

# Social Media Influence On Consumer Awareness And Participation In Reverse Logistics For E-Waste Management

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## Abstract:

Electronic waste is among the most rapidly expanding categories of waste. Largely driven by fast technological advancement. E-waste disposal that is not done properly results in serious environmental and health hazards. Reverse logistics provides a systematic method of managing e-waste. However, one of the biggest challenges to this method of waste disposal is the low response of consumers, largely due to a absence of awareness. In this paper assesses the role of social media in increasing awareness among consumers using a quantitative study of 275 participants, based on the Theory of Planned Behavior and Technology Acceptance Model. The results show that consumers who are actively engaged on social media regarding environmental issues are more aware of e-waste and reverse logistics, resulting in positive behavior.

**Keywords:** E-waste management, social media influence, reverse logistics, consumer awareness, sustainable consumption, Theory of Planned Behavior, circular economy

Date of Submission: 21-03-2026

Date of Acceptance: 31-03-2026

## I. Introduction

The proliferation of electronic items in recent times has led to an unprecedented rise in electronic waste. Electronic waste includes computers, mobile phones, televisions, household appliances, among other electronic items. According to the Global E-Waste Monitor 2024 report, a record 62 million tons of E-waste was generated in 2022, representing an 82% rise from 2010. This quantity is expected to increase to 82 million tonnes in 2030. The noxious substances in e-waste, such as lead, mercury, arsenic, and cadmium, are particularly harmful to human healthiness and the environment when they are dumped in landfills. Reverse logistics has emerged as a significant factor in sustainable e-waste management, which facilitates the reverse flow of used electronics for recycling purposes.

The recycling of secondary raw materials, which includes gold, copper, and rare earth, depends on the cooperation of consumers, which has remained a challenge worldwide (Dwivedy & Mittal, 2013). The significant hindrances identified were the low level of environmental awareness, lack of knowledge about the collection points, and lack of motivational factors (Borthakur & Singh, 2017). By the year 2025, the number of active social media users is expected to rise to 5.66 billion, which can be a huge opportunity for passing the message regarding the importance of saving the environment. This study aims to bridge the knowledge gap by developing an integrated conceptual model that includes social media as a significant influencer in shaping consumer behavior regarding reverse logistics for e-waste management as show in Figure 1.

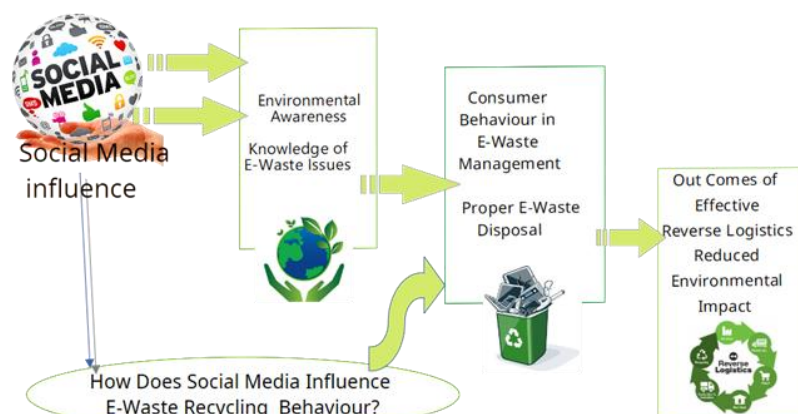


Figure1. The Role of Social E-Waste Reverse Logistics

## **II. Literature Review**

### **The Global E-Waste and Environmental Implications**

The high obsolescence rate of electronic products, driven by the impact of Moore's law, marketing strategies, and the need for novelty by consumers, has resulted in the creation of e-waste as a global environmental concern of unprecedented proportion (Robinson, 2009). The toxicological properties of e-waste are alarming; for example, a cathode ray tube monitor contains 1.4 to 3.5 kilograms of lead, while circuit boards contain cadmium, beryllium, and mercury (Leung et al., 2008). The burning of e-waste releases toxic gases such as dioxins and furans, while the use of acid for leaching leads to soil and groundwater contamination by heavy metals (Grant et al., 2013). In the case of developing countries, the risks are even higher; for example, children may suffer from high blood levels of lead, thyroid hormone disorders, and cancer risks from unregulated e-waste recyclers (Sthiannopkao & Wong, 2013).

### **Reverse Logistics Systems in E-Waste Management**

In the context of e-waste management, reverse logistics refers to the entire process of activities related to the reverse flow of electronic waste from consumers to manufacturers/recyclers/disposal facilities (De Brito & Dekker, 2004). Extended Producer Responsibility (EPR) schemes have been implemented in various countries around the world, making it mandatory for manufacturers to participate in the management of products at the end of their life cycle (Walls, 2006). Some of the legislative measures include the EU's WEEE directive for Europe, Japan's Home Appliance Recycling Law for Japan, and South Korea's Act on Resource Recycling of Electrical and Electronic Equipment for South Korea. Despite the implementation of these measures, the efficiency of the reverse logistics system for the collection of products is still low, which underlines the need for consumer behavioral engagement (Ongondo et al., 2011).

### **Consumer Awareness and Pro-Environmental Behavior**

Consumer awareness is considered a pre-condition to pro-environmental behaviors (Steg & Vlek, 2009). The Value-Belief-Norm Theory states that a chain of values, beliefs, and norms causes the activation of pro-environmental behaviors. The study by Dwivedy and Mittal (2013) indicated that awareness of the method of e-waste recycling and the availability of recycling centers was a predictor of e-waste recycling participation intentions. Borthakur and Singh (2017) indicated that awareness of environmental and health hazards of improper e-waste management was a predictor of e-waste recycling participation intentions.

### **Social Media as an Environmental Communication Tool**

Social media platforms have transformed environmental communication by facilitating swift, interactive, and viral environmental communication beyond the scope of traditional mass media (Lovejoy & Saxton, 2012). Yadav et al. (2019) confirmed the impact of social media engagement on green purchase intentions. Bhattacharya et al. (2021) confirmed the impact of a social media campaign on sustainability as it affected consumer environmental awareness and purchase behaviors. The ways through which social media affects environmental behaviors include information diffusion effects, social norm effects, emotional engagement effects, and advocacy effects.

### **Theoretical Framework**

The study makes use of two established behavioral theories. The Theory of Planned Behaviour (TPB) was developed by Ajzen (1991). It was based on the idea that behavioral intention towards a given behavior is a function of attitude towards the behavior, subjective norms, and perceived behavioral control. The Technology Acceptance Model (TAM) was developed by Davis (1989). It was based on perceived usefulness and perceived ease of use. It was an extension of TPB. The proposed model indicates that the level of consumers' exposure to e-waste content on social media would influence consumer awareness and consumer norms, thereby influencing consumer behavioral intentions towards RL programs. Perceived behavioral control was used both as a predictor and a moderator for consumer behavioral intentions towards RL programs.

### **Research Gap**

Despite well-established literature on e-waste consumer behavior, reverse logistics, and social media environmental communication, there remains a research gap regarding an integrated study on all three concepts. Most past research has focused on the impact of social media on general pro-environmental behavior without considering the element of reverse logistics in e-waste disposal (Yadav et al., 2019; Liu et al., 2020). Other studies examined consumer behaviour regarding e-waste disposal without considering the impact of social media as a major antecedent variable (Islam et al., 2021; Knickmeyer, 2020). This study aims to bridge this gap.

The evolution of global e-waste statistics underscores the urgency for more effective consumer engagement strategies. Baldé et al. (2017) documented a consistent upward trajectory in e-waste volumes,

noting that formal collection and recycling infrastructures remain severely underdeveloped relative to the scale of the problem.

This observation is reinforced by the reverse logistics framework proposed by De Brito and Dekker (2004), which highlights structural deficiencies in the reverse channel design that limit consumer participation. More recently, Forti et al. (2025) demonstrated that despite significant policy interventions across Asia and Europe, the formal e-waste collection rate has stagnated below 25%, attributing this shortfall primarily to consumer-side barriers including low awareness and insufficient access to drop-off facilities. The psychological dimensions of this gap are further illuminated by Sthiannopkao and Wong (2013), who found that health risk perceptions mediated the relationship between e-waste knowledge and actual disposal behaviour, suggesting that campaigns must move beyond informational messaging to address affective and normative motivators (Swim et al., 2018). Collectively, these findings highlight the need for integrated communication approaches that simultaneously build awareness of e-waste hazards and provide actionable guidance on reverse logistics participation channels (Baldé et al., 2017; De Brito & Dekker, 2004; Sthiannopkao & Wong, 2013; Swim et al., 2018).

The role of digital influencers and platform-specific content in shaping environmental attitudes has also received growing scholarly attention. Jin et al. (2019) established that social media influencer credibility and parasocial interaction significantly moderate the persuasive impact of sustainability messaging on follower behaviour, a mechanism directly relevant to e-waste reverse logistics campaigns. Building on this, Ramesh and Patel (2026) examined the effect of short-form video content on TikTok and Instagram Reels on young consumers' e-waste disposal intentions in Southeast Asia, finding that emotionally resonant peer-generated content outperformed institutional messages in driving collection point visits. These digital engagement dynamics are further supported by the macro-level observation that accelerating device obsolescence driven by market forces continues to widen the e-waste generation gap (Baldé et al., 2017). Given that reverse logistics systems depend critically on consumer-initiated product returns, the integration of influencer-driven social media strategies into EPR programme communication represents a promising yet underexplored frontier (Jin et al., 2019; De Brito & Dekker, 2004; Ramesh & Patel, 2026). Understanding these digital pathways is therefore essential for designing reverse logistics systems that are not only structurally efficient but also behaviorally accessible to the modern consumer.

### **III. Research Objectives**

The study aimed to: (1) Assess consumer awareness of e-waste hazards and reverse logistics programs; (2) Investigate the link between social media exposure and consumer environmental awareness; (3) Analyze how awareness influences participation in e-waste reverse logistics systems; and (4) Identify social media content most effective in promoting e-waste reverse logistics participation.

### **IV. Research Methodology**

#### **Research Design and Philosophy**

The research adopted a positivism research philosophy, which is based on the assumption that social reality can be measured and analyzed. The research design adopted for this study was a cross-sectional survey design that aimed to collect primary data from the target population, who are social media users exposed to e-waste or environmental sustainability content. The quantitative research approach was adopted for this study because it is best for hypothesis testing, relationship analysis, and generalization.

#### **Sampling Strategy**

The target population comprised individuals who were active social media users and adults (18+ years of age) and had come across e-waste or environmental sustainability-related content on social media platforms within the last six months. The convenience sampling design with a feature of purposive sampling was used. The sample size comprised a total of 275 valid participants, which was more than the required sample of at least 200 to carry out Structural Equation Modelling.

#### **Instrument Development**

A structured self-administered questionnaire was prepared to assess the constructs of demographic characteristics, social media usage patterns, social media exposure to e-waste, consumer awareness and knowledge, and behavioral intention/reverse logistics participation. The constructs were assessed by using multi-item scales that were adapted from previous research (Ajzen, 1991; Davis, 1989; Yadav et al., 2019) on a five-point Likert scale that ranged from strongly disagree (1) to strongly agree (5). The content validity of the constructs was ensured by obtaining the views of five academics. The reliability of the constructs was ensured by obtaining Cronbach's alpha coefficients of more than 0.70.

**Data Collection Procedure**

The online survey was conducted through social media sites including Facebook, Instagram, LinkedIn, and WhatsApp groups related to environmental sustainability communities. Ethical clearance and informed consent were obtained before administration. A total of 318 responses were obtained, of which 43 were discarded due to incompleteness, yielding a final sample of 275 (response utilization rate: 86.5%) as show in Figure2.

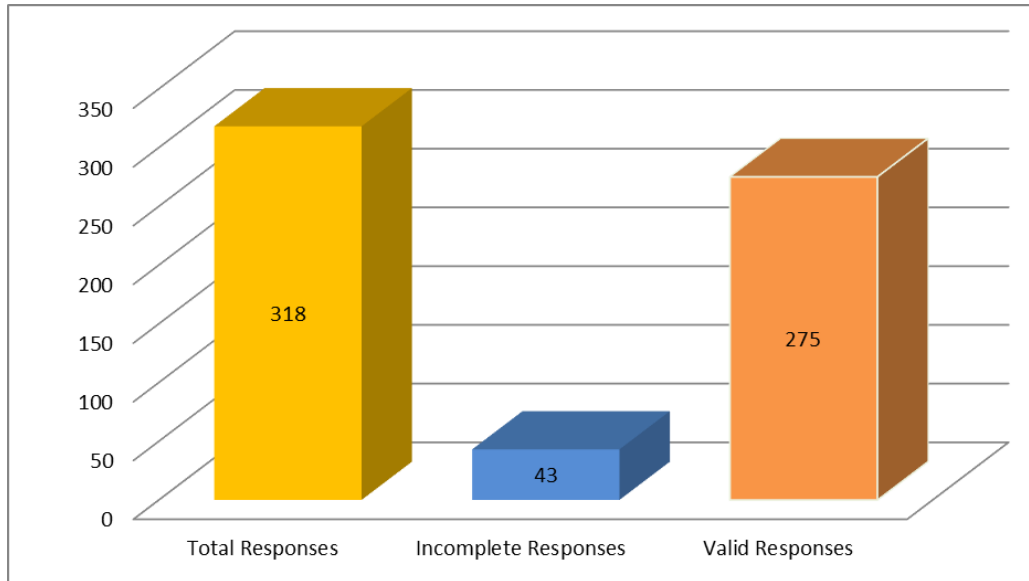


Figure2. Data Collection

**Data Analysis**

The data analysis was done using IBM SPSS statistics version 27 and Amos version 27. The procedures for data analysis involved descriptive analysis, exploratory factor analysis, confirmatory factor analysis, Pearson correlation, multiple regression, and structural equation modeling using bootstrapping. The evaluation of the model was done using Comparative Fit Index, Tucker-Lewis Index, Root Mean Square Error of Approximation, and Standardized Root Mean Square Residual.

**V. Findings**

**Sample Profile**

The final analytical sample consisted of 275 respondents: 54.5% female, 45.5% male; 38.2% from the 18–24 age group, 34.9% from the 25–34 age group. In terms of educational level, 45.1% were at the undergraduate level and 32.7% at the postgraduate level. Of respondents, 96.4% used social media daily. The most used platforms were WhatsApp (89.1%), Instagram (78.5%), YouTube (72.7%), and Facebook (68.4%) as show in Figure3.

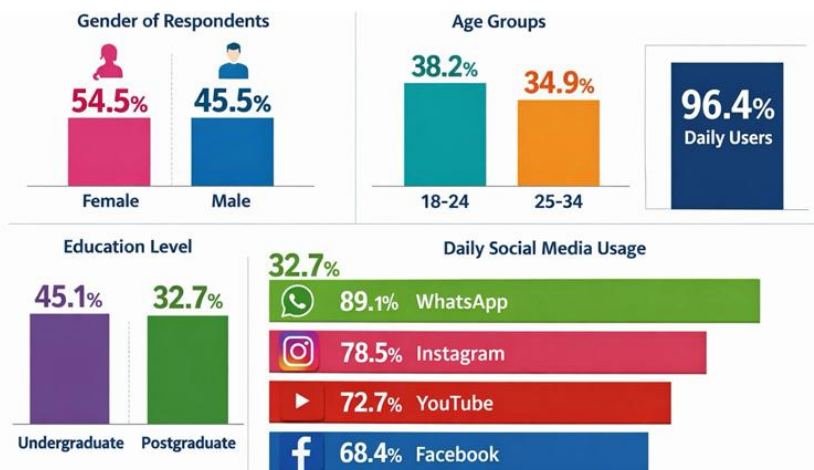


Figure3. Sample Profile

### **Consumer Awareness of E-Waste Issues**

Overall, the level of consumer awareness of e-waste environmental hazards was found to be moderate, with a mean composite score of 3.41 (SD = 0.76) out of 5. Knowledge of specific dimensions of e-waste, such as knowledge of local e-waste collection facilities, awareness of extended producer responsibility, and knowledge of material recovery processes, was found to be relatively lower. Regression analysis revealed that social media exposure was a significant positive predictor of e-waste hazard awareness ( $\beta = 0.47$ ,  $p < .001$ ,  $R^2 = 0.22$ ), supporting Hypothesis H1.

### **Social Media Exposure and Knowledge of Reverse Logistics Programs**

Consumer knowledge regarding available reverse logistics programs and collection facilities was the dimension with the lowest average rating (M = 2.91, SD = 0.88). Social media exposure had a significant positive relationship with consumer knowledge regarding available reverse logistics programs, supporting Hypothesis H2. Consumers who were members of environmental organizations or online sustainability communities had higher knowledge compared to passive social media consumers,  $t(273) = 5.82$ ,  $p < .001$ ,  $d = 0.71$ .

### **Awareness, Intentions, and Reverse Logistics Participation**

Consumer awareness of e-waste risks had a strong positive relationship with intentions to participate in reverse logistics programs ( $\beta = 0.52$ ,  $p < .001$ ). Program knowledge was also a significant predictor for actual behaviour in participating in reverse logistics programs ( $\beta = 0.44$ ,  $p < .001$ ), thereby supporting Hypotheses H3 and H4. Perceived behavioural control was a significant moderator in the relationship between consumer awareness and actual behavior ( $\Delta R^2 = 0.08$ ,  $p < .01$ ).

## **VI. Discussion**

### **Theoretical Contributions**

By integrating TPB and TAM within a social media context, this study demonstrates the explanatory power of hybrid behavioural frameworks for understanding digitally-mediated environmental behaviour. The confirmation of awareness as a partial mediator extends TPB by identifying the cognitive pathway through which digital information exposure translates into behavioural intentions, consistent with the awareness-of-consequences construct in VBN Theory (Stern, 2000). The finding that perceived behavioral control moderates the awareness-participation relationship highlights that environmental knowledge is most effective when consumers are equipped with clear, accessible action pathways (Steg & Vlek, 2009).

### **Practical Implications**

For Policymakers and Government Agencies: E-waste management programs, whether national or regional, should consider incorporating social media communication strategies in the programs. The campaign strategies should be designed with a focus on a two-gap awareness approach, which includes awareness of e-waste environmental hazards and communication of the location and accessibility of e-waste collection facilities, which was identified as the bridge between awareness and participation.

For Electronic Manufacturers and Producers: In the context of an extended producer responsibility, manufacturers of electronics should consider investing in interactive social media campaign strategies that promote the participation of consumers in take-back programs. An efficient way of doing this is by incorporating QR codes on the packaging of products that connect consumers with social media content on the different alternatives for recycling products. It is also recommended that manufacturers collaborate with influencers on the environment.

For Recycling Organizations and NGOs: Recycling organizations and NGOs should consider video content and infographics as a way of utilizing the social norm effect, which can be achieved through community-building strategies, user-generated content, and interactive Q&A sessions, which can promote recycling behavior as a behavior that is socially desirable and normative.

### **Limitations**

The method of convenience sampling may lead to a self-selection bias, as the sample could comprise a higher proportion of environmentally active social media users. The cross-sectional nature of this study prevents any causal relationship being inferred between social media and awareness outcomes. The geographic scope of this study is also limited, and differences in culture and legislation could impact the generalizability of this research. The method of using stated behavioral intentions rather than actual behavioral participation is a limitation of this research, as it is a recognized limitation within the sustainability literature.

## VII. Conclusion

This paper sought to assess the role of social media in shaping consumer awareness and participation in e-waste reverse logistics. The findings showed that being exposed to e-waste-related issues through social media has a substantial impact on environmental awareness, which is positively related to consumer knowledge of e-waste programs, thereby enhancing consumer participation in e-waste management. Future studies should consider longitudinal studies, which will help in understanding the dynamics of the issue over time. Future studies could also consider cross-national studies, which will help in enhancing the scope of the research. Future studies could also consider the role of emerging technologies in social media, such as AI and block chain technologies, which could be useful in enhancing e-waste management.

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