benefits are significantly linked through intentions to reuse Electronic-waste.*

E-waste/digital environmental concerns and E-waste re-use decisions

Environmental concerns include consumers' perceptions of mitigating ecological problems (Espinoza et al., 2024; Kosarkar & Barthwal, 2025; Yadav et al., 2022) besides ecological degradation (Forti et al., 2020). E-waste comprises hazardous substances, primarily due to limited expertise in treating the enormous volumes of E-waste generated annually and inadequate recycling technology (Kosarkar & Barthwal, 2025). Cathode Ray Tubes (CRTs) have raised environmental concerns because they are often discarded with other electronics (Socolof et al., 2005). They are found mainly in computer monitors and television sets. They are a significant source of electronic waste, containing toxic constituents such as barium, cadmium, fluorescent powder, and lead, which are released during improper recycling. Radiation exposure, especially from the CRT, monitors damage and mutates the brain tissue and also potentially causes life-threatening damage to the human reproductive system (Socolof et al., 2005). Prior studies have highlighted that environmental and eco-friendly concerns positively relate to intentions, attitudes, and preparedness to engage in pro-environmental behaviour (Kosarkar & Barthwal, 2025). For example, Singh (2025) found that ecological concerns, particularly regarding consumer eco-friendly awareness, are positively related to attitude. Similarly, Dhir et al. (2021) noted that green concerns significantly influence the inclination to recycle and reuse digital waste decisions. Baldé et al. (2024) and Singh (2025) also highlighted green worries about climate crisis significantly affect green aspirations to pay for climate change mitigation people who are willing to finance interventions to mitigate the climate crisis and are concerned about the environment. Kosarkar and Barthwal (2025) confirm that efforts to address conservational concerns promote pro-environmental intentions and are widespread in digital waste recycling and reuse (Kosarkar & Barthwal, 2025; Dhir et al., 2021). Thus:

H3a: *Environmental concerns related to digital waste are linked to the intent to reuse E-waste.*

'Reasons against' and sustainable Recycle and Reuse of digital waste

Electronic-waste image barrier and Electronic-waste recycling decisions

Scholars have underscored the importance of emotional drivers such as hindering consumers or users of devices have negative perceptions and understandings of the aftermath of the process (Wang et al., 2020) product and brand, (Borthakur et al., 2019) or innovations (Kuar et al., 2020). Extant studies have pinpointed complexity, time-consuming, and inadequate service delivery as issues impacting the image barriers to buying groceries online (Borthakur et al., 2019). Similarly, Kosarkar and Barthwal (2025) stated that green reuse and recycling alike might be affected by attributes that create a poor perception, for instance, the hesitation of individuals to engage in recycling, coupled with tasks perceived as problematic. For example, the perceived difficulty of transporting huge digital devices, like fridges and laundry machines, from households to salvaging facilities is regarded as an impediment in the transportation sector. Prior literature has empirically established that 'reasons against' impact consumer intentions unfavorably (Claudy et al., 2015). Also, the negative associations are probable in the E-waste recycling and reuse context. Hence:

H4a: *Electronic/digital waste image barriers are negatively linked with digital waste recycling intents.*

E-waste risk barrier and E-waste recycling and re-use decisions

Risk barrier also serves as one of the critical components of 'reason against' behaviour. Schlezak (2023) stresses that concerns about risk pose a significant barrier to influencing purchasing patterns. Not surprisingly, Kaur et al. (2020) and Jaiswal and Mukti (2024) stated that risk barrier shows a significant but negative association with mobile payment system usage intentions. For instance, theft or the stealing of confidential data from EEEs heightens risk barrier anxiety in decisions involving E-waste recycling and reuse (Sajid & Zakkariya, 2023) and also compromises recovery from obsolete EEEs, such as smartphones and other electrical and tech devices (Kosarkar & Barthwal, 2025). Likely mishandling of the stored data in custody may reflect poorly on the decisions to recycle or reuse E-waste. According to Ajzen (1991), planned behaviour holds that an individual's attitude, perceived control, and community/social norms are three principles that determine a person's intention and behaviour. Environmental attitude is caring about the environment or being concerned about environmental issues (Sthiannopkao & Wong, 2013), which is influenced by behaviour. Raising awareness and green education

amongst consumers and E-waste players is crucial to addressing E-waste challenges (Sthiannopkao & Wong, 2013), with risk behaviour driving sustainable consumer behaviour. According to Sajid and Zakkariya (2023), consumer awareness of risk barriers will help authorities and producers take the necessary steps to advance the 3 Rs—recycle, reuse, and reduce—the methods of waste disposal.

Thus:

H5a: *Perceptions of barriers to e-waste risk negatively impact and lower E-waste recycling intentions.*

H5b: *Perceptions of barriers to e-waste risk negatively impact and lower E-waste reuse intentions*.

E-waste usage barrier and E-waste recycling and re-use decisions

The inconveniences associated with innovations affect their use and, consequently, become barriers (Jaiswal & Mukti, 2024; Ongondo et al., 2011; Kaur et al., 2020). Similarly, increased task particulars and their complexity decrease individuals' willingness to perform (Jaiswal & Mukti, 2024). For instance, Jaiswal and Mukti (2024) revealed a negative linkage amongst the usage barriers in addition to intent. Scholars (Sajid & Zakkariya, 2023; Yadav et al., 2022) stress that innovations that oppose customers' representative values, practices, and traditions will affect adoption, as individuals will not positively perceive them. Considering digital waste recycling and reuse decisions (Ongondo et al., 2011; Sajid & Zakkariya, 2023) stress that improving convenience in using an innovation positively influences the consumer's behavioural intention to recycle and reuse it. Therefore, the usage barrier is crucial regarding the 'reasons against' aspect. Thus:

H6a: *Perceptions of e-waste use negatively affect electronic-waste recycling intents.*

H6b: *Perceptions of electronic-waste use negatively affect electronic-waste reuse intentions.*

Electronic-waste value barrier and Electronic-waste reuse decisions

A value barrier is also a vital component of 'motives against'. For instance, when customers observe that proper and formal salvaging and reuse of digital waste entail additional costs, the shoppers' preparedness to participate in the E-waste salvaging process and their desire to reuse will likely be negatively affected (Quinto et al., 2025). Indeed, Yadav et al. (2022) and Sajid and Zakkariya, (2023) ascertained that the charge of recycling digital waste negatively impacts consumers' recovery intentions and consumption levels. Yadav et al. (2022) emphasised that the perception of value barrier is related to the economic value added by purchasing patterns. Similarly, Baldé et al. (2024) found that the perceived value barrier was negatively related to purchase intentions and decisions. Thus:

H7a: *The perceived low value of E-waste negatively impacts E-waste reuse intentions.*

Methodology

Survey instrument and collection of data

The study utilized a cross sectional descriptive research with a quantifiable process. Descriptive investigation gathers information about a population or phenomenon as reported by participants (Creswell & Zhang, 2009). The cross-sectional design offers snapshot data from the field, and the quantitative approach enables standardized data collection for statistical comparison. However, since the study is considering all intents at a single point, causality or real behavior can't be established (Creswell & Zhang, 2009). Study hypotheses were tested using a cross-sectional survey of 667 graduates from 2021 to 2024. Information was obtained from the faculty.

The study population comprised all individuals meeting specified criteria (Mugenda & Mugenda, 2003). Data collection was conducted through a questionnaire survey (Details obtainable in the Appendix A) administered to IT-savvy university graduates. The sample size of 246 was determined by means of Krejcie and Morgan's (1970) table, and convenience sampling procedure was employed to select IT-savvy graduates who pursued Information Technology (IT)-related university programs. However, this approach has limited generalizability. Sampling refers to the process of selecting subjects or cases for inclusion in the sample (Mugenda & Mugenda, 2003). The unit of analysis was the individual graduates who completed IT-related programs at MUBS, but Makerere University degrees. Roscoe (1975) recommends a sample size of 30 to 500 for further consideration.

Of the 246 in-person distributed questionnaires in a six-month period including on MUBS Alumni's day, 212 were returned as valid and usable. 13.8% non-response rate comprised 34 students who were not accessible during picking of the questionnaires. 86.2% response rate was registered due to a big an appearance of former graduates during the Alumni's day. Non-response of 34 respondents were from respondents who were not followed-up. According to Table 1, 94 respondents (44.3%) were male and 118 (55.7%) were female, which aligns with the global trend of a higher female population. A total of 141 graduates (55.7%) were aged 21–25, and 46 graduates (21.7%) were aged 26–30, suggesting a high level of technological proficiency. Among the respondents, 124 (58.5%) held the BBC degree and 88 (41.5%) held the BOIM degree, indicating a greater number of BBC graduates. Respondents were guaranteed information would be solely used for academics and treated with the utmost privacy for that purpose.

Table 1. Demographics

Variable	Explanation	Frequency (%)
Gender	Female	118 -(55.7%)
	Male	94 - (44.3%)
Age(bracket)	21 – 25	141 - (66.5%)
	26 – 30	46 - (21.7%)
	31 – 35	12 - (5.7%)
	36 > and above	13 - (6.1%)
Program	BBC degree	124 - (58.5%)
	BOIM degree	88 - (41.5%)

We chose a five-point Likert rating scale to gauge responses related to the study variables. Wu and Leung (2017) state that a Likert scale is preferable for large-scale research involving more than 100 participants. The equal intervals between each option on the Likert scale provide a sense of balance for participants. The scale includes the following choices: "Strongly Disagree," "Disagree," "Neutral," "Agree," and "Strongly Agree", and also had to be assessed for linguistic correctness by three language specialists. The items gauged were used to measure/quantify the motives for and against or the parameters driving E-waste recycling and reuse decisions included barriers such as risk, value, image, usage and, environmental concern (Espinoza et al., 2024) and drivers like environmental or ecological benefits and personal benefits (Espinoza et al., 2024; Dhir et al., 2021). Accordingly, some modifications were effected, with measurement constructs as well as items decisively drawn from existing literature, but largely the BRT model, as publicized in Table 2.

Data analysis

Partial least squares path - structural equation modeling or latent variable was deployed to analyze and assess data, using PLS software (Hair et al., 2019) to test and assess the hypotheses. The data analysis followed a two-stage approach, incorporating together the measurement and structural models to assess the proposed model for E-waste recycling and re-use decisions. In contrast to covariance-based SEM, (Alturki & Aldraiweesh, 2023) PLS-SEM is regarded as more effective for identifying the primary drivers of the dependent variable (Hair et al., 2019). Furthermore, PLS-SEM is an appropriate data analysis technique when normality tests are not available. It also accommodates constructs with as few as 3 indicators and addresses challenges in estimating stable factor scores (Hair et al., 2019). Besides common bias methods test is unnecessary in the study because PLS-SEM was used as it diminished its impact (Alturki, & Aldraiweesh, 2023).

Measurement Model

The measurement model when considering PLS-SEM remains evaluated in item loadings, reliability, internal consistency, convergent as well as, discriminant validity of the instrument items. Construct validity, in addition to internal consistencies considerably exceeding 0.7 are deemed as fitting (Hair et al., 2019). Also, Hair et al. (2019) recommended items with a loading beyond 0.70 retained, while those less than 0.50 dropped. Hair et al. (2019) contend that dropping them increases robustness in both CR and AVE values and thresholds. The consequence dictates the strength of association between loadings and model constructs. Consequently, items such as EEB3, EPB3, EPB5, EEC3, EEC5, ERB4, EWRI3, EWRI4, and EWRI5 in Table 2 were omitted since they were not deemed fit for inclusion in the final analysis.

Cronbach's alpha constant remains important and employed to check the survey instrument's reliability. A value more than 0.7 is adequate. For discriminant validity (Chin, 2009; Hair et al., 2017), as well as, squared root of AVE (Chin, 2009) per construct is superior than all correlation values through other constructs. Convergent validity (Hair et al., 2019), is tolerable once constructs have an AVE of 0.5 and above (Chin, 2009).

In Table 2, the factor scores, alpha value, and construct reliability/scale reliability all stand above required edge of 0.7. The loadings are between .700 – .952, CA between .754 – .928, then CR between .832 – .932, correspondingly, therefore representing suitability for data review. Also, the AVE constructs are beyond .50 but between .564 – .874) thus, a confirmation of adequate convergent validity for further analysis.

Table2: Assessment Model or / Measurement Model

Model variables	Measurement items	Scores/Loadings	CA	CR	AVE
E-waste Environmental Benefits (EEB) (Forti et al., 2020)	**EEB1:** Recycling and re-use E-waste is known for reducing pollusion and protecting the environment.	0.901	0.904	0.928	0.722
	EEB2: Proper E-waste disposal is known for conserving natural resources.	0.917			
	EEB4: E-waste recycling and re-use is known for minimising landfill waste	0.766			
	EEB5: Recycling and reuse of electronics is known for reducing greenhouse emissions of gas.	0.897			
	EEB6: E-waste management is known for protecting biodiversity.	0.751			
E-waste Personal Benefits (EPB) (Dhir et al., 2021; Fawole et al., 2023)	**EPB1:** Recycling E-waste generates income/cash.	0.900	0.904	0.926	0.717
	EPB2: Proper E-waste disposal can create a harmless living atmosphere and space.	0.912			
	EPB4: E-waste recycling can benefit communities.	0.768			
	EPB6: Digital waste recycling & reuse can save money.	0.854			
	EPB7: Recycling digital waste and reuse provides sense of fulfillment.	0.770			
E-waste Environmental Concerns (EEC) (Forti et al., 2020; Yadav et al., 2022)	**EEC1:** Digital waste pollution besides undeterred contamination affects climate change.	0.840	0.891	0.920	0.699
	EEC2: Toxic E-waste chemicals contaminate and harm soils and water.	0.928			
	EEC4: Electronic waste impacts negatively on environmental degradation.	0.907			
	EEC6: Inappropriate digital waste disposal remains posed to impact negatively on future generations.	0.749			
	EEC7: E-waste supervision is a persistent ecological issue.	0.738			
E-waste Image Barrier (EIB) (Borthakur et al., 2019)	**EIB1:** Recycling and E-waste reuse is not perceived as "cool".	0.866	0.870	0.910	0.719
	EIB2: Individuals regard me to be strange for recycling and reuse of E-waste.	0.896			
	EIB3: E-waste recycling and reuse is perceived as time wasting.	0.913			
	EIB4: My community does not value E-waste reuse and recycling.	0.700			
E-waste Risk Barrier (ERB) (Kaur et al., 2020)	**ERB1:** Treatment of electronic waste is risky owing to its toxic components and poses environmental and health risks.	0.794	0.853	0.900	**0.693**

Model variables	Measurement items	Scores/Loadings	CA	CR	AVE
	ERB2: E-waste amenities and services are not safe.	0.868			
	ERB3: Inappropriate E-waste disposal harms people's health and may result in data breaches.	0.838			
	ERB5: E-waste recycling and reuse contains risky chemicals.	0.828			
E-waste Usage Barrier (EUB) (Yadav et al., 2022)	**EUB1:** I do not know how E-waste can be recycled appropriately.	0.737	0.754	0.832	0.564
	EUB2: E-waste recycling facilities and services are not easily accessible.	0.773			
	EUB5: Recycling of E-waste consumers too much valuable time.	0.910			
	EUB6: I do not have proper equipment to recycle E-waste.	0.772			
E-waste Value Barrier (EVB) (Baldé et al., 2024)	**EVB1:** I do not profit monetarily from recycling of digital waste.	0.853	0.902	0.932	0.775
	EVB2: Digital waste recycling is not monetarily rewarding.	0.796			
	EVB3: The E-waste recycling costs is believed to outweigh benefits.	0.931			
	EVB4: I do not view in mind the recycling value of waste deliver monetary benefits.	0.934			
E-waste Recycling Intention (EWRI) (Borthakur, 2023)	**EWRI1:** I anticipate to recycle digital waste soon.	.952	.928	.954	.874
	EWRI2: I plan towards contributing to E-waste recycling programs.	0.951			
	EWRI6: I will motivate peers for E-waste recycling	0.901			
E-waste Reuse Intentions (EWUI) (Borthakur, 2023)	**EWUI1:** I intend to reuse old electronics on every occasion possible.	0.796	0.841	0.894	0.678
	EWUI2: I plan to repair all electronic equipment at my disposal rather than replacing them.	0.774			
	EWUI3: Reuse of E-waste is rather something I feel imperative.	0.850			

Discriminant Validity

An assessment of discriminant validity of the gauged variables remains typically conducted to ensure variables across constructs are unrelated (Chin, 2009). Hence, survey questionnaire elements that gauge those particular constructs ought not to be correlated mutually (Chin, 2009). A more effective indicator of discriminant validity remains that AVE square root is greater or more compared to correlations matrix amongst those constructs or elements besides other model factors (Chin, 2009; Fornell & Larcker, 1981). Accordingly, Table 3 displays AVE square root construct values and / elements sideways the diagonal line greater than the correlations below the diagonal. Henceforth, discriminant validity assessment outcome is accepted/ or passed.

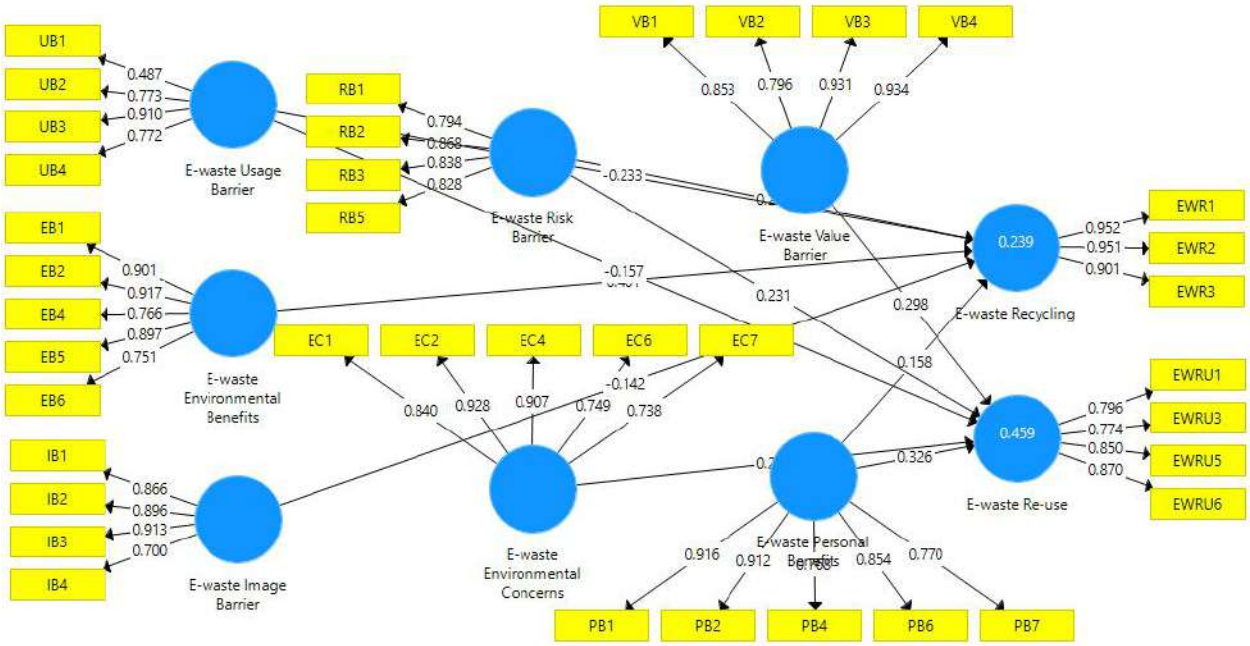
Table 3: Fornell-Larcker Criterion

Model Constructs/ Variables	EEB	EEC	EIB	EPB	EWUI	EWRI	ERB	EUB	EVB
EEB	**0.850**								
EEC	0.632	**0.836**							
EIB	0.457	0.349	**0.848**						
EPB	0.413	0.074	0.692	**0.847**					
EWUI	0.447	0.358	0.529	0.499	**0.823**				
EWRI	0.448	0.192	0.164	0.229	0.347	**0.935**			
ERB	0.329	0.451	0.450	0.217	0.432	0.158	**0.832**		
EUB	0.345	0.435	0.454	0.285	0.331	0.055	0.723	**0.751**	
EVB	0.487	0.217	0.598	0.506	0.554	0.265	0.464	0.424	**0.880**

Note: *EEB – E-waste Environmental Benefits, EEC – E-waste Environmental Concerns, EIB – E-waste Image Barriers, EPB – E-waste Personal Benefits, EWUI – E-waste Reuse Intentions, EWRI – E-waste Recycle Intentions, ERB – E-waste Risk Barrier, EUB – E-waste Usage Barrier and EVB – E-waste Value Barrier. The diagonal indicates AVE square root.*

Structural model

The structural framework and hypothesized model and relationships are evaluated through the beta coefficients. The R-squared values (explained variance) for the endogenous constructs (R^2 values) indicate the total predictive power of hypothesized model. Thus, path coefficients demonstrate the impact of the explanatory on the outcome variable, though the R-squared values reflect the variance explained by the exogenous (independent) latent variables and the total explanatory power of hypothesized or proposed model.



To ascertain the hypothesized model for digital waste recycling and reuse intents, the endogenous factors (EWRI and EWUI), the R-squared value, and the path coefficients resulting from the preceding PLS formula computations are measured and revealed in Figure1 above. The R^2 figures for EWRI and EWUI are .239 and .459, respectively, representing that 23.9% and 45.9% of the variation in the behavioural tendencies for digital waste recycling and reuse. Correspondingly, this is explained by external or exogenous latent factors and with casual model explaining the associations among the constructs in the study. 45.9% suggests a moderate variance by portion hence other factors could be linked to say norms, or even attitude and perceived control in reuse intentions. Similarly, 23.9% signifies less variance an indicator other factors such as awareness dictate recycling intentions. To determine the underlying hypotheses, the research employed bootstrapping to transform the slope coefficients into t-statistics or score, utilized to evaluate the weight of the posited relatedness amongst the exogenous unobserved and dependent (endogenous) underlying factors/ or variables. This triggered the founding of the parameter error margins and t-values reported in Table 4. The cutoff point or benchmark magnitude for t-values (metrics) is 1.96 for backed hypotheses.

Table 4: Path Coefficient, R^2 & t figures for E-waste Behavioural Intentions

Variables	Path Coefficient(β)	t-values	P(2-tailed)	Verdict
H1a: EEB → EWRI	0.461	9.767	0.000	**Supported**
H2a: EPB → EWUI	0.326	7.890	0.000	**Supported**
H2b: EPB → EWRI	0.158	2.451	0.015	**Supported**
H3a: EEC → EWUI	0.233	5.532	0.000	**Supported**
H4a: EIB → EWRI	-0.142	2.494	0.013	**Supported**
H5a: ERB → EWUI	0.231	4.257	0.000	**Supported**
H5b: ERB: → EWRI	0.205	3.584	0.000	**Supported**
H6a: EUB: → EWUI	-0.157	2.707	0.007	**Supported**
H6b: EUB: → EWRI	-0.233	3.162	0.002	**Supported**
H7a: EVB: → EWUI	0.298	6.894	0.000	**Supported**
EWUI - R-Squared (R^2)	**45.9%**			
EWRI - R-Squared (R^2)	**23.9%**			

Note: *Significant at P < 0.05. Also, EPB – Personal Benefits, EEB – Environmental Benefits, EEC: Environmental Concerns, EVB – Value Barrier, EUB – Usage Barrier, ERB – Risk Barrier, EIB – Image Barriers and EWUI – E-waste User Intentions, EWRI – E-waste Recycling Intents.*

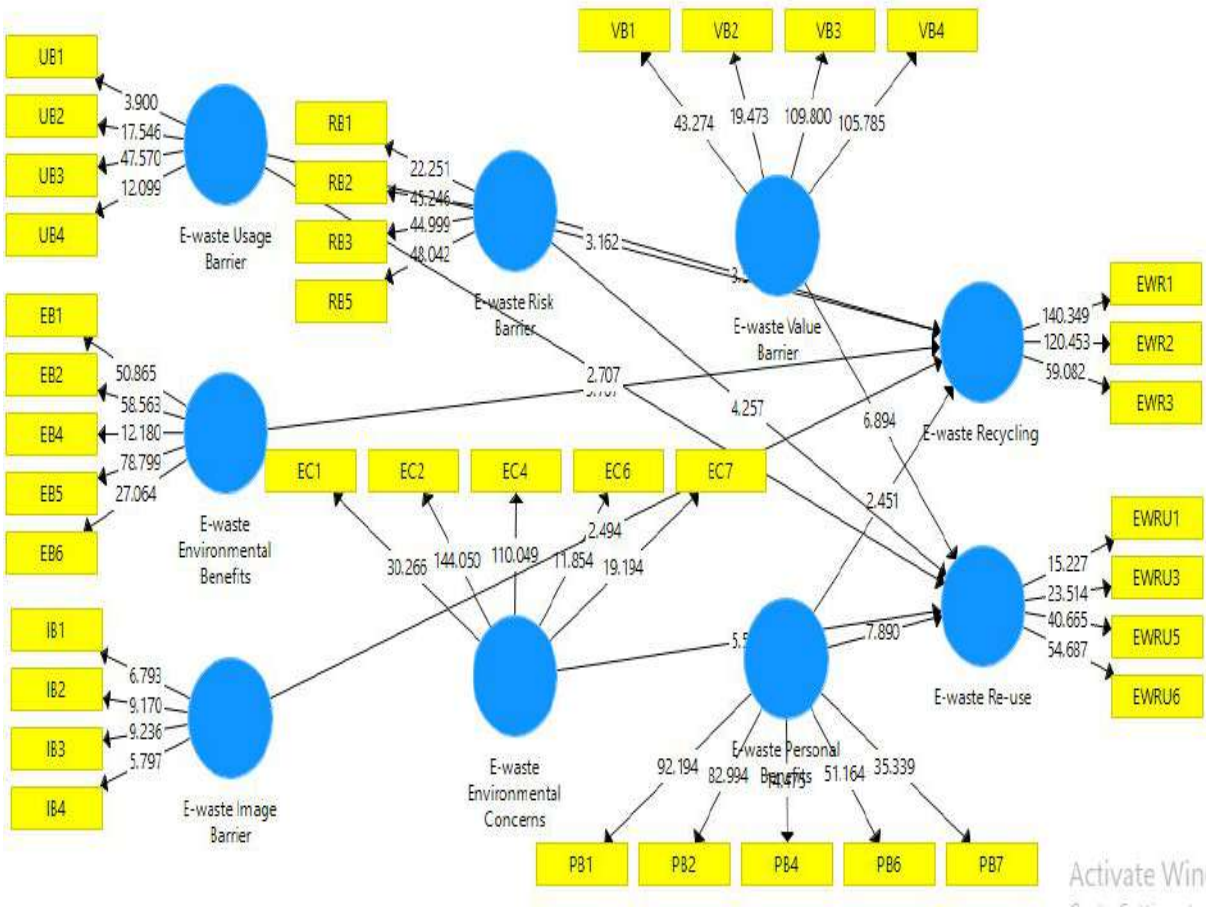


Figure 2: -Structural model-Model fit test

Findings revealed that the relationship between EEB and EWRI (t = 9.767, β = .461, P < .05), EPB and EWUI (t = 7.890, β = .326, P < .05), EPB and EWRI (t = 2.451, β = .158, P < .05), EEC and EWUI (t = 5.532, β = .233, P < .05), and EIB and EWRI (t = 2.494, β = -.142, P < .05), ERB and EWUI (t = 4.257, β = .231, P < .05), showed significance. Also, ERB and EWRI (t = 3.584, β = .205, P < .05), EUB and EWUI (t = 2.707, β = -.157, P < .05), EUB and EWRI (t = 3.162, β = -.233, P < .05), EVB and EWUI (t = 6.894, β = .298, P < .05), were substantially significant. Accordingly, hypotheses H1a-EEB, H2a-EPB, H2b-EPB, H3a-EEC, H4a -EIB, H5a -ERB, H5b-ERB, H6a-EUB, H6b-EUB, and finally, H7a-EVB, all supported. In a nutshell, the outcomes of Electronic waste personal benefits (EPB), E-waste usage barriers (EUB), value barriers (EVB), image barriers (EIB), digital waste environmental benefits (EEB), E-waste

risk barrier (ERB), and E-waste environmental concerns (EEC); fully drive intention for E-waste reuse and recycling.

Discussion

All hypotheses supported, highlighting significant determinants influencing digital waste recycling and reuse intents. Thus, the research's findings point towards supporting the BRT in explanation of electronic/digital waste recycling and E-waste reuse intentions amongst savvy Ugandan university graduates. Specifically, electronic waste environmental benefits, electronic waste personal benefits, and electronic waste environmental concerns are significant "reasons for" E-waste recycling and reuse intentions.

Conversely, electronic waste image barrier, electronic waste risk barrier, electronic waste usage barrier, and electronic waste value barrier are significant "motives against" digital waste recycling and reuse intentions, highlighting the importance of addressing both motivational drivers and contextual barriers. Thus, underscoring BRT's usefulness for explaining E-waste behaviors and highlighting context-specific barriers.

The study applied the Behavioral Reasoning Theory as a baseline for the proposed model to appreciate the electronic/digital waste recycling and reuse behaviour intention. Precisely, the association between motives against and drivers for E-waste recycling and reuse behavioural intents was tested using PLS-SEM, which analysed the developed research model with 212 digitally savvy graduates from a Ugandan public university setting, with all proposed hypotheses supported.

The research results point towards perceived electronic/digital waste recycling environmental benefits including preservation of resources and reduction in pollution, reduction in carbon footprint, reduction of landfill waste and protection of biodiversity, positively impact on recycling intentions. This is congruent with prior research (Forti et al., 2020). With $\beta = 0.461$ in this study and $\beta = 0.420$ regarding a study by (Yadav & Pathak, 2016) where ecological benefits impacted green IT adoption. However, $\beta = 0.461$ suggested a stronger positive impact on reuse intent stressing the importance of environmental benefits. Also graduates who perceived personal benefits such as skill development and saving money through income generation gaining skills, as well as contribution to community well-being, were viewed as more likely to engage to reuse and also recycle digital waste (Fawole et al., 2023).

Besides, digital waste environmental concerns like health risks and pollution and concerns like climate change, toxic chemicals as well as future generations, were found to drive reuse and recycling intentions. This is also congruent with the BRT's premise that values shape behavior (Kosarkar & Barthwal, 2025; Yadav et al., 2022). With $\beta = 0.233$ in this study for EEC and $\beta = 0.350$ regarding a study by (Chan & Bishop, 2013) where ecological concerns predicted intents to recycle significantly. However, $\beta = 0.350$ suggested a stronger positive impact on recycling intent stressing the importance of environmental concerns.

Conversely, regarding E-waste image barrier, social stigma related to recycling of perceived low status of electronic/digital waste and understood to be poor was found to negatively influence intentions, also pinpointing to social stigma related to recycling of digital waste (Kaur et al., 2020; Borthakur et al., 2019). Also, involving electronic/digital waste risk barrier, research found concerns regarding safety and human risks regarding how E-waste is handled reechoing the sightings on risk perceptions (Borthakur et al., 2019; Kaur et al., 2020). Hypothesis H5a and H5b both show positive coefficients for ERB→EWUI and ERB→EWRI ($\beta = 0.231, 0.205$). However, these were hypothesized as negative ("reasons against") probably because perceived risk leads to more cautious decision-making in reuse and recycle intentions. That is having known the risk through possibly persistent awareness, careful consideration in handling the risk is paramount. Other E-waste risk barriers include injuries, toxic chemicals and probable data breaches impact on intention to recycle (Sthiannopkao & Wong, 2013). Moreover, the study also found out that E-waste usage barrier such as inadequate knowledge and information, inconvenience, and lack of recycling facilities access hindered intentions to recycle and reuse aligning with E-waste recycling and reuse resistance due to infrastructure challenges (Sajid & Zakkariya, 2023; Ongondo et al., 2011). Furthermore, E-waste value barrier as a BRT factor found that high costs coupled with limited benefits (Quinto et al., 2025), and perceived low or inadequate monetary value in E-waste lessened reuse and recycling intentions, also congruent with studies on financial motivators of indulging in E-waste (Baldé et al., 2024).

Conclusion

We employed the BRT to recognize the E-waste reuse and recycling intentions amongst university graduates in Uganda. Key findings demonstrate that environmental concerns alongside personal and environmental benefits, drive intentions, whereas value, image, usage, and risk hinder them. Consequently, emphasizing targeted interventions to address both contextual barriers and motivational drivers. The digitally savvy university graduates exhibited heightened awareness about the impact of electronic waste and yet also faced practical and real-world challenges such as scarce recycling infrastructure limiting the effort in E-waste management leading to widespread unregulated unsafe E-

waste practices impacting negatively to the environment and human. Also, on the risk barrier paradox, perceived risks possibly will trigger and improve careful reuse/recycle engagement due to awareness.

Implications and Recommendations for Policy

To start with, following the BRT context, the findings adds to the literature by delivering theoretical action-oriented (behavioural) comprehension of reasons for and against digital waste recycling and reuse. The study too contributes theoretically to the application of BRT to E-waste handling in a developing republic context and use of PLS-SEM to analyse two endogenous outcomes of electronic-waste recycling and reuse in one study. Besides, it informs policy and practice for appropriate handling of digital waste in Uganda.

The findings have displayed numerous implications in E-waste handling in Uganda also beyond with similar contexts. Policymakers should plan those interventions that will leverage personal and environmental benefits while also speaking to handle the barriers to reuse and recycling. Similarly, education and promoting mindfulness around the impacts of electronic-waste as well as encouraging safe and harmless practices can promote recycling intentions. Moreover, expansion of recycling infrastructure countrywide and E-waste collection systems is imperative to overcoming and fixing usage barriers.

Government can incentivize recycling effort by offering tax subsidies and breaks and probably rewards to non-governmental organizations and individuals engaged in E-waste recycling. Government can also integrate management of E-waste into curricula right from elementary classes and launch a public education and awareness campaigns targeting graduates and all youth alike. In addition, collaboration with the private enterprises actors through a Public-Private Partnership is key in the advancement of affordable and eventually accessible E-waste recycling and collection systems. Other recommendations include application of social marketing through social media and popular influencers or champions to encourage positive attitudes toward counter stigma and E-waste recycling, and enforcing existing digital waste regulatory agendas such as Extended Producer Responsibility known for ensuring manufacturers accountability.

Government can operationalize the recommendations by action policy that includes the streamlining of the National E-waste guidelines that remain aligned with global standards, for example, the Basel Convention, where provisions for harmless handling of digital waste, safe recycling plan, and disposal are incorporated in public universities and beyond. Government Ministries, Departments and Agencies mainly in-charge of education, ICT and Parliament can work together to sort out the encounters allied with sustainable digital waste management in the country for a period guided by the Executive.

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Appendix A – Survey instrument

MAKERERE UNIVERSITY BUSINESS SCHOOL
QUESTIONNAIRE

SECTION A:
Gender (Tick against the right gender)

Male	Female

Age Bracket

21 – 25 years	26 - 30 years	31 - 35 years	36 – 40 years	Above 41 years
Tick				

SECTION B:
Please tick below the extent to which you agree/disagree with the statements as applicable to MUBS

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
5	4	3	2	1

	E-waste Environmental Benefits (EEB)	5	4	3	2	1
EEB1	Recycling and re-use E-waste is known for reducing pollusion and environmental protection.					
EEB2	Proper digital waste disposal is known for conserving natural resources.					
EEB3	Proper E-waste disposal is not known for conserving natural					

	resources.					
EEB4	E-waste recycling and re-use is known for minimising landfill waste					
EEB5	Recycling and reuse of electronics is known for reducing greenhouse emissions of gas.					
EEB6	E-waste management is known for protecting biodiversity.					
	E-waste Personal Benefits (EPB)	**5**	**4**	**3**	**2**	**1**
EPB1	Recycling E-waste generates income/cash.					
EPB2	Proper E-waste disposal can create a harmless living atmosphere and space.					
EPB3	E-waste recycling can benefit very communities.					
EPB4	E-waste recycling can benefit communities.					
EPB5	Digital waste reuse cannot save money.					
EPB6	Digital waste recycling can save money.					
EPB7	Recycling digital waste and reuse provides sense of fulfillment.					
	Environmental Concern (EEC)	**5**	**4**	**3**	**2**	**1**
EEC1	Digital waste pollution besides undeterred contamination affects climate change.					
EEC2	Toxic E-waste chemicals contaminate and harm soils and water.					
EEC3	Toxic E-waste chemicals do not contaminate and harm soils and water.					
EEC4	Electronic waste impacts negatively on environmental degradation.					
EEC5	Electronic waste impacts positively on environmental degradation.					
EEC6	Inappropriate digital waste disposal remains posed to impact negatively on future generations.					
EEC7	E-waste supervision is a persistent ecological issue.					
	E-waste Image Barrier (EIB)	**5**	**4**	**3**	**2**	**1**
EIB1	Recycling and reuse of digital waste is not perceived as cool.					
EIB2	Individuals regard me to be strange for the recycling and reuse of digital waste.					
EIB3	E-waste recycling as well as reuse is perceived as time wasting.					
EIB4	My community does not value reuse and recycling of digital waste.					
	E-waste Risk Barrier (ERB)	**5**	**4**	**3**	**2**	**1**
ERB1	Treatment of electronic waste is risky owing to its toxic components and poses environmental and health risks.					
ERB2	E-waste amenities and services are not safe.					
ERB3	Inappropriate E-waste disposal harms people's health and may result in data breaches.					
ERB4	E-waste recycling and reuse do not contain risky chemicals.					
ERB5	E-waste recycling and reuse contains risky chemicals.					
	E-waste Usage Barrier (EUB)	**5**	**4**	**3**	**2**	**1**
EUB1	I do not know how E-waste can be recycled appropriately.					
EUB2	E-waste recycling facilities and services are not easily accessible.					
EUB3	I know how E-waste can be recycled appropriately.					
EUB4	I have proper personal equipment for recycling of digital waste.					
EUB5	Recycling of digital waste consumes excessive valuable time.					
EUB6	I don't have proper equipment to recycle digital waste.					
	E-waste Value Barrier (EVB)	**5**	**4**	**3**	**2**	**1**
EVB1	I do not profit monetarily from recycling of digital waste.					
EVB2	Digital waste recycling is not monetarily rewarding.					
EVB3	The E-waste recycling costs is believed to outweigh benefits.					
EVB4	I do not view in mind the recycling value of waste deliver monetary benefits.					
	E-waste Recycling Intention (EWRI)	**5**	**4**	**3**	**2**	**1**
EWRI1	I anticipate to recycle digital waste soon.					
EWRI2	I plan towards contributing to E-waste recycling programs.					
EWRI3	I do not intend to plan contributing to E-waste recycling programs.					
EWRI4	I will not motivate peers for E-waste recycling					
EWR15	I do not anticipate to recycle digital waste soon.					
EWRI6	I will motivate peers to digital waste recycling intents.					
	E-waste Reuse Intent (EWUI)	**5**	**4**	**3**	**2**	**1**

EWU1	I intend to reuse old electronics on every occasion possible.					
EWU2	I plan to repair all electronic equipment at my disposal rather than replacing them.					
EWU3	Reuse of E-waste is rather something I feel imperative.					