

A Research Model on Factors Influencing Consumers' Intention to Participate in E-Waste Collection and Recycling Behavior

Nguyen Quynh Lam^{1*}, Lai Kim Anh¹, Bui Minh Kha¹, Nguyen Tran Anh Khoi¹
¹HUTECH University, Ho Chi Minh City, Vietnam

*Corresponding Author

Nguyen Quynh Lam

HUTECH University, Ho Chi Minh City, Vietnam

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Abstract: E-waste has globally become an increasingly urgent issue, particularly in developing countries. Although a lot of studies have been conducted, the key themes and development trends in e-waste research have not yet been fully systematized. Understanding the current state of this field not only helps identify pressing issues but also contributes to shaping new research directions. Following that, the study aims to propose a model of the factors influencing consumers' intention to participate in collection and their recycling behavior toward e-waste. The proposed model incorporates several key factors, including Value, Attitude, Supporting reasons (Environmental Benefits, Personal Benefits), and Opposing reasons (Risk Barriers, Usage Barriers, Value Barriers, and Image Barriers). Additionally, the Intention to Collect is examined to establish a systematic theoretical foundation, thereby contributing to the expansion of the research framework on consumer participation in e-waste collection and recycling.

Keywords: E-waste, e-waste management, consumer behavior, recycling.

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1. PROBLEM STATEMENT

Amidst the rapid advancement of the electronics industry, the escalating demand for technological modernization and automation has precipitated a significant surge in global e-waste generation (Kiddee *et al.*, 2013). Coupled with deficiencies in management practices, flawed policies and intervention measures have contributed to the escalating prevalence of environmental pollution and resource depletion worldwide, particularly in developing nations.

E-waste refers to electrical and electronic equipment, including chips, circuit boards, telephones, computers, televisions, and smart home appliances, that have reached the end of their operational lifespan and are officially eliminated (Frazzoli *et al.*, 2010; Grant *et al.*, 2013). A defining feature of these devices is their truncated product

lifecycle, which precipitates significant waste generation upon obsolescence or replacement by newer iterations. These wastes contain a substantial amount of hazardous substances, including heavy metals such as lead and mercury, toxic chemicals, and persistent organic pollutants (Perkins *et al.*, 2014). This issue poses a significant threat to the environment, all living organisms, and human health (Heacock, Kelly, Asante *et al.*, 2016). Furthermore, a large volume of unrecycled waste leads to resource wastage, negatively impacts the circular economy, and hinders sustainable development in many countries worldwide (Shittu *et al.*, 2021; Tsydenova & Bengtsson, 2011).

However, in developing countries, e-waste issues have never been considered a priority (Shahabuddin *et al.*, 2023), and the implementation of e-waste management practices still faces

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numerous challenges. The primary reason stems from difficulties in identifying and influencing public behavior toward e-waste recycling. Although some countries have started enforcing stricter regulations, recycling behaviors among individuals and organizations remain limited, mainly due to a lack of awareness, inadequate infrastructure, insufficient incentives, or other barriers to participation.

2. RESEARCH OVERVIEW

Based on the information from articles, including author, year of publication, keywords, affiliated organizations, countries, citations, etc., the author employs VOSviewer software to analyze the relationships between studies using the bibliometric analysis method. This method tracks scientific literature based on attributes such as authorship, country, institution, co-citation, and keyword co-occurrence (Van Eck & Waltman, 2013) to identify the situation and research trends.

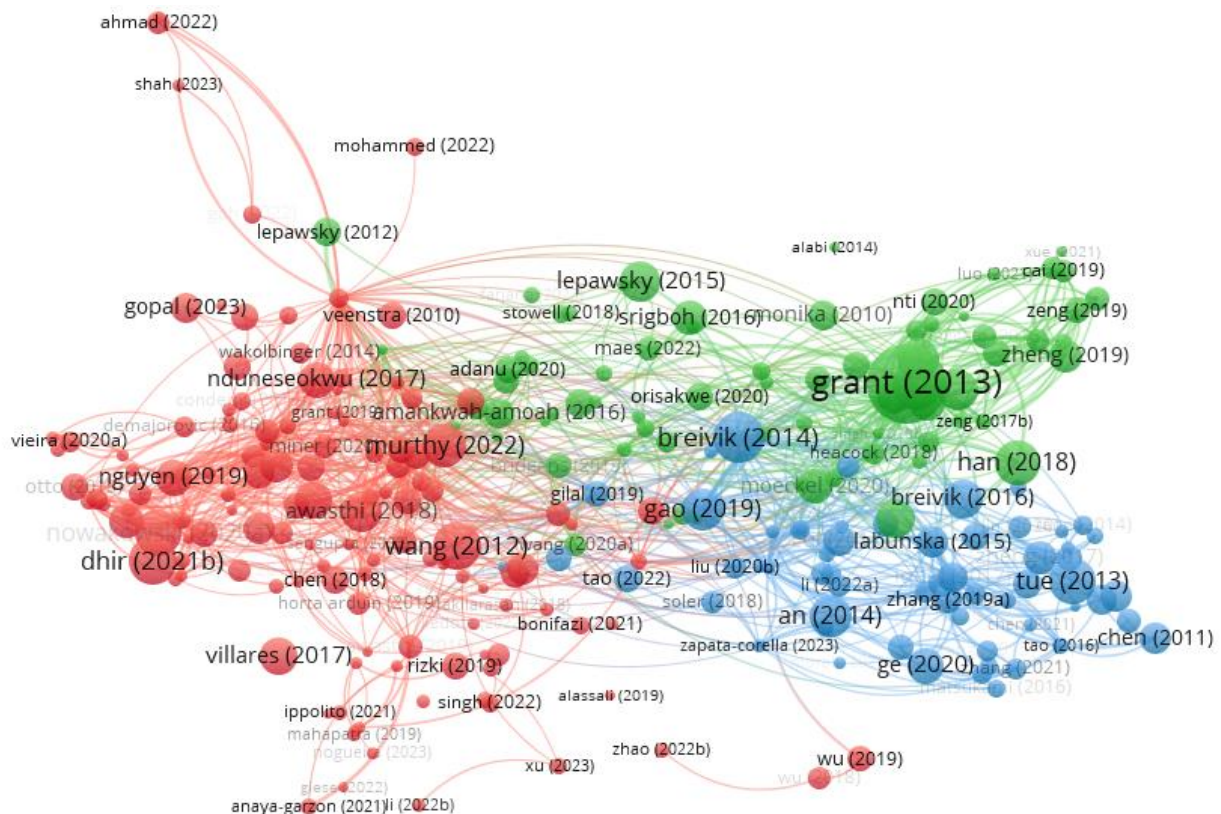


Figure 1: Mapping of Simultaneously Occurring Keywords in the Scopus Database

Current research trends on electronic waste (e-waste) are primarily divided into three major clusters (Figure 1). The Red Cluster consists of studies exploring factors influencing intentions, recovery, and recycling behaviors. These studies focus on identifying both the drivers and barriers to e-waste recovery by applying and developing behavioral intention models such as the Theory of Planned Behavior (TPB) and Behavioral Reasoning Theory (BRT). Several highly cited studies in this research stream include Dhir *et al.*, (2021), Nduneseokwu and Jampala (2023), and Shivnani (2024), among others. The Green Cluster examines the adverse effects of e-waste and global research trends aimed at addressing these issues. These studies analyze the environmental and human health impacts of e-waste. Key influential studies in this area include Grant *et al.*, (2013), Han *et al.*, (2018), and

Lepawsky (2015), which have received significant citations and established strong academic linkages. The Blue Cluster focuses on e-waste treatment and recycling technologies. This research stream primarily investigates the development of e-waste treatment and recycling methods, including innovations in processing technologies to enhance efficiency, reduce pollution, and lower treatment costs. Notable studies in this category include Breivik *et al.*, (2016), Soler *et al.*, (2018), and Zhang *et al.*, (2010), which have contributed significantly to advancements in this field.

This study focuses on exploring the factors influencing intentions, recovery, and recycling behaviors. Electronic waste (e-waste) is becoming an increasingly severe environmental issue, attracting significant global attention, including in Vietnam.

While previous studies have examined the harmful effects of e-waste and various treatment methods, an essential aspect that remains underexplored is the motivations and factors influencing consumers' intentions and behaviors toward e-waste recycling. Therefore, this research aims to provide in-depth insights into consumer behavior change mechanisms, thereby contributing to the development of effective strategies to encourage e-waste collection and recycling.

After reviewing both domestic and international studies, the authors observed that quantitative research on the factors influencing e-waste collection and recycling intentions and behaviors has primarily applied the Theory of Planned Behavior (TPB). Most existing studies focus on motivational factors, such as positive attitudes toward recycling, subjective norms, and perceived behavioral control, while paying little attention to supporting, opposing, and hindering factors that influence consumer recycling behavior. This lack of consideration for opposing and inhibiting factors limits the comprehensiveness and accuracy of explanations regarding actual consumer behavior. In Vietnam, e-waste is becoming an increasingly urgent environmental issue; however, research on e-waste recycling intentions and behaviors remains limited. Domestic studies mainly focus on awareness of e-waste hazards or treatment methods, with few in-depth investigations—particularly those employing the Behavioral Reasoning Theory (BRT). Given these research gaps, the authors recognize significant opportunities for further exploration of the factors influencing e-waste collection and recycling intentions and behaviors. This study integrates two theoretical models—TPB and BRT—to provide a more comprehensive understanding of consumer recycling behaviors. The research primarily adopts BRT as the foundation while incorporating the “Recycling Behavior” factor from TPB to construct a measurement framework for identifying the determinants of e-waste collection and recycling behaviors. The proposed research model includes the following factors: Attitudes; Values; Supporting reasons (Personal benefits, Environmental benefits); Opposing reasons (Risk barriers, Value barriers, Usage barriers, Image barriers); Collection intentions.

3. THEORETICAL FRAMEWORK

3.1 Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB) was developed by Icek Ajzen in 1985 as an extension of the Theory of Reasoned Action (TRA), incorporating Perceived Behavioral Control to explain human behavior in situations where individuals do not have complete control over their actions. TPB posits that an individual's behavior is determined by their

intention to perform the behavior, which is influenced by three key factors: Attitude toward the behavior, Subjective Norms, and Perceived Behavioral Control. This theory has been widely used to predict and explain human behavior, ranging from adoption of new products to lifestyle changes. However, several scholars argue that TPB does not fully explain recycling behavior and suggest that additional variables should be integrated into the model (Boldero, 1995; Davies *et al.*, 2002). Researchers emphasize that understanding why, when, and whether consumers adopt innovations—such as new products or lifestyles—has become increasingly important in this field (Sahu *et al.*, 2020). Several well-established theories, including the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), and the Theory of Planned Behavior (TPB), have been widely applied. However, most of these frameworks focus primarily on factors related to acceptance, while consumer resistance remains largely overlooked (Claudy *et al.*, 2015; Sahu *et al.*, 2020). Previous literature has highlighted that high failure rates of new products and services are often due to a lack of focus on understanding the various reasons behind consumer resistance or barriers to adoption (Antioco & Kleijnen, 2010; Kleijnen *et al.*, 2009).

3.2 Behavioral Reasoning Theory (BRT)

The Behavioral Reasoning Theory (BRT), proposed by Westaby (2005), serves as a theoretical framework that enables scholars and individuals to gain a comprehensive understanding of both supportive reasons and opposing reasons behind behavioral decisions. BRT differs from acceptance-based frameworks, which primarily consider the “reasons” for engaging in an innovation (Sahu *et al.*, 2020). Scholars argue that opposing reasons for resisting an innovation are not necessarily the opposite of supportive reasons (Claudy *et al.*, 2015; Sahu *et al.*, 2020). For instance, high costs and lack of experience can be significant factors discouraging individuals from participating in e-waste recycling. Therefore, a comprehensive understanding of actual consumer behavior cannot be achieved without examining both supportive and opposing reasons. BRT not only enables scholars to distinguish between these two types of reasoning but also helps evaluate their impact on consumer behavior through a unified decision-making framework (Sahu *et al.*, 2020). Furthermore, BRT establishes empirical relationships between values, reasons (both supportive and opposing), attitudes, and behavioral intentions. Due to these advantages, recent studies have indicated that BRT can explain a higher percentage of variance in user intentions compared to other acceptance models (Claudy *et al.*, 2015; Sahu *et al.*, 2020).

4. PROPOSED RESEARCH MODEL AND HYPOTHESES

This study builds upon previous research findings and selectively integrates elements from the Theory of Planned Behavior (TPB) and the Behavioral

Reasoning Theory (BRT). Based on this foundation, the study proposes a research model that examines the factors influencing consumers' intention to participate in e-waste collection and recycling behavior, as illustrated in Figure 2.

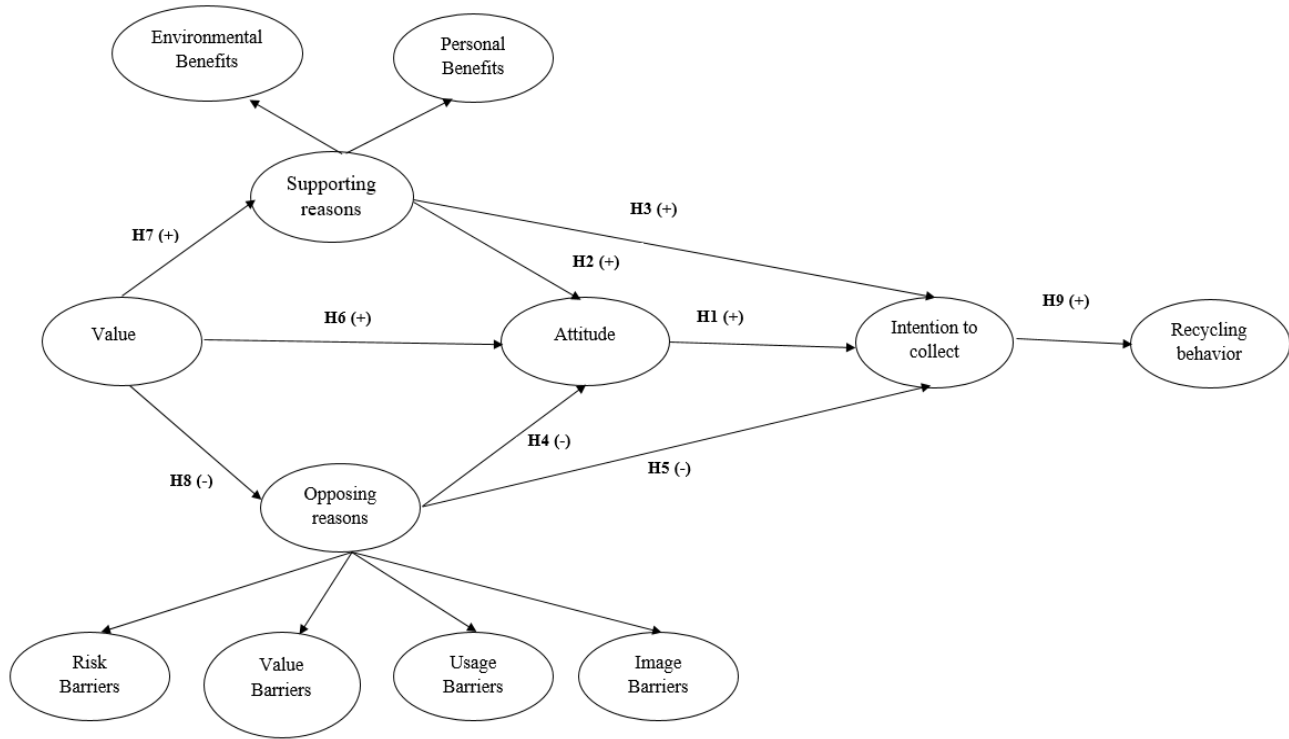


Figure 2: Proposed Research Model

Attitude is defined as the extent to which an individual evaluates their own behavior in relation to a specific outcome (Kumar, 2019). In the context of e-waste recycling, attitude reflects the degree of positive or negative assessment regarding the act of collection and recycling (Jobit & Fawehinmi, 2024). Intention is considered a key predictor of behavior, representing an individual's willingness or desire to perform a particular action (Jobit & Fawehinmi, 2024). According to Delcea *et al.*, (2020), individuals with a positive attitude toward e-waste collection and recycling, especially when perceived as a civic responsibility and an environmentally friendly behavior, are more likely to exhibit a higher intention to engage in e-waste collection.

Hypothesis H1: Attitude has a positive effect (+) on the intention to collect e-waste.

Supportive reasons serve as motivating factors influencing consumer decisions to participate in e-waste recovery and recycling activities (Dhir *et al.*, 2021). Prior studies on e-waste management suggest that supportive reasons include two specific aspects: Environmental benefits and Personal benefits (Dhir *et al.*, 2021; Kassim *et al.*, 2023). Environmental benefits refer to positive impacts of e-waste collection and recycling, such as energy

conservation, pollution reduction, and minimization of solid waste affecting the natural environment (Dhir *et al.*, 2021; Manaktola & Jauhari, 2007). Meanwhile, personal benefits pertain to direct advantages that consumers receive from recycling e-waste, including economic incentives or reduced health risks associated with e-waste exposure (Dhir *et al.*, 2021).

Hypothesis H2a: Environmental benefits have a positive effect (+) on attitude.

Hypothesis H2b: Personal benefits have a positive effect (+) on attitude.

Research by Tandon *et al.*, (2020) highlights that supportive reasons for organic food consumption positively influence consumer intention. This reasoning can be extended to the context of e-waste collection and recycling, where supportive reasons may play a similar role in shaping behavioral intention. Based on this relationship, the following hypotheses are proposed:

Hypothesis H3a: Environmental benefits have a positive effect (+) on the intention to collect e-waste.

Hypothesis H3b: Personal benefits have a positive effect (+) on the intention to collect e-waste.

Oppositional reasons refer to negative factors that create barriers preventing consumers from engaging in specific behaviors, such as e-waste collection and recycling (Sahu *et al.*, 2020). Prior research on e-waste management identifies four key oppositional barriers: Risk barriers; Value barriers; Usage barriers; Image barriers (Claudy *et al.*, 2015; Kassim *et al.*, 2023; Sahu *et al.*, 2020). Risk barriers mainly concern fears regarding personal data or confidential information stored in electronic devices being stolen or misused (Dhir *et al.*, 2021). Value barriers reflect consumer perceptions that the value of recycling e-waste is lower compared to its cost or alternative disposal methods (Kushwah *et al.*, 2019). Usage barriers refer to factors that hinder the adoption and usage of a new technology, product, or service (Lian & Yen, 2014; Talwar *et al.*, 2020). Image barriers relate to users' perceptions of the complexity or difficulty associated with participating in e-waste recycling (Kaur *et al.*, 2020). Oppositional reasons serve as significant barriers that negatively affect both attitude and intention toward e-waste collection (Lian & Yen, 2014; Talwar *et al.*, 2020). Therefore, the following hypotheses are proposed:

Hypothesis H4a: Risk barriers have a negative effect (-) on attitude.

Hypothesis H4b: Value barriers have a negative effect (-) on attitude.

Hypothesis H4c: Usage barriers have a negative effect (-) on attitude.

Hypothesis H4d: Image barriers have a negative effect (-) on attitude.

Hypothesis H5a: Risk barriers have a negative effect (-) on the intention to collect e-waste.

Hypothesis H5b: Value barriers have a negative effect (-) on the intention to collect e-waste.

Hypothesis H5c: Usage barriers have a negative effect (-) on the intention to collect e-waste.

Hypothesis H5d: Image barriers have a negative effect (-) on the intention to collect e-waste.

Values play a crucial role in individuals' decision-making processes, profoundly influencing both their personal life choices and career decisions (Dhir *et al.*, 2021). Existing studies have utilized environmental concerns in e-waste collection and recycling as part of the environmental value component in the BRT model (Dhir *et al.*, 2021; Kassim *et al.*, 2023). Environmental concern is defined as the extent to which consumers are concerned about the degradation of the natural environment (Park & Lin, 2020). Environmental value refers to an individual's fundamental attitude toward environmental protection, which significantly impacts recycling intention through attitude formation (Kassim *et al.*, 2023). Accordingly, the authors propose the following hypothesis:

Hypothesis H6: Values have a positive effect (+) on attitude.

Previous studies show that environmental concern positively influences intention to participate in recycling (Dwivedy & Mittal, 2013). Furthermore, Kassim *et al.*, (2023) highlight that values play a critical role in shaping both supportive and oppositional reasons. Additionally, Kushwah *et al.*, (2019) demonstrate that values—measured through environmental concern—positively impact individuals' willingness to participate in e-waste collection and recycling. Hence, the following hypotheses are proposed:

Hypothesis H7a: Values have a positive effect (+) on environmental benefits.

Hypothesis H7b: Values have a positive effect (+) on personal benefits.

Hypothesis H8a: Values have a negative effect (-) on risk barriers.

Hypothesis H8b: Values have a negative effect (-) on value barriers.

Hypothesis H8c: Values have a negative effect (-) on usage barriers.

Hypothesis H8d: Values have a negative effect (-) on image barriers.

Behavior is a complex concept, influenced by multiple factors. According to the Theory of Reasoned Action (TRA), "behavior is within an individual's volitional control" (Staats, 2004). Ajzen (1991) concluded that intention serves as a crucial predictor of behavior, as it captures the motivational factors influencing an action. A stronger intention leads to a higher likelihood of actual behavior performance (Ajzen, 1991). Prior studies confirm a significant positive relationship between e-waste recycling intention and actual recycling behavior (Abdul Waheed *et al.*, 2023; Delcea *et al.*, 2020; Mohamad *et al.*, 2022). Hence, the authors suggest the following hypothesis:

Hypothesis H9: Intention to collect e-waste has a positive effect (+) on actual recycling behavior.

5. CONCLUSION

Electronic waste (e-waste) has become a significant global issue, posing severe threats to the environment, human health, and sustainable societal development. Addressing this challenge requires comprehensive solutions, including coordinated actions from governments, businesses, communities, and individuals. Understanding the factors that influence and encourage consumer intentions and behaviors in e-waste collection and recycling is crucial. This study develops a theoretical model to analyze the determinants of consumer participation in e-waste collection and recycling behaviors. The findings reveal that, alongside positive factors such as attitude, supporting reasons (environmental and personal benefits), and environmental values, significant barriers such as risk concerns, value conflicts, usability challenges, and social image

perceptions negatively impact consumer engagement in these activities. By integrating the Theory of Planned Behavior (TPB) and the Behavioral Reasoning Theory (BRT), this research highlights that recycling behavior is influenced not only by positive motivations but also by opposing factors, underscoring the necessity of a comprehensive approach in understanding consumer decision-making. The study's findings provide a critical foundation for policy development and strategic communication initiatives aimed at raising public awareness, encouraging consumer participation in e-waste collection and recycling, and ultimately contributing to environmental protection and sustainable development.

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