Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014

JOURNAL OF TOURISM, HOSPITALITY AND ENVIRONMENT MANAGEMENT (JTHEM)
www.jthem.com

E-WASTE RECYCLING FOR ENVIRONMENTAL SUSTAINABILITY: MODELLING E-WASTE BEHAVIOR IN MALAYSIA

Nur Batrisyia Nordin [1*], Nurul Hidayana Mohd Noor[2], Mahazril 'Aini Yaacob[3]

[1] Faculty of Administrative Science and Policy Studies, Universiti Teknologi MARA (UiTM), Shah Alam, Selangor, Malaysia
Email: batrisyiaida@gmail.com
[2] Faculty of Administrative Science and Policy Studies, Universiti Teknologi MARA (UiTM), Seremban, Negeri Sembilan, Malaysia
Email: hidayana@uitm.edu.my
[3] Faculty of Administrative Science and Policy Studies, Universiti Teknologi MARA (UiTM), Seremban, Negeri Sembilan, Malaysia
Email: mahazril@uitm.edu.my
[*] Corresponding Author

Article Info:

Article history:
Received date: 14.03.2025
Revised date: 10.04.2025
Accepted date: 27.05.2025
Published date: 19.06.2025

To cite this document:

Nordin, N. B., Noor, N. H. M., & Yaacob, M. A. (2025). E-waste Recycling For Environmental Sustainability: Modelling E-waste Behavior In Malaysia. *Journal of Tourism Hospitality and Environment Management, 10* (40), 217-231.

DOI: 10.35631/JTHEM.1040014.

Abstract:

E-waste, or electronic waste, refers to discarded electronic products that no longer function as intended. Improper management of e-waste disposal can result in environmental pollution and risks to human health. This study aims to identify the determinants of e-waste recycling among the Malaysian public in Negeri Sembilan. The study design uses a quantitative approach, and data was obtained using a questionnaire. The study sample involved 300 respondents who were selected using multi-stage sampling. The final data of 258 respondents were analysed using Parametric Analysis, namely Pearson correlation and multiple regression. The study results showed that policy and regulation, moral obligation, waste sorting knowledge, facility support, and subjective factors significantly influence e-waste recycling. On the other hand, attitude and time availability do not predict e-waste recycling. The study results also found that policy and regulation have the most decisive influence on e-waste recycling. Therefore, the government should enforce laws related to e-waste disposal. For example, mandating people to separate e-waste will ease garbage collectors to bring e-waste to special disposal centres. It can still be seen that many people take recycling for granted, which can save resources, prevent pollution, and contribute to public health. Therefore, policy and regulation are necessary to reduce e-waste dumped into landfills and to prevent pollution due to unsystematic e-waste management.

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014

Keywords:

Determinant, E-waste Recycling, Parametric Analysis, Malaysia Public

Introduction

E-waste is an abbreviation for electrical and electronic waste, also known as electrical and electronic equipment waste, which has been damaged, worn out, or expired (Department of Environment, 2023). The increase in the use of this equipment has contributed to the increase in discarded waste, known as e-waste, and this has become a concern for the global community, including Malaysia (Noor et al., 2023c). E-waste has emerged as one of the fastest-growing types of waste compared to other existing waste categories due to the over-reliance of individuals on electronic devices to increase their daily productivity (Shahabuddin et al., 2023). E-waste will result in harmful effects on the environment and public health if not managed properly. The increase in electronics, coupled with the growing global population, has resulted in a tremendous increase in the generation of e-waste. According to the Transboundary E-waste Flows Monitor report, the world will witness an annual e-waste generation of 74.7 metric tons, marking an annual increase of two metric tons (Mihai et al., 2022). Malaysia faces several challenges in achieving sustainable e-waste management. In 2022, Malaysia collected a large amount of e-waste from households, namely 2657.83 metric tons or 2.65 kilograms (Kg), which recorded a significant increase of 198.32 metric tons from the previous year (Department of Environment, 2023). The recycling rate of Malaysian society is still low despite showing an increase of around 21% in 2017, 24.6% in 2018 (Leoi, 2019), and 28 percent in 2019 (Chu, 2019), far behind European countries, and even behind Asian countries such as South Korea, Singapore, and Taiwan. E-waste management in Malaysia still lacks adequate regulations and controls (Ismail & Hanafiah, 2021).

In 2015, the focus was more on environmental protection than quantity control in e-waste management (Ismail & Hanafiah, 2021). As previously announced by the Ministry of Natural Resources and Environment of Malaysia, no formal system has been established for managing household e-waste (Andeobu et al., 2021). E-waste from the manufacturing industry is only controlled according to the Environmental Quality (Scheduled Waste) Regulations 2005 from production to disposal. The absence of regulations and a structured system for managing household e-waste is a gap that requires urgent attention. Shad et al. (2020) argue that appropriate actions and measures should be taken without comprehensive regulations related to household e-waste. Insufficient commitment from business organizations and private companies in Malaysia to managing and reporting e-waste is one contributor to this issue (Ismail & Hanafiah, 2021). Furthermore, households' absence and lack of e-waste recycling facilities and low participation in e-waste disposal are common issues in developing countries such as Malaysia (Herat, 2021). This situation is an obstacle to moving towards sustainable e-waste management.

Numerous studies have been conducted to study the behaviour and attitudes of the community towards e-waste recycling activities (e.g., Michael et al., 2024). Kassim et al. (2023) used the Theory of Planned Behaviour (TPB) to assess the factors influencing behaviour toward e-waste recycling in Malaysia. The findings suggest that positive attitudes towards recycling, social norms, and perceived behavioural control are significant factors influencing people to recycle e-waste. Noor et al. (2023) found that many consumers expect rewards if they bring their e-

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014
waste to a recycling centre. Moreover, the study also found that information and attitudes significantly influence e-waste recycling. Thus, this study aims to comprehensively review the determinants of e-waste recycling behaviour among the Malaysian public in Negeri Sembilan. In particular, the determinants include policy and regulation, moral obligation, attitude, waste sorting knowledge, facility support, time availability, and subjective norm. Electronic materials, especially gadgets such as smartphones and tablets, are necessary for every individual today. However, in terms of disposal management, it causes a lot of waste and health problems. This is the result of incorrect disposal management. Therefore, this study hopes to raise awareness among relevant parties about the importance of proper disposal of e-waste.

Literature Review

Theory of Planned Behaviour

The theory of planned behaviour (TPB) is proposed by Ajzen (1991). It is the development of the theory of reasoned action (TRA), the conceptual basis that exists as the most important framework in predicting, understanding, and changing human social behaviour. Figure 1 shows three elements that could influence individual behaviour: attitude towards behaviour, subjective norm, and perceived behaviour control. Attitude toward behaviour is the degree to which a person has either positive or negative feelings toward behaviour of interest. An individual's attitudinal response can be measured in terms of whether they are positive or negative towards starting e-waste recycling. The second determinant is characterized by Ajzen (1991) as the level of perception that an individual holds about the level of social power to perform or not perform a behaviour. Subjective norms are considered important by an individual because they advise individuals to perform or not perform a specific behaviour, and the willingness to do or not do something is considered important depending on motivation. According to Vijayan et al. (2023), subjective norms significantly relate to e-waste recycling. The similarity of the TPB with TRA is the conceptual basis, but it adds a new construct, namely, perceived behavioural control, which is a behavioural manifestation of the control view. The effects of two beliefs that influence perceived behavioural control include control beliefs and perceived facilitation (Ajzen, 2020). Control beliefs include expected abilities, resources, and opportunities, while perceived achievement or facilitation results from a given set of outcomes. Ajzen (1991) asserted that intentions to engage in various behaviours could be predicted accurately from attitudes toward the behaviour, subjective norms, and perceived behavioural control. These intentions, as well as perceived behavioural control, also lead to significant differences in actual behaviour. The study will focus on several determinants: policy and regulation, moral obligation, waste sorting knowledge, facility support, subjective norm, attitude, and time availability. The attitude and subjective are derived from the original TPB. In addition, we include policy and regulation, moral obligation, waste sorting knowledge, facility support, and time availability as additional variables that could also influence e-waste recycling.

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014

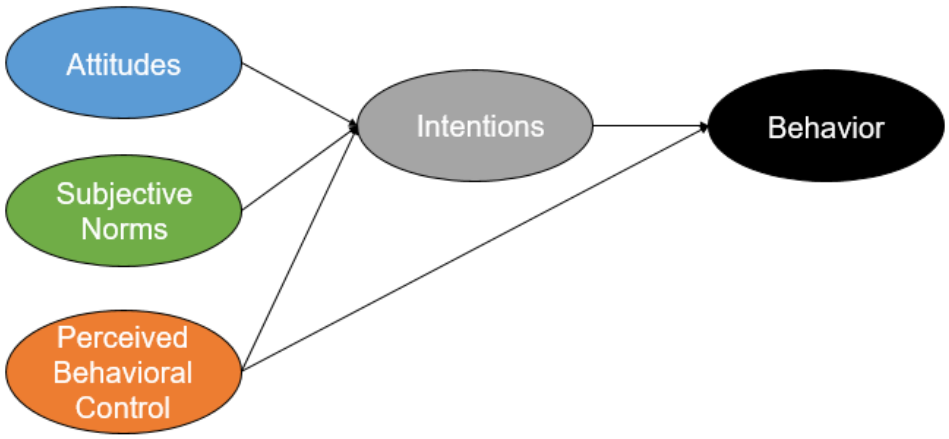

Figure 1: The TPB Model (Source: Ajzen, 1991)

E-Waste

E-waste is electronic products that are old, damaged, outdated, or no longer needed. There are at least nine categories of e-waste, including household e-waste, mainly small appliances and consumer electronics (Shahabuddin et al., 2023). Household e-waste is electrical and electronic equipment that can no longer be used or want to be used and needs to be disposed of, such as old television sets, refrigerators, mobile phones, laptops, air conditioners, washing machines, VCD and DVD players, computers, hair dryers, and projectors (Rautela et al., 2021). In Malaysia, e-waste is known as e-waste and has been listed as one of the scheduled wastes under the Environmental Quality Regulations 2005. E-waste is coded as SW110 as per the First Schedule of the regulations. SW110 or e-waste is defined as waste from electrical and electronic installations that contain components such as accumulators, mercury switches, glass from cathode ray tubes and other activated glass or polychlorinated biphenyl capacitors, or that are contaminated with cadmium, mercury, lead, nickel, chromium, copper, lithium, silver, manganese or polychlorinated biphenyls (Dahan et al., 2024). In addition, e-waste is categorized as scheduled waste because it has characteristics such as flammability, corrosiveness, reactivity, and toxicity (Li & Achal, 2020).

Most e-waste contains toxic and potentially harmful substances, not only to the environment but also to health. Throwing it in e-waste is risky because many electronic and electrical items contain harmful substances (Fawole et al., 2023). For example, Sulphur is found in certain types of batteries and can cause permanent kidney and heart damage. Mercury is found in light bulbs and computer monitors, which can cause muscle weakness, physical developmental disabilities, and memory problems (Fawole et al., 2023). According to a United Nations (UN) report, in 2021, everyone will produce an average of 7.6 kilograms (kg) of e-waste, with a total of 57.4 million metric tons produced worldwide. This situation is worrying because only 17.4 percent of e-waste is reported to be recycled or disposed of in an environmentally friendly manner through Environmentally Sound Management (ESM), which needs to be done together. E-waste must be disposed of properly, and the minor components in electronic and electrical items can be salvaged and reused in new devices or projects (Liu et al., 2023). One of the best ways to dispose of e-waste is by recycling. With the development of technology, disposing of e-waste is no longer difficult. Many eco-friendly companies in Malaysia specialize in disposing of e-waste, and the process is simplified to benefit the entire community. These include UrbanR

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014
Recycle+, SOLS Tech, T-Pot Group, and IPC Recycling & Buy Back Centre. All industry players, corporate bodies, and the private sector must be committed to achieving the Sustainable Development Goals (SDGs) 2030 and environmental, social, and governance (ESG) practices to ensure holistic e-waste management.

Determinants of E-Waste Recycling

Electrical and electronic waste, or e-waste, is one of the fastest-growing pollution problems worldwide due to various toxic substances that can pollute the environment and threaten human health if disposal protocols are not managed carefully (Dahan et al., 2024). The increase in e-waste is due to the high demand to produce electrical and electronic equipment from Malaysian consumers. Studies on the management of e-waste in Malaysia should be further expanded to provide awareness of the proper management of electrical and electronic waste. One method to manage e-waste is by recycling (Liu et al., 2023). Recycling can be defined as converting a material into a new material. A plethora of studies have discovered the determinants of e-waste recycling. These include policy and regulation, moral obligation, waste sorting knowledge, facility support, subjective norm, attitude, and time availability.

First, the legal system aims to control all human actions in a society. Various problems will arise if there is no legal system. An Act relating to the prevention, elimination, control of pollution, and improvement of the environment can reduce e-waste (Arya & Kumar, 2020; Noor & Nordin, 2023b). Therefore, the government should enforce laws related to e-waste disposal. In this case, relevant departments such as the Department of Environment should enforce the Law by mandating that people separate daily e-waste so that it is easier for garbage collectors to bring e-waste to special disposal centres. Anyone who does not will be punished and fined. With that, the people will feel afraid and manage e-waste well (Thakur & Kumar, 2022). As supported by past studies such as Nithya et al. (2021) and Shittu et al. (2021), enforced laws can encourage people to manage e-waste. There needs to be a clear and precise legal arrangement regarding the management of e-waste to minimize its negative impact (Shittu et al., 2021). In general, countries worldwide have regulations governing the management of e-waste. Japan has a law on e-waste management called the Law on the Promotion of Electronic Waste and Material Management (Herat, 2021). This Law obliges manufacturers to collect and recycle used electronic goods. Japan also has rules that require electronic stores to accept damaged or obsolete electronic goods from consumers.

Second, moral obligation could be a supporting value system that improves the environment's well-being, including e-waste management (Yadav et al., 2022). Individuals with high moral obligations highlight the importance of maintaining the balance of nature and ecosystems to maintain the continuity of life (Pham et al., 2023). Humans must take care of the environment on this earth, with a clean, well-maintained, and natural environment, then the survival of living beings will be guaranteed (Noor & Nordin, 2023a). A well-maintained environment will prevent natural disasters such as floods, landslides, and forest fires. Therefore, everyone should have a sense of loving the environment. People who love the environment will always take actions that can protect the environment around them (Yadav et al., 2022).

The third factor that could influence e-waste recycling is attitude. Ajzen (1991) defines attitude as the degree to which a person makes good or bad judgments about his or her behaviour. Good attitudes encourage individuals to recycle e-waste as well. Several studies have shown that attitude is important in individual decisions to influence pro-environmental behaviour

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014
(Aboelmaged, 2021; Hamzah et al., 2020). The findings of a study by Dhir et al. (2021) using TPB to understand the factors underlying the actual recycling confirm that specific attitudes influence behaviour. Fourth, the level of environmental knowledge among the public can lead to caring for the environment (Noor et al., 2024). Knowledge is the capacity to acquire, retain, and use information, a mixture of understanding, experience, wisdom, and skills. A study by Hamzah et al. (2020) has shown that assessing the level of sustainability knowledge affects e-waste recycling behaviour. Thus, educators should expose sustainability activities involving recycling activities as early as preschool age because students at an early age are more likely to instil noble values, which will become daily practices in the future (Yahya et al., 2022).

The fifth factor is facility support. Some people keep their e-waste, while others throw them in the rubbish. The public must send e-waste to a registered recycling centre to be appropriately processed (Dutta & Goel, 2021). Among the available e-waste facilities in Malaysia are Sunshine Jelutong, Cheras Modern Market, Bukit Raja Shopping Complex, Precinct 16 Public Market, and Precinct 9 Neighbourhood Complex. The Ministry of Housing and Local Government also plans to establish Drive-Through Recycling Centres (DTRCs) in all shopping centres nationwide to extend the facility to the people. However, most collection centres accept cheap recyclables, making it easier for residents to burn the materials than sell them (Esenduran et al., 2020). Past studies have discovered that the lack of recycling collection centres is why this recycling practice is not widespread (Tutton et al., 2022). Apart from that, some communities do not cooperate when the government carries out this recycling campaign (Dutta & Goel, 2021).

The sixth factor in influencing e-waste recycling is time availability. Among the leading causes and obstacles that cause this recycling practice not to be welcomed is the lack of time, where a few people do not care about this e-waste recycling practice (Ahirwar & Tripathi, 2021; Jabbour et al., 2023). The final factor that could influence e-waste recycling is the subjective norm. Subjective norm is the acceptance and focus on influences such as peers, colleagues, and family members that have a significant impact on individual behaviour (Ajzen, 1991), and studies such as Aboelmaged (2021) and Bhutto et al. (2023) have found subjective norm significantly influence e-waste recycling. Malaysians should realize that waste management is not solely the government's responsibility. They also have a role to play in helping to manage their e-waste well, starting at home. Among the practices that are seen to help reduce e-waste disposal is recycling. Each of us needs to cultivate the practice of recycling as a social norm because it is essential to reduce the destruction and pollution of nature (Nadarajan et al., 2024). Based on the above discussion, this study posited the following hypothesis:

H1: Policy and regulation significantly predict e-waste recycling among the Malaysian public in Negeri Sembilan.
H2: Moral obligation predicts e-waste recycling among the Malaysian public in Negeri Sembilan.
H3: Attitude predicts e-waste recycling among the Malaysian public in Negeri Sembilan.
H4: Waste sorting knowledge predicts e-waste recycling among the Malaysian public in Negeri Sembilan.
H5: Facility support predicts e-waste recycling among the Malaysian public in Negeri Sembilan.
H6: Time availability predicts e-waste recycling among the Malaysian public in Negeri Sembilan.

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014

H7: Subjective norm predicts e-waste recycling among the Malaysian public in Negeri Sembilan.

Figure 2 portrays the research model for this study.

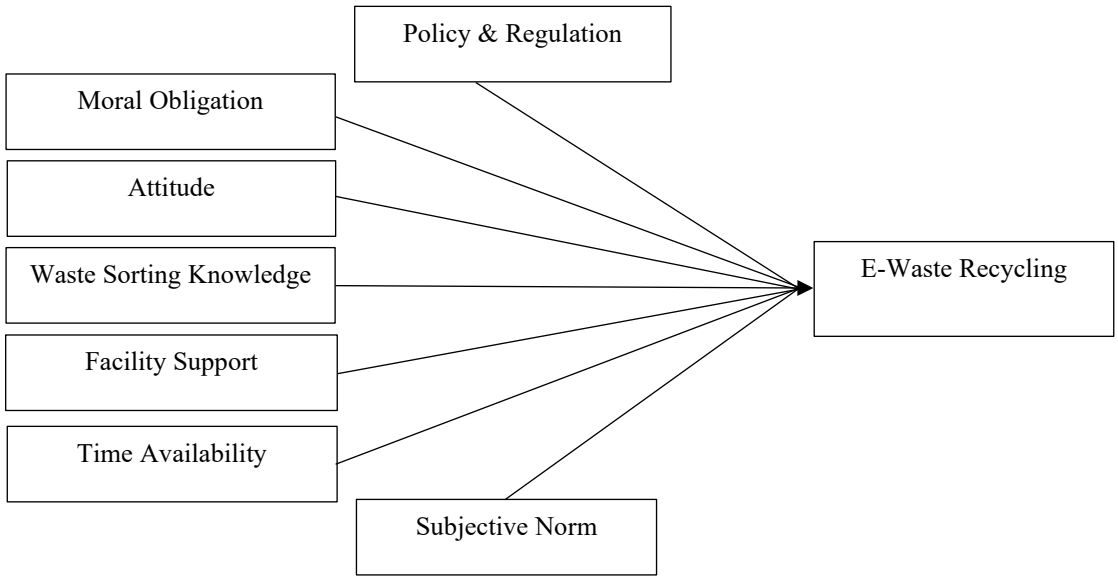

Figure 2: Research Model

Methodology

This study uses a cross-sectional survey design by applying a quantitative approach. The study population is the Malaysian public in Negeri Sembilan. Determining the number of samples needed for the questionnaire survey refers to the theory of Roscoe (1975). According to Roscoe (1975), the eligible sample size in the research is 30 to 500. Thus, 300 respondents have been selected using multi-stage sampling. The first stage begins with cluster sampling, where the researcher clusters the sample into two central districts in Negeri Sembilan, namely Seremban (n=150) and Port Dickson (n=150). Second, the study has employed a convenience sampling. One advantage of convenience sampling is that data can be collected quickly and cheaply. The study data was collected using a questionnaire modified from a questionnaire that had been used. The questionnaire contains three main sections: demographic information, determinants of e-waste recycling (i.e., policy and regulation, moral obligation, attitude, waste sorting, facility support, time availability, and subjective norm), and e-waste recycling.

A Likert scale from 1 to 5 was used. One as strongly disagree and five as strongly agree. The research tool for the variables is adapted from Rakhmawati et al. (2023). Before all hypotheses are assessed, the researchers need to conduct data normality tests to identify whether the data being analyzed has extreme data and meets the characteristics of normal data distribution or vice versa. The normality test is conducted by examining the skewness and kurtosis values. According to Kline (2005), skewness values must fall between -3 and +3, and kurtosis values must fall between -10 and +10. Next, to determine an instrument's usability, it is necessary to implement the reliability test. The study's reliability level can be determined by interpreting Cronbach's Alpha value. Cronbach's Alpha value has a range between 0.00 to 1.0. The reliability level is good and high if the range value is close to 1.0. This study achieves reliability when Cronbach's Alpha value is more than 0.60 (Nunally & Bernstein, 1994). The hypothesis

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014

is then evaluated using Pearson correlation. It is a statistical technique used to evaluate the presence or absence of a relationship and the direction of the relationship between two or more variables. Finally, regression analysis is employed to test a cause-and-effect relationship analysis.

Findings

Demographic Profiles

The respondent's background information that has been collected is analysed using descriptive analysis involving frequency and percentage. Based on Table 1, most of the respondent are female with 192 respondents (74.4%) and the rest is male with 66 respondents (25.6%). For the age, most of the respondents are between the age range of 21-25 years, with a total of 161 respondents (62.4%), followed by 18-20 years with a total of 95 respondents (36.8%), 26-30 years with a total of one respondent (0.4%), and one respondent aged between 41–45 years (0.4%). Next, regarding the race group, most of the respondents are Malay with total of 252 respondents (97.7%) and the rest is Bumiputera with total of respondents (2.3%). Of the respondents, 155 of them are from low-income group (60.1%), 87 of the respondents are from middle income group (33.7%) and sixteen respondents are high income group (6.2%). For the level of education, most of the respondent had obtained undergraduate qualifications with 179 people (69.4%). This follows by *Sijil Pelajaran Malaysia (SPM)* with 64 people (24.8%), *Sijil Tinggi Pelajaran Malaysia (STPM)* with 9 respondents (3.5%), foundation with 4 respondents (1.6%), and secondary school level with 2 respondents (0.8%). While for living area, most of the respondents from urban area with 115 respondents (44.6%), followed by semi-urban with 94 respondents (36.4%), and lastly rural area with 49 respondents (19%).

Table 1: Demographic Profile

No.	Profile		Frequency (n)	Percentage (%)
1	Gender	Female	192	74.4
		Male	66	25.6
2	Age	18-20 years old	95	36.8
		21-25 years old	161	62.4
		26-30	1	0.4
		41-45	1	0.4
3	Race Group	Malay	252	97.7
		Bumiputera	6	2.3
4	Monthly Income	Low Income	155	60.1
		Middle Income	87	33.7
		High Income	16	6.2
6	Level of Education	Secondary School	2	0.8
		SPM	64	24.8
		STPM	9	3.5
		Foundation	4	1.6
		Undergraduate	179	69.4
7	Living Area	Rural	49	19.0
		Semi-urban	94	36.4
		Urban	115	44.6

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014

Normality and Reliability Tests

Table 2 shows the normality and reliability results for all variables. The skewness and kurtosis value for e-waste recycling behaviour (Skewness=-0.479, Kurtosis=-0.476), policy and regulation (Skewness=-0.286, Kurtosis=0.068), moral obligation (Skewness=-0.821, Kurtosis=0.635), attitude (Skewness=-0.821, Kurtosis=0.635), waste sorting knowledge (Skewness=-0.289, Kurtosis=-0.328), facility support (Skewness=1.011, Kurtosis=0.903), time availability (Skewness=1.011, Kurtosis=0.903), and subjective norm (Skewness=-0.181, Kurtosis=0.179) were within the required range. Next, Cronbach's Alpha for e-waste recycling behaviour (α=0.689), policy and regulation (α=0.898), moral obligation (α=0.892), attitude (α=0.896), waste sorting knowledge (α=0.903), facility support (α=0.930), time availability (α=0.669), and subjective norm (α=0.906), which all variables were acceptable and high. In summary, all variables fulfil the goodness of measures.

Table 2: Normality & Reliability Results

Variable	Mean	SD	Skewness	Kurtosis	Cronbach's Alpha
E-Waste Recycling Behaviour	3.8052	0.79493	- 0.479	0.476	0.689
Policy and Regulation	3.7926	0.75477	-0.286	0.068	0.898
Moral Obligation	4.1647	0.71088	-0.821	0.635	0.892
Attitude	4.1647	0.71088	-0.821	0.635	0.896
Waste Sorting Knowledge	3.2645	0.99587	-0.289	-0.328	0.903
Facility Support	2.5917	0.84945	1.011	0.903	0.930
Time Availability	2.5917	0.84945	1.011	0.903	.669
Subjective Norm	2.9884	0.93560	-0.181	0.179	0.906

Pearson Correlation Analysis

Based on Table 3, the finding shows that there is a positive correlation between policy and regulation and e-waste recycling behaviour (r=0.380, p=0.000, p<0.05). Then, moral obligation to e-waste recycling behaviour (r=0.225, p=0.000, p<0.05), waste sorting knowledge to e-waste recycling behaviour (r=0.346, p=0.000, p<0.05), facility support to e-waste recycling behaviour (r=0.307, p=0.000, p<0.05), and subjective norm to e-waste recycling behaviour (r=0.225, p=0.000, p<0.05) also shows a positive correlation. While for attitude towards e-waste recycling behaviour (r=0.116, p=0.062, p>0.05) and time availability towards e-waste recycling behaviour (r=0.112, p=0.072, p>0.05) shows a negative correlation. Thus, it shows that the hypothesis for policy and regulation (H1), moral obligation (H2), waste sorting knowledge (H4), facility support (H5) and the subjective norm (H7) is accepted. While for attitude (H3) and time availability (H6) do not have significant relationship towards e-waste recycling behaviour.

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014

Table 3: Pearson Correlation

		E- Waste Recycling
Policy and Regulation	Pearson Correlation	0.380**
	Sig. (2-tailed)	0.000
	N	258
Moral Obligation	Pearson Correlation	0.225**
	Sig. (2-tailed)	0.000
	N	258
Attitude	Pearson Correlation	0.116
	Sig. (2-tailed)	0.062
	N	258
Waste Sorting Knowledge	Pearson Correlation	0.346**
	Sig. (2-tailed)	0.000
	N	258
Facility Support	Pearson Correlation	0.239**
	Sig. (2-tailed)	0.000
	N	258
Time Availability	Pearson Correlation	0.112
	Sig. (2-tailed)	0.072
	N	258
Subjective Norm	Pearson Correlation	0.307**
	Sig. (2-tailed)	0.000
	N	258

Regression Results

R square has a value between 0 - 1 with the provision that the closer to the number one means, the better. The R square value of 0.192 means that the independent variable can explain 19.2% of the spread of the dependent variable. Based on the results in Table 4, the most decisive influence on e-waste recycling behaviour is the waste sorting knowledge (β=0.169, p=0.039), subjective norm (β=0.124, p=0.163), facility support (β=0.070, p=0.263) and lastly moral obligation (β=-0.136, p=0.156). A high beta value for policy and regulation indicates that incentive explains a high degree of e-waste recycling behaviour (β=0.355, p=0.000). This study shows that the strongest predicator is policy and regulation.

Table 4: Multiple Regression

Variables	Beta (β)	Sig. (p)	Tolerance	VIF
Policy and Regulation	0.355	0.000	0.495	2.022
Moral Obligation	-0.136	0.156	0.535	1.868
Waste Sorting Knowledge	0.169	0.039	0.582	1.718
Facility Support	0.070	0.263	0.736	1.359
Subjective Norm	0.124	0.163	0.612	1.635
R^2	0.192			
Adjusted R^2	0.176			
F Change	11.957			
Sig.	0.000			

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014

Discussion

The study results showed that policy and regulation, moral obligation, waste sorting knowledge, facility support, and subjective norm significantly influenced e-waste recycling. On other hand, attitude and time availability do not predict e-waste recycling. The results of the study also found that policy and regulation have the most decisive influence on e-waste recycling. Policy and regulation could provide guidelines or procedures for community to behave environmentally (Arya & Kumar, 2020). The country of Malaysia has a regulation for electronic waste, categorized under the code SW 110, First Schedule, Environmental Quality (Schedule Wastes) Regulations 2005. This regulation ensures that every company that uses electronic components complies with the code SW110 so that the management of the e-waste disposal system can be effectively managed for e-waste produced by any company under the regulation. However, this Act does not enforce household waste and consumer waste. Appropriate action must be considered to improve a matter to meet shortcomings and needs better. To establish a sustainable e-waste management system in Malaysia, developing a comprehensive and strong legal framework for managing e-waste is important. This framework should include guidelines for properly collecting, recycling, and disposing of e-waste and strict action for non-compliance with the regulations (Thakur & Kumar, 2022). In addition, specific regulations that focus on various categories of e-waste, such as household e-waste, industrial, and hazardous e-waste, should be given more profound attention even though several regulations have already been outlined to form a strong foundation for more responsible e-waste management by setting clear standards for all stakeholders involved (Herat, 2021).

As implications, an effective way to encourage effective e-waste management is to actively implement this Extended Producer Responsibility (EPR) concept (Sengupta et al., 2022). The EPR pilot study was already conducted in Langkawi Island in 2022, which aimed to see the best EPR implementation mechanism in the Langkawi Island area, and the results of this study have assisted the Ministry of Local Government Housing in creating a policy and framework for implementing EPR in Malaysia. In this concept, manufacturers and importers are responsible for managing the end-of-life phase of their products. By adopting this EPR, as in other countries, electronic product manufacturers in Malaysia can shift their focus to eco-friendly product design and extend the useful life of electronic devices, thus reducing the overall impact of e-waste on the environment and human health.

Then, there is a need to increase public awareness of the importance of proper e-waste disposal and its impact on the environment and public health. Through these campaigns, the government and non-governmental organizations (NGOs) can interact with the public on the effects of inefficient e-waste disposal and promote a culture of responsibility for environmental sustainability (Hamzah et al., 2020). Increasing the number of efficient collection centers throughout Malaysia, especially in rural areas, is crucial. Ease of access to these collection centers is the key to success in a sustainable environment (Andeobu et al., 2021). In addition, implementing a "door-to-door" collection system could increase waste collection capacity. In addition, the industry and government should promote a standard to harmonize the use of electronics (Sengupta et al., 2022). This means that components, accessories, and replacement materials for various electronic items can be standardized to be used for various purposes. For example, a remote control used at home to watch television can also be used to play other electronic devices such as disc players, radios, and others. This will reduce the need for users to buy multiple remote controls for each electronic device. A single charger can be used to charge mobile phones and laptops. This will help users avoid spending more, reduce the hassle

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014
of carrying these devices everywhere, and directly reduce electronic waste (Almulhim, 2022). In a nutshell, the government or NGOs must carry out environmental campaigns with more aggressive, planned, and systematic implementation so that the objectives, goals, vision, and mission of an environmental program can achieve the desired targets for the environment, especially the practice of recycling discarded goods, including e-waste. It is hoped that Malaysians will appreciate e-waste more as a new resource that can be used as an alternative in a new life process. This is because there is no such thing as waste in the world; it is just a product that does not move. The future generations and the environment will be more secure if natural resources are managed wisely and sustainably. It is time for Malaysians to take responsibility for the waste generated because no one else can do it.

Conclusion

The objective of the study is to examine the determinants of e-waste recycling. The study has delivered new insights into the current literature on environmental management. To achieve a sustainable e-waste management system, a comprehensive legal and policy framework encompassing all aspects of e-waste management is an important starting point. The Extended Producer Responsibility (EPR) model has the potential to bring about positive change by shifting responsibility to producers and importers and providing incentives to encourage environmentally friendly product design. Education and awareness campaigns also play a role in changing public behavior and ensuring that the implementation of these initiatives is achievable. In conclusion, as a reasonable consumer, we should change ourselves and start practicing a more sustainable and responsible way of life using electronic equipment because change starts with us, in line with Lao Tze's saying that a journey of a thousand miles begins with a single step. Therefore, the entire community must work together to overcome the complications of e-waste because if the problem is not solved, humans and the planet cannot achieve a safe and healthy life. The study's limitations can be seen as the sample of this study consists of the Malaysian public in Seremban and Port Dickson only. Therefore, subsequent studies can be conducted with the involvement of other respondents throughout the country to obtain more comprehensive study results. In addition, other factors may have additional effects on the findings of this study. Therefore, future studies should consider other potential factors that affect e-waste recycling.

Acknowledgement

We would like to express sincere gratitude to all participants who contributed to the completion of this article. All of your support and insights were valuable throughout this work.

References

Aboelmaged, M. (2021). E-waste recycling behavior: An integration of recycling habits into the theory of planned behavior. *Journal of Cleaner Production, 278*, 124182.

Ahirwar, R., & Tripathi, A. K. (2021). E-waste management: A review of recycling process, environmental and occupational health hazards, and potential solutions. *Environmental Nanotechnology, Monitoring & Management, 15*, 100409.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.

Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies, 2*(4), 314–324.

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014
Almulhim, A. I. (2022). Household's awareness and participation in sustainable electronic waste management practices in Saudi Arabia. *Ain Shams Engineering Journal, 13*(4), 101729.

Andeobu, L., Wibowo, S., & Grandhi, S. (2021). A systematic review of e-waste generation and environmental management of Asia Pacific countries. *International Journal of Environmental Research and Public Health, 18*(17), 9051.

Arya, S., & Kumar, S. (2020). E-waste in India at a glance: Current trends, regulations, challenges, and management strategies. *Journal of Cleaner Production, 271*, 122707.

Bhutto, M. Y., Rūtelionė, A., Šeinauskienė, B., & Ertz, M. (2023). Exploring factors of e-waste recycling intention: The case of generation Y. *Plos One, 18*(10), e0287435.

Chu, M. M. (2019). *Generating more waste than ever*. Retrieved from https://www.pressreader.com/malaysia/the-star-malaysia/20190730/282157882853917

Dahan, S. M., Omar, W. A. H. W., & Taib, M. Y. (2024). *Disposal of e-waste: Government agencies' perspective.* In AIP Conference Proceedings (Vol. 3023, No. 1). AIP Publishing.

Department of Environment (2023). *Bahagian bahan berbahaya, Jabatan Alam Sekitar*. Retrieved from https://ewaste.doe.gov.my/index.php/ms/infografik/

Dhir, A., Koshta, N., Goyal, R. K., Sakashita, M., & Almotairi, M. (2021). Behavioral reasoning theory (BRT) perspectives on E-waste recycling and management. *Journal of Cleaner Production, 280*, 124269.

Dutta, D., & Goel, S. (2021). Understanding the gap between formal and informal e-waste recycling facilities in India. *Waste Management, 125*, 163-171.

Esenduran, G., Lin, Y. T., Xiao, W., & Jin, M. (2020). Choice of electronic waste recycling standard under recovery channel competition. *Manufacturing & Service Operations Management, 22*(3), 495–512.

Fawole, A. A., Orikpete, O. F., Ehiobu, N. N., & Ewim, D. R. E. (2023). Climate change implications of electronic waste: Strategies for sustainable management. *Bulletin of the National Research Centre, 47*(1), 147.

Hamzah, T. A. A. T., Yahya, A. S. M., & Shafie, A. (2020). Knowledge, attitude, and practices on E-waste recycling among public in Port Dickson. *Pertanika Journal of Social Sciences and Humanities, 28*(4), 2731-2748.

Herat, S. (2021). E-waste management in Asia Pacific region: Review of issues, challenges and solutions. *Nature Environment and Pollution Technology, 20*(1), 45–53.

Ismail, H., & Hanafiah, M. M. (2021). Evaluation of e-waste management systems in Malaysia using life cycle assessment and material flow analysis. *Journal of Cleaner Production, 308*, 127358.

Jabbour, C. J. C., Colasante, A., D'Adamo, I., Rosa, P., & Sassanelli, C. (2023). Comprehending e-waste limited collection and recycling issues in Europe: A comparison of causes. *Journal of Cleaner Production, 427*, 139257.

Kassim, E. S., Hassan, M. F., Nor, F. M., & Lee, T. R. (2023). To recycle e-waste or not: Understanding consumers' intention from the lens of behavioral theories. *Information Management and Business Review, 15*(1 (I) SI), 72-85.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd Ed.). New York, NY: Guilford Press.

Leoi, S. L. (2019). *Malaysia is overflowing with waste, and we're running out of options*. Retrieved from https://www.thestar.com.my/lifestyle/living/2019/07/16/plastic-waste-landfills

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014
Li, W., & Achal, V. (2020). Environmental and health impacts due to e-waste disposal in China–A review. *Science of the Total Environment, 737*, 139745.

Liu, K., Tan, Q., Yu, J., & Wang, M. (2023). A global perspective on e-waste recycling. *Circular Economy, 2*(1), 100028.

Michael, L. K., Hungund, S. S., & KV, S. (2024). Factors influencing the behavior in recycling of e-waste using integrated TPB and NAM model. *Cogent Business & Management, 11*(1), 2295605.

Mihai, F. C., Gnoni, M. G., Meidiana, C., Schneider, P., Ezeah, C., & Elia, V. (2022). A global outlook on the implementation of the Basel Convention and the Transboundary Movement of E-waste. In *Paradigm shift in E-waste management* (pp. 49-75). CRC Press.

Nadarajan, P., Vafaei-Zadeh, A., Hanifah, H., & Thurasamay, R. (2024). Sustaining the environment through e-waste recycling: An extended valence theory perspective. *Aslib Journal of Information Management, 76*(6), 1059-1087.

Nithya, R., Sivasankari, C., & Thirunavukkarasu, A. (2021). Electronic waste generation, regulation, and metal recovery: A review. *Environmental Chemistry Letters, 19*, 1347-1368.

Noor, N. H. M., & Nordin, N. B. (2023a). Reassuring pro-environmental behavior: A goal-framing theory perspective. *Bioresources and Environment, 1*(3), 14-26.

Noor, N. H. M., & Nordin, N. B. (2023b). Environmental Law and policy on domestic waste segregation: Study on the indirect effect of community awareness. *Asian Journal Of Environment, History and Heritage, 7*(2).

Noor, N. H. M., Soleman, N. A. F., & Azuan, A. S. K. (2023c). To recycle or not to recycle? Factors affecting malaysian residents' intention for recycling e-waste. *Malaysian Journal of Social Sciences and Humanities (MJSSH), 8*(2), e002102-e002102.

Noor, N. H. M., Zaini, S. M., Pudin, S., & Sidek, M. S. J. (2024). Environmental sustainability: Mediating effect of environmental knowledge for pro-environmental behavior. *Indonesian Journal of Sustainability Accounting and Management, 8*(1), 230-248.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd Ed.). New York, NY: McGraw-Hill.

Pham, T. T., Lam, T. P. M., Le Dang, H., & Pham, N. T. (2023). Consumers' willingness to pay an environmental fee for e-waste recycling in Vietnam: Integrating the theory of planned behavior and the norm activation model. *Journal of Material Cycles and Waste Management, 25*(5), 2900-2914.

Rakhmawati, T., Damayanti, S., Jati, R. K., & Astrini, N. J. (2023). An extended TPB model of waste-sorting intention: A case study of Indonesia. *Management of Environmental Quality: An International Journal, 34*(5), 1248-1268.

Rautela, R., Arya, S., Vishwakarma, S., Lee, J., Kim, K. H., & Kumar, S. (2021). E-waste management and its effects on the environment and human health. *Science of the Total Environment, 773*, 145623.

Roscoe, J. T. (1975). *Fundamental research statistics for the behavioral sciences* (2nd Ed.). New York, NY: Holt Rinehart & Winston.

Sengupta, D., Ilankoon, I. M. S. K., Kang, K. D., & Chong, M. N. (2022). Circular economy and household e-waste management in India: Integration of formal and informal sectors. *Minerals Engineering, 184,* 107661.

Shad, K. M., Ling, S. T. Y., & Karim, M. E. (2020). Comparative study on e-waste management and the role of the Basel convention in Malaysia, Singapore, and Indonesia: A Way Forward. *Indon. L. Rev., 10*, 63.

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 40 (June 2025) PP. 217-231
DOI 10/35631/JTHEM.1040014
Shahabuddin, M., Uddin, M. N., Chowdhury, J. I., Ahmed, S. F., Uddin, M. N., Mofijur, M., & Uddin, M. A. (2023). A review of the recent development, challenges, and opportunities of electronic waste (e-waste). *International Journal of Environmental Science and Technology, 20*(4), 4513–4520.

Shittu, O. S., Williams, I. D., & Shaw, P. J. (2021). Global E-waste management: Can WEEE make a difference? A review of e-waste trends, legislation, contemporary issues, and future challenges. *Waste Management, 120*, 549–563.

Thakur, P., & Kumar, S. (2022). Evaluation of e-waste status, management strategies, and legislations. *International Journal of Environmental Science and Technology, 19*(7), 6957-6966.

Tutton, C. G., Young, S. B., & Habib, K. (2022). Pre-processing of e-waste in Canada: Case of a facility responding to changing material composition. *Resources, Environment and Sustainability, 9*, 100069.

Vijayan, R. V., Krishnan, M. M., Parayitam, S., Duraisami, S. P. A., & Saravanaselvan, N. R. (2023). Exploring e-waste recycling behavior intention among the households: Evidence from India. *Cleaner Materials, 7*, 100174.

Yadav, R., Panda, D. K., & Kumar, S. (2022). Understanding the individuals' motivators and barriers of e-waste recycling: A mixed-method approach. *Journal of Environmental Management, 324*, 116303.

Yahya, A. S. M., Hamzah, T. A. A. T., & Shafie, A. (2022). Knowledge of E-waste recycling among communities in Selangor, Malaysia. *Southeast Asia: A Multidisciplinary Journal, 22*(1), 5-22.