

# A Holistic Consumer-Centric and Value Co-Creation Scale for E-Waste Management through the Extended Theory of Planned Behavior

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## Abstract:

The growing problem of electrical and electronic waste (e-waste) poses a major environmental challenge, particularly in India, where limited management facilities and consumer reluctance aggravate the situation. Rising consumption and rapid technological advancements further intensify the issue. This study extends the Theory of Planned Behavior (TPB) by incorporating co-creation to examine consumer behavior in e-waste management. A comprehensive scale was developed to assess key constructs Attitude, Subjective Norms, Intention, Perceived Behavioral Control, Responsible Consumer Behavior, and Co-creation influencing consumer engagement. Data were collected from 445 participants across India and analyzed using SPSS ver. 26 and PLS-SEM ver. 4. Findings show that attitude, subjective norms, and perceived behavioral control significantly predict intentions for responsible e-waste management. Co-creation ( $t = 9.807$ ) significantly moderates responsible consumer behavior, strengthening the positive effect of intention on sustainable practices. The scale demonstrated strong reliability and validity, underscoring the importance of collaboration in promoting sustainable e-waste management.

**Keywords:** E-waste management, Consumer behavior, Theory of Planned Behavior, Co-creation, Sustainability, Responsible consumer behavior, Scale development.

## Introduction and Conceptual Background

Electrical and electronic waste (e-waste) has emerged as one of the fastest-growing categories of solid waste globally (Bhardwaj, Rath and Tokas, 2023; Venes et al., 2025). Over recent decades, the electrical and electronics industry has experienced significant growth driven by a consumer-centric market and rapid technological advancements. Consequently, electronic products are becoming obsolete at an accelerating pace, with many reaching the end of their lifecycle more quickly than in the past (Kumar, Holuszko and Espinosa, 2017). The continuous introduction of newer models has led consumers to frequently replace existing devices, contributing to overconsumption

and resource depletion (Michael, Hungund and Sriram, 2024). This trend has resulted in environmental challenges such as pollution, land degradation, and climate change (Tansel, 2017; Ertz et al., 2019; Walke et al., 2025).

Globally, 62 million tonnes of e-waste were generated in 2022, of which only 22.3% was properly collected and recycled (Jaiswal and Mukti, 2024). India, one of the largest electronics markets in the Asia-Pacific region, has also witnessed a rise in manufacturing and consumption (Invest India, 2022a; Minister of State for Environment, Forest & Climate Change, 2023). While electronic products improve quality of life, their disposal poses serious environmental and health risks due to toxic components (Needhidasan, Samuel and Chidambaram, 2014; Bagwan, 2024). The presence of an unregulated informal recycling sector further aggravates these risks (Dutta and Goel, 2021). Although regulatory frameworks such as the E-Waste Rules (2011, amended in 2016, 2018, and 2023) have been introduced, challenges in effective implementation remain.

Effective e-waste management requires the collective effort of all stakeholders, particularly consumers, as emphasized under Sustainable Development Goal 12 (UN, 2021). Existing studies highlight factors influencing consumer participation; however, a comprehensive consumer-centered framework for evaluating behavior remains limited (Borthakur, 2015; Kumar, 2019; Wang et al., 2019). A major barrier to recycling is consumer reluctance, with many devices stored instead of being disposed of properly (Kumar, 2019). Although reverse logistics and recycling strategies are widely discussed, they often overlook the critical link between consumer behavior and effective implementation (Mohd Sharif and Soo, 2017). This gap is more pronounced in developing countries, where research on consumer intentions remains limited (Do Valle et al., 2004; Mohamad, Thoo and Huam, 2022).

The Theory of Planned Behavior (TPB) is widely used to examine consumer behavior, alongside models such as the Technology Acceptance Model (TAM) and Norm Activation Theory (NAT). TPB explains behavior through attitude, subjective norms, and perceived behavioral control; however, it has limitations in capturing broader

contextual and motivational factors (Awasthi et al., 2018; Nguyen et al., 2019; Ramzan et al., 2021). Prior studies have examined determinants such as awareness, convenience and social influence in shaping e-waste recycling intentions (Laequddin et al., 2022; Aboelmaged, 2021; Zhang et al., 2018). These studies highlight that attitudes, social norms, and perceived convenience significantly influence consumer intentions, although findings vary across contexts.

Despite these contributions, the role of co-creation in influencing consumer behavior in e-waste management remains underexplored. Co-creation refers to collaborative value generation between consumers and stakeholders, particularly in designing sustainable products and promoting recycling practices. While widely studied in other domains, its application in e-waste management is limited.

To address this gap, the present study proposes an extended TPB framework by incorporating co-creation as a moderating variable. The study develops a comprehensive scale integrating key constructs: Attitude (ATT), Subjective Norm (SN), Intention (INT), Perceived Behavioral Control (PBC), Responsible Consumer Behavior (RCB), and Co-creation (CoC). This framework aims to assess consumer willingness to engage in e-waste management and examine how co-creation strengthens sustainable practices. The study further seeks to validate this scale for use by policymakers, researchers and practitioners to improve e-waste management strategies.

## Methodology and Results

To develop a comprehensive consumer-centric scale incorporating co-creation for e-waste management, established scale-development guidelines were followed (Churchill, 1979; Gerbing and Anderson, 1988; Bearden, Netemeyer and Teel, 1989; Nenkov, Inman and Hulland, 2008). The study was conducted in three phases: item development, scale development, and scale evaluation (Boateng et al., 2018). Phase 1 included domain identification, operationalization of constructs, hypothesis formulation, item generation, and content validity. Phase 2 included statistical analysis and pre-testing. Phase 3 included sample size determination, factor analysis,

reliability and validity assessment, model fit, and hypothesis testing.

## **Phase I: Item Development/Generation**

### **Step 1: Domain Identification**

The first step was to identify the domain of the study, which defines the boundaries of the phenomenon under investigation and guides item generation and content validation (Haynes, Richard and Kubany, 1995; Boateng et al., 2018). In the present study, the constructs were finalized through an extensive literature review. The review indicated that Attitude (ATT), Subjective Norm (SN), Intention (INT), Responsible Consumer Behavior (RCB), Co-Creation (CoC), and Perceived Behavioral Control (PBC) have been widely studied individually, but not together in the context of e-waste management.

Through a systematic literature review (Registration ID: CRD42024623157), various theories related to e-waste management were examined (Dave K et al., 2025). Among these, the Theory of Planned Behavior (TPB), proposed by Ajzen (1991), was found to be frequently used to understand and predict recycling intentions (Ajzen, 1991). Accordingly, the above constructs were finalized and operationalized in line with the objectives of the present study.

### **Step 2: Operationalization of the Constructs and its Antecedents**

#### ***a. Extended Theory of Planned Behavior (TPB)***

The Theory of Planned Behavior (TPB), developed by Ajzen (1991), is one of the most widely used frameworks for understanding and predicting human behavior across various domains, including marketing, public health, and behavioral research (Ajzen, 1991; Wang, Guo and Wang, 2016; Kumar, 2019; Nguyen et al., 2019; Shevchenko, Laitala and Danko, 2019; Delcea et al., 2020). According to the TPB, an individual's behavior is influenced by their intention, which is, in turn, predicted by three core factors: Attitude ("What do I think?"), Subjective Norms ("What do my family and friends think?"), and Perceived Behavioral Control ("How difficult is it for me to perform the behavior?"). If any of these factors are unfavorable, the likelihood of forming the behavioral intention is

reduced (Lou, 2022).

The TPB extends the Theory of Reasoned Action (Fishbein and Ajzen, 1977), originating from social psychology, and remains a robust tool for predicting individuals' intentions. It does so by assessing the interactions between attitude, perceived control, and subjective norms, which together influence behavioral intentions. Despite some criticisms, the TPB has proven effective and has been widely applied across diverse areas, including health, education, consumer behavior, environmental studies, and technology (Ajzen, 1991). Researchers have also adapted and expanded the model to enhance its predictive power (Conner and Armitage, 1998; Ajzen, 2012). In the context of e-waste management, several studies have extended the TPB by incorporating constructs such as moral norms, convenience, infrastructure, and a sense of duty (Wang et al., 2011; Ramayah, Lee and Lim, 2012; Kumar, 2017, 2019), as discussed in the earlier sections of this manuscript. These studies predominantly focus on household consumers in both developed and emerging economies. However, few studies have specifically investigated e-waste recycling behavior among young adults using the extended TPB framework.

Moreover, no studies have examined co-creation as a moderator influencing behavior in the context of e-waste management. Responsible Consumer Behavior (RCB) is another key construct influenced by intention, which underscores the significance of attitudes in driving sustainable practices (Figure 1).

#### ***b. Attitude and its Antecedents***

Attitude is commonly defined as an individual's tendency to rate a particular entity as favorable or unfavorable (Eagly and Chaiken, 2007). In the context of e-waste management, attitude refers to an individual's overall opinion or mindset about e-waste, shaped by their knowledge, feelings, and likelihood of taking action. This attitude influences whether they support or engage in actions like recycling electronics (Kumar, 2019).

Attitude is formed through behavioral beliefs and the evaluation of expected outcomes, particularly whether the behavior is perceived as favorable or unfavorable (Greaves, Zibarras and Stride, 2013). In the context of e-waste

management, attitude is considered positive when recycling or safe disposal is viewed as good, useful, beneficial, sensible, and responsible (Cheung, Chan and Wong, 1999; Tonglet, Phillips and Bates, 2004; Kumar, 2019). Previous studies have linked environmental attitudes with moral responsibility, sense of duty, convenience, awareness of consequences, and pro-environmental values such as reducing waste and reusing materials (Corral-Verdugo and Frías-Armenta, 2006; Kumar, 2019). Accordingly, the attitude items in this study were derived to assess consumers' evaluation of e-waste management as a responsible, beneficial, and environmentally relevant action.

#### ***c. Subjective Norms and its Antecedents***

Subjective Norm refers to the perceived social pressure to perform or avoid a particular behavior, shaped by the expectations of significant others such as family, friends, colleagues, and the broader community. In the context of e-waste management, it reflects how these social groups influence an individual's intention to engage in responsible behaviors. According to the Theory of Planned Behavior (TPB), individuals are more likely to act when they believe that important others expect them to do so, making subjective norms a key predictor of pro-environmental actions.

Subjective norms are shaped by normative beliefs, which represent individuals' perceptions of others' expectations regarding their behavior (Ajzen and Fishbein, 1972; Greaves, Zibarras and Stride, 2013). The strength of these perceived expectations determines the extent to which individuals are motivated to comply. In addition to direct social influence, subjective norms may also reflect broader societal values and internalized moral expectations.

In the present study, subjective norms were operationalized through perceived expectations from family, friends, colleagues, workplace, and community (Greaves, Zibarras and Stride, 2013; Al-Swidi et al., 2014; Gonul Kochan et al., 2016). These influences are important in understanding e-waste management behavior, as recycling and disposal decisions are often shaped by social approval, moral norms, and perceived responsibility (Aboelmaged, 2021; Sabbir, Taufique and Nomi, 2023). Previous research also suggests

that factors such as habits and convenience can interact with normative beliefs, further influencing individuals' perceptions of social pressure and their intention to engage in responsible environmental practices (Tsai and Tan, 2022; Vijayan et al., 2023). Accordingly, the items for this construct were developed to capture the role of social expectations in shaping consumer behavior toward e-waste management.

#### ***d. Intention and its Antecedents***

Intention, as defined by Triandis (1980) and Söderlund and Öhman (2005)(Söderlund and Öhman, 2005), refers to an individual's self-directed plan or commitment to engage in a specific behavior in order to achieve a desired outcome. It reflects the individual's readiness and determination to carry out the behavior in question. According to the Theory of Planned Behavior (TPB)(Fishbein and Ajzen, 1977; Ajzen, 2012), intentions are shaped by three key factors: attitude, subjective norms, and perceived behavioral control. In the context of this study, intention is conceptualized as the consumer's willingness to manage their e-waste through actions such as returning, recycling, exchanging, or refurbishing(Laequddin et al., 2022). Research has shown that a consumer's intention to recycle significantly influences their actual behavior towards e-waste management(Gonul Kochan et al., 2016).

#### ***e. Perceived Behavioral Control (PBC) and its Antecedents***

Perceived Behavioral Control refers to the extent to which individuals feel capable of performing a behavior. It includes both self-efficacy and perceived ease or difficulty of action. In this study, PBC is conceptualized as consumers' confidence in their ability to manage e-waste disposal, including recycling and overcoming related barriers (Aboelmaged, 2021). PBC is influenced by control beliefs that determine whether individuals perceive a behavior as feasible (Ajzen, 1985; Greaves, Zibarras and Stride, 2013).

In the context of e-waste management, this construct is operationalized through various control factors that either facilitate or hinder recycling behavior. These control factors may include aspects like the availability of recycling schemes, storage space, and convenience, as well

as situational barriers such as inconvenience and lack of infrastructure (Ajzen, 2002; Chen and Tung, 2010). The effectiveness of PBC in predicting consumer behavior towards e-waste management which largely depends on how accessible and convenient recycling options are to individuals (Tsai and Tan, 2022; Sabbir, Taufique and Nomi, 2023).

#### ***f. Responsible Consumer Behavior (RCB) and its Antecedents***

In the present study, behavior is examined as Responsible Consumer Behavior (RCB), which refers to the habitual, goal-oriented actions that individuals take to manage e-waste responsibly. These behaviors such as cleaning, storing, sorting, separating, disassembling, reusing, or properly disposing of e-waste become automatic over time with minimal conscious effort once they become habitual. These repetitive actions are motivated by a sense of responsibility toward environmental sustainability and are sustained over time (Knussen and Yule, 2008; Labrecque and Angeles, 2016). Prior research indicates that habits, once formed, significantly influence behavior by bypassing conscious decision-making processes, even in the presence of conflicting attitudes or social norms (Neal et al., 2012; Wood, 2024). In the context of e-waste management, RCB involves a sequence of learned actions that individuals incorporate into their routines to minimize the environmental impact of electronic waste. The antecedents of such behaviors are multi-faceted, encompassing psychological factors such as attitudes, subjective norms, perceived behavioral control (PBC), and habits. Attitudes toward responsible e-waste management, shaped by environmental concerns and personal values, significantly contribute to the formation of recycling habits (Ajzen, 1991; Tsai and Tan, 2022). Subjective norms, which reflect the influence of family, peers, and societal expectations, further drive individuals' intentions to engage in e-waste management practices (Vijayan et al., 2023). Additionally, perceived behavioral control, which involves an individual's belief in their ability to perform the recycling behavior, plays a crucial role in fostering habitual e-waste management actions (Sabbir, Taufique and Nomi, 2023). Together, these antecedents contribute to the development

of RCB, reinforcing individuals' consistent engagement in environmentally responsible behaviors toward e-waste.

#### ***g. Co-creation and its Antecedents***

This study examines co-creation through consumers' willingness to engage in activities that enhance e-waste management practices. Simply put, working together to create something valuable. (join forces to share ideas, skills, and resources). It focuses on consumers' involvement in product design, e-waste disposal, and management, as well as their readiness to share ideas for improvement. Key aspects of co-creation, such as design participation, information sharing, advocacy, decision-making, and engagement, were explored, highlighting co-creation as a collaborative process between consumers and companies. Co-creation is a dynamic, participatory process where value is jointly created through interactions between customers, firms, and other stakeholders, as defined by the service-dominant (S-D) logic framework (Vargo and Lusch, 2008). This perspective shifts from traditional value-exchange models, recognizing customers as active contributors to value creation. The antecedents of co-creation were studied in literature include customers' willingness to interact, share knowledge, feedback, advocacy and engage in responsive behaviors. In the literature, co-creation is studied from various perspectives, focusing on the roles customers play in the process. Studies highlight the importance of customer interaction, knowledge-sharing, and responsive attitudes in facilitating value co-creation. For example, Grönroos (2008) and Vargo and Lusch (2008) (Grönroos, 2008; Vargo and Lusch, 2008) argue that value is co-created through ongoing interactions, with firms acting as facilitators and customers playing an essential role in the service creation process. Customers are encouraged to share their ideas, preferences, and feedback, which influences the firm's product or service offerings. Studies, such as those by Shamim and Ghazali (2017) (Shamim, Ghazali and Albinsson, 2017), show that attitudes towards interaction and knowledge sharing significantly influence participation in co-creation. Environmental factors like communication and accessibility further encourage consumer involvement. Overall, co-creation represents a shift towards a more

inclusive and collaborative approach to value creation, where active participation from customers is essential for both service providers and customers to derive meaningful value. This is particularly relevant in sectors like e-waste management, where consumer engagement is crucial to achieving successful outcomes.

### **Step 3: Hypothesis**

Hypothesis 1: Attitude is positively associated with the intention to engage in responsible consumer behavior, which, in turn, influences e-waste management practices.

Hypothesis 2: Subjective norms are positively associated with the intention to engage in responsible consumer behavior, which, in turn, influences e-waste management practices.

Hypothesis 3: Individuals' perceived ability to manage e-waste is positively associated with their intention to engage in responsible consumer behavior, which, in turn, positively influences e-waste management practices.

Hypothesis 4: The intention to manage e-waste is positively associated with responsible consumer behavior.

Hypothesis 5: Co-Creation (CoC) moderates the positive relationship between individuals' intention to engage in responsible consumer behavior, such that the relationship is stronger when the level of Co-Creation is high.

### **Step 4: Item Generation**

After finalizing the constructs, the item pool was developed through a comprehensive literature review using a deductive approach (Hinkin, 1995; Boateng et al., 2018). Initially, 20 to 35 items were developed for each construct to allow flexibility in selecting suitable items. For Co-Creation, 153 items were generated because this construct had not been previously examined as a moderator in consumer behavior toward e-waste management.

After reviewing and removing duplicate or redundant items, 67 items were selected for validation. A 5-point Likert scale was used, ranging from "Strongly Agree" (5) to "Strongly Disagree" (1), to capture participants' attitudes, perceptions, and behaviors related to e-waste management.

### **Step 5: Content Validity**

Content validity ensures that a measure adequately

represents the intended domain and reflects the target population's experiences (Morgado et al., 2017). In the present study, content validity was assessed through expert review using both qualitative and quantitative methods. Face validity was established through expert discussions and cognitive interviews to evaluate the clarity, relevance, and appropriateness of the scale items.

Experts provided detailed feedback, which was systematically recorded and incorporated. Based on their suggestions, redundant items and those not aligning well with the constructs were removed or revised. For instance, items such as 'My goal is to make people aware about e-waste management practices' and 'Local media influences me to safely manage my e-waste' were deleted. Minor modifications were also made to improve clarity, such as adding the phrase "As a Consumer" to Co-Creation items. These revisions ensured that the scale items were conceptually consistent, relevant, and easily understandable. Subsequently, both qualitative and quantitative evaluations were conducted to finalize the content validity of the scale.

The following three steps were taken to establish content validity for the current study:

#### *1. Establishment of the Expert Panel*

A total of ten experts were invited to participate in the validation process, of which seven accepted. The panel comprised two subject experts from marketing, one industry professional, one environmentalist, one methodologist, and two consumers. The study materials and evaluation sheets were shared with the experts for detailed review and feedback.

#### *2. Qualitative Review of Scale Items*

Experts were requested to evaluate the scale in terms of the appropriateness of the title, clarity of directions, overall content, and individual items. They were also encouraged to provide additional comments and suggestions. Based on their feedback, redundant or unclear items were either removed or revised. For example, items such as 'My goal is to make people aware about e-waste management practices' and 'Local media influences me to safely manage my e-waste' were deleted. Minor modifications were also

made to improve clarity and contextual relevance, such as adding the phrase “As a Consumer” to Co-Creation items.

### 1. Quantitative Review of Scale Items

Experts rated each item on relevance, clarity and essentiality. Relevance was measured on a 4-point scale (0 = Not relevant to 3 = Very relevant), clarity on a 3-point scale (0 = Not clear to 2 = Very clear), and essentiality on a 3-point scale (0 = Not essential, 1 = Useful but not essential, 2 = Essential). Responses were recorded and coded systematically.

The Content Validity Ratio (CVR) was calculated using Lawshe's formula (Lawshe, 1975):

$$CVR = \frac{n_e - \frac{N}{2}}{\frac{N}{2}}$$

where  $n_e$  represents the number of experts rating an item as “essential” and  $N$  is the total number of experts. Based on the panel size ( $N = 7$ ), a minimum CVR value of 0.43 was adopted as the threshold. Items below this threshold were revised or removed to improve clarity, relevance, and construct alignment. For example, items reflecting social expectations were reworded to better capture broader influences (e.g., combining “family” and “friends”), while redundant items related to similar behavioral conditions were removed, and minor wording refinements were made to enhance clarity.

Following the first round, the revised scale was recirculated to the same panel for validation. After re-evaluation, all items met the minimum CVR requirement, and the overall CVR of the scale was 0.75, indicating acceptable content validity (Lawshe, 1975) (Table 1).

In addition, the Content Validity Index (CVI) was calculated based on relevance ratings (Yusoff, 2019). Ratings were recoded into binary values (1 = relevant, 0 = not relevant). The I-CVI values exceeded 0.85, while S-CVI/Ave (0.95) and S-CVI/UA (0.73) indicated satisfactory content validity. These values meet the recommended criteria for expert panels with six or more members (Lynn, 1986) (Table 2).

## PHASE 2: SCALE DEVELOPMENT

### Step 6: Statistical Analysis

Descriptive statistics were used to summarize the demographic characteristics and data distribution. SPSS version 26 was used for statistical analysis, and Excel was used for data organization. Measures such as means, standard deviations, frequencies, and percentages were calculated. Structural Equation Modeling (SEM) using SmartPLS 4 was employed to assess the reliability and validity of the constructs and to test the relationships among variables. The sample size was determined based on the commonly accepted respondent-to-item ratio of 10:1 to ensure adequate statistical power.

### Step 7: Pre-testing Questions

Pre-testing was conducted with 100 consumers to assess the internal consistency and clarity of the scale items. The sample included male and female participants aged 18 years and above from the Delhi-NCR region, with varied demographic backgrounds.

The majority of participants were aged 18–30 years (65%), with a mean age of approximately 29 years. Most respondents were male (64%), and 61% were graduates. Socio-economic status was assessed using the Kuppuswamy Scale (Saleem and Jan, 2021), with most participants belonging to lower-middle and upper-middle categories. This diversity enhanced the representativeness of the pre-test sample.

Internal consistency was assessed using Cronbach's alpha. All constructs demonstrated acceptable reliability, with values above 0.75 (Nunnally, 1978): Attitude (0.85), Intention (0.75), Subjective Norm (0.85), Co-Creation (0.93), Responsible Consumer Behaviour (0.82), and Perceived Behavioral Control (0.80). No items were removed at this stage, and a total of 51 items were retained for further analysis.

## PHASE 3: SCALE EVALUATIONS

### Step 8: Sample Size Determination for Factor Analysis

To ensure a heterogeneous sample for Confirmatory Factor Analysis (CFA), participants were selected from multiple regions and cities, representing diverse demographic backgrounds. Data were collected through hard-copy

surveys administered across various locations, including colleges, markets, and residential networks, targeting individuals aged 18 years and above who could read and understand English.

For PLS-SEM analysis, sample size was determined using the “10 times indicators” and “5 times paths” rule to ensure adequate statistical power (Laequddin et al., 2022). With six structural paths and 52 indicators, the minimum required sample size was 225.

Data collection was conducted from November 2024 to January 2025. A total of 449 responses were received, of which 445 valid responses were retained after excluding incomplete entries. This sample size is considered sufficient for PLS-SEM analysis.

### **Step 9: Data analysis and results**

#### *Descriptive Statistics*

Table 3 presents the demographic characteristics of the sample. The majority of respondents were aged 18-30 years (77.3%), followed by 31-40 years (16.0%). The sample included a higher proportion of females (60.9%) than males (39.1%). In terms of education, most respondents were graduates (58.2%), followed by those with intermediate/diploma qualifications (14.8%). A large proportion of respondents were unemployed (52.4%), while professionals constituted 15.3% of the sample. Most participants were single (69.4%) and belonged to nuclear families (60.4%). Geographically, respondents were primarily from Punjab (47.0%) and Uttar Pradesh (31.0%), with smaller representation from Delhi-NCR (18.9%) and Madhya Pradesh (2.5%). The majority of respondents belonged to the upper-middle (52.6%) and lower-middle (22.7%) socioeconomic categories.

#### *PLS-SEM*

The collected data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS 4.0 to assess the measurement properties of the constructs and validate the proposed model. Table 4 presents the factor loadings and cross-loadings of the items across their respective constructs.

#### *Factor Loadings*

Table 4 presents the factor loadings and cross-loadings of

all items across their respective constructs. Most items demonstrated satisfactory loadings above the recommended threshold of 0.50, indicating strong associations with their respective constructs. Cross-loadings were comparatively lower, supporting discriminant validity. For instance, items such as ATT\_7 (0.706) and CoC\_9 (0.686) showed strong loadings on their respective constructs, while maintaining lower cross-loadings on other constructs.

Items with loadings below 0.50 or higher cross-loadings were excluded from further analysis. Based on this criterion, 7 items were removed, resulting in a final set of 45 items retained for subsequent analysis. However, INT\_1, RCB\_4, and RCB\_9 (0.331) were retained due to their theoretical relevance and expert validation, despite lower loadings. The relatively lower loadings may be attributed to sample heterogeneity and variation in responses across different demographic groups (Figure 2).

The moderating role of Co-Creation was also supported. The interaction term between Co-Creation and Intention showed a positive path coefficient ( $\beta = 0.086$ ), indicating that higher levels of Co-Creation strengthen the relationship between Intention and Responsible Consumer Behavior.

#### *Reliability, Discriminant and Convergent Validity*

All constructs were assessed for reliability, as well as discriminant and convergent validity, as presented in Tables 4 and 5. Discriminant validity was evaluated using the Heterotrait-Monotrait Ratio (HTMT), where values below 0.85 indicate acceptable validity. In the present model, most construct pairs met this criterion, supporting discriminant validity. For instance, HTMT values for SN-RCB (0.052), INT-CoC (0.57), and RCB-CoC (0.70) were within acceptable limits. The HTMT value between RCB and PBC (0.813) was comparatively higher, indicating some overlap, likely due to conceptual similarity between the constructs.

Reliability was assessed using Cronbach's alpha and composite reliability. All constructs exceeded the recommended threshold of 0.70, indicating satisfactory reliability. For example, CoC showed a Cronbach's alpha of 0.863, and RCB demonstrated composite reliability of 0.768.

During pre-testing, all constructs exhibited reliability values above 0.80. However, in the final sample, PBC showed a slightly lower reliability (0.62). Despite this, the construct was retained due to its theoretical importance within the model. The lower value may be attributed to sample heterogeneity and variability in responses across different demographic groups. This aspect may be further examined in future studies.

#### *T-Statistics: Hypothesis testing*

After validating the measurement model, hypothesis testing was conducted using bootstrapping in PLS-SEM. The results are presented in Table 6. All proposed hypotheses were supported, with t-statistics exceeding 1.96 and p-values below 0.05.

The findings indicate that Attitude positively influences Intention, which in turn significantly affects Responsible Consumer Behavior (RCB). Subjective Norms and Perceived Behavioral Control also showed significant positive effects on Intention. In addition, Co-Creation significantly moderates the relationship between Intention and RCB, strengthening the effect at higher levels of co-creation.

The standardized path coefficients were significant across all relationships (Table 6). For example, Attitude ( $\beta = 0.311$ ,  $p < 0.001$ ), Subjective Norms ( $\beta = 0.396$ ,  $p < 0.001$ ), Intention ( $\beta = 0.331$ ,  $p < 0.001$ ), Co-Creation ( $\beta = 0.418$ ,  $p < 0.001$ ), and Perceived Behavioral Control ( $\beta = 0.157$ ,  $p = 0.001$ ) showed positive effects on Responsible Consumer Behavior. The moderating effect of Co-Creation was also significant ( $\beta = 0.075$ ,  $p = 0.006$ ).

These findings support all proposed hypotheses, indicating that attitude, subjective norms and perceived behavioral control significantly influence responsible consumer behavior with Co-Creation strengthening this relationship.

#### *Model Fitness*

The model fit results are presented in Table 7. The R-square values indicate substantial explanatory power, with Intention ( $R^2 = 0.692$ ) and Responsible Consumer Behavior ( $R^2 = 0.664$ ). The adjusted R-square values (0.690 for Intention and 0.661 for Responsible Consumer Behavior) further support the model's robustness.

The f-square values indicate the strength of relationships among variables. Attitude showed a medium effect on Intention ( $f^2 = 0.314$ ), while Co-Creation ( $f^2 = 0.330$ ) and Intention ( $f^2 = 0.385$ ) demonstrated medium effects on Responsible Consumer Behavior. In contrast, Perceived Behavioral Control  $\rightarrow$  Intention ( $f^2 = 0.035$ ) and the moderating effect of Co-Creation  $\times$  Intention ( $f^2 = 0.033$ ) exhibited smaller effect sizes.

Overall, the results indicate a well-fitting model with meaningful explanatory power, highlighting the role of attitude, co-creation, intention, and subjective norms in influencing responsible consumer behavior (Table 7).

## **Discussion and Conclusion**

The continuous generation of e-waste has emerged as a major environmental challenge, affecting sustainable economic growth across countries (Rezaul et al., no date; Mohamad, Thoo and Huam, 2022). Addressing this issue requires an effective regulatory framework supported by efficient take-back mechanisms involving all stakeholders, particularly consumers and industries. Consumer participation is critical, as they are the primary users and initiators of the e-waste lifecycle, and their engagement at early stages significantly influences recycling and disposal outcomes.

Reverse logistics has been recognized as an effective approach to manage e-waste, however, studies linking it with consumer behavior remain limited (Mallick, P. K., et al 2023, Singh et al 2025, Pongen I et al 2026). Since consumers act as the starting point of the reverse supply chain, their active involvement is essential for its success (Ravi and Shankar, 2015). The present study addresses this gap by examining the role of co-creation in shaping responsible consumer behavior in e-waste management.

Using an extended Theory of Planned Behavior (TPB) framework, this study incorporates co-creation as a moderating factor in the Indian context. A scale was developed to assess consumer participation through co-creation, emphasizing its contribution to sustainable development, particularly in achieving Sustainable Development Goals (SDGs) 11 and 12. The findings confirm that co-creation significantly enhances e-waste

management outcomes.

The results indicate that attitude significantly influences intention, which in turn affects responsible consumer behavior. The path coefficient for attitude was significant ( $\beta = 0.311$ ,  $p < 0.001$ ), indicating that positive attitudes toward e-waste management contribute to stronger behavioral intentions. This finding is consistent with prior studies demonstrating that positive attitudes toward recycling are strong predictors of behavioral intention (Davies, Foxall and Pallister, 2002; Ramayah, Lee and Lim, 2012; Dixit and Badgaiyan, 2016; Gonul Kochan et al., 2016; Awasthi et al., 2018; Wang et al., 2018; Kumar, 2019). Attitudes toward e-waste management such as perceiving recycling as responsible, beneficial and necessary that plays a critical role in shaping consumer intentions. As noted by Greaves et al. (2013), attitudes are formed through favorable evaluations of behavior, while Echegaray and Hansstein (2017) emphasize the perceived environmental and health benefits of recycling. However, the findings also suggest that positive attitudes do not always translate into actual behavior. This gap may be attributed to limited awareness and knowledge in certain contexts, highlighting the need for targeted awareness and educational interventions.

The findings further indicate that subjective norms significantly influence intention with a strong positive effect ( $\beta = 0.396$ ,  $p < 0.001$ ), suggesting that social expectations from family, peers, colleagues, and communities play an important role in shaping e-waste management intentions as observed in recycling context (Laequddin et al., 2022; Vijayan et al., 2023). However, some studies report mixed results, particularly in non-Western contexts, suggesting that the influence of subjective norms may vary depending on cultural and situational factors (Aboelmaged, 2021). In the present study, the strong effect of subjective norms highlights the importance of social influence in shaping responsible e-waste management practices.

Perceived Behavioral Control (PBC) also showed significant positive relationship with intention, although its effect was comparatively smaller ( $\beta = 0.157$ ,  $p = 0.001$ ). This finding is consistent with earlier research emphasizing the role of perceived control in facilitating recycling

behavior (Nigbur, Lyons and Uzzell, 2010a; Pakpour et al., 2014a; Botetzagias, Dima and Malesios, 2015; Wang et al., 2018). PBC reflects individuals' confidence in their ability to perform recycling-related actions, which is influenced by factors such as accessibility, infrastructure, and convenience. Enhancing these enabling conditions can strengthen consumers' intention to engage in e-waste management. However, some studies have reported weaker or insignificant effects of PBC, particularly in contexts with limited infrastructure (Mohamad, Thoo and Huam, 2022), suggesting that structural barriers may constrain behavioral outcomes.

A significant positive relationship was observed between intention and responsible consumer behavior ( $\beta = 0.331$ ,  $p < 0.001$ ). This finding reinforces the central role of intention in driving pro-environmental behavior, as established in TPB-based research (Bamberg and Möser, 2007; Nigbur, Lyons and Uzzell, 2010b). Literature highlights that both intrinsic factors, such as moral norms and habits, and extrinsic factors, such as social pressure and incentives, contribute to shaping behavioral intentions (Sabbir, Taufique and Nomi, 2023; Vijayan et al., 2023). The present study confirms that stronger intentions lead to more consistent engagement in responsible e-waste management practices.

Finally, the moderating role of co-creation was significant ( $\beta = 0.075$ ,  $p = 0.006$ ), indicating that co-creation strengthens the relationship between intention and responsible consumer behavior. Co-creation also showed a direct positive association with responsible consumer behavior ( $\beta = 0.418$ ,  $p < 0.001$ ), further confirming its relevance in the proposed model. This finding highlights the importance of actively involving consumers in the value creation process, rather than treating them as passive participants. Although limited research has examined co-creation in the context of e-waste management (Martínez-Cañas et al., 2016), existing studies emphasize its role in enhancing consumer engagement and sustainability outcomes (Pralhad and Ramaswamy, 2004; Grönroos, 2008; Payne, Storbacka and Frow, 2008; Brodie et al., 2013).

Supporting studies also highlight the importance of

collaboration and stakeholder engagement in improving environmental outcomes. For instance, Giampaolo et al. (2020) demonstrate how communication and proximity enhance responsible disposal behavior, while Gurauskienė (2008) emphasizes the dual role of consumers as both users and contributors in e-waste systems. Emotional and social dimensions of engagement, such as those discussed by Lodato and Loi (2014), further reinforce the importance of co-creation in fostering sustainable behavior. Overall, co-creation enhances consumer engagement through active participation, knowledge sharing, stakeholder collaboration, and feedback mechanisms, thereby promoting shared responsibility between consumers and organizations.

These findings provide empirical support for all proposed hypotheses and validate the extended TPB framework with co-creation in explaining responsible consumer behavior in e-waste management.

### Limitations

This study has some limitations. Although the sample size is adequate, it may limit the generalizability of the findings. Future research can include a larger and more diverse sample from different regions and cultural contexts to improve external validity. The reliability of the Perceived Behavioral Control (PBC) construct was slightly below the recommended threshold. This may be due to differences in respondents' understanding or the diversity of the sample. Further refinement of the scale and testing across different groups may help improve its reliability.

In addition, the study treats consumers as a single group. Future research may focus on specific segments such as socio-economic groups, age groups, gender or occupation to gain more detailed insights into responsible consumer behavior. Expanding the geographical scope and including more diverse populations may also help in better understanding contextual differences in e-waste management practices.

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**TABLE LEGENDS**

Table 1: The essentiality ratings on the item scale by seven experts (CVR)

Table 2: The relevance ratings on the item scale by seven experts

Table 3: Socio-demographic Details

Table 4: Summary of the measurement model.

Table 5: Discriminant validity assessment (HTMT).

Table 6: Hypothesis testing

Table 7: Model Fitness

**FIGURE LEGEND**

Figure 1: Research Framework

Figure 2: Measurement Model

**Table 1: The essentiality ratings on the item scale by seven experts (CVR)**

Items	Essentiality			N (total number of experts)	Ne (number of experts indicating "essential")	N/2	CVR
	Not essential (0)	Useful, but not essential (1)	Essential (2)				
Q1			7	7	7	3.5	<b>1.00</b>
Q2			7	7	7	3.5	<b>1.00</b>
Q3		1	6	7	6	3.5	<b>0.71</b>
Q4		1	6	7	6	3.5	<b>0.71</b>
Q5			7	7	7	3.5	<b>1.00</b>
Q6		1	6	7	6	3.5	<b>0.71</b>
Q7			7	7	7	3.5	<b>1.00</b>

Items	Essentiality			N (total number of experts)	Ne (number of experts indicating "essential")	N/2	CVR
	Not essential (0)	Useful, but not essential (1)	Essential (2)				
Q8		1	6	7	6	3.5	<b>0.71</b>
Q9		0	7	7	7	3.5	<b>1.00</b>
Q10			7	7	7	3.5	<b>1.00</b>
Q11		2	5	7	5	3.5	<b>0.43</b>
Q12		0	7	7	7	3.5	<b>1.00</b>
Q13		1	6	7	6	3.5	<b>0.71</b>
Q14		1	6	7	6	3.5	<b>0.71</b>
Q15		1	6	7	6	3.5	<b>0.71</b>
Q16		2	5	7	5	3.5	<b>0.43</b>
Q17			7	7	7	3.5	<b>1.00</b>
Q18			7	7	7	3.5	<b>1.00</b>
Q19		2	5	7	5	3.5	<b>0.43</b>
Q20		1	6	7	6	3.5	<b>0.71</b>
Q21		1	6	7	6	3.5	<b>0.71</b>
Q22	1		6	7	6	3.5	<b>0.71</b>
Q23			7	7	7	3.5	<b>1.00</b>
Q24		1	6	7	6	3.5	<b>0.71</b>
Q25			7	7	7	3.5	<b>1.00</b>
Q26		1	6	7	6	3.5	<b>0.71</b>
Q27		1	6	7	6	3.5	<b>0.71</b>
Q28		1	6	7	6	3.5	<b>0.71</b>
Q29			7	7	7	3.5	<b>1.00</b>
Q30			7	7	7	3.5	<b>1.00</b>
Q31		2	5	7	5	3.5	<b>0.43</b>
Q32		2	5	7	5	3.5	<b>0.43</b>
Q33		1	6	7	6	3.5	<b>0.71</b>
Q34		2	5	7	5	3.5	<b>0.43</b>
Q35		1	6	7	6	3.5	<b>0.71</b>
Q36	1	1	5	7	5	3.5	<b>0.43</b>
Q37		2	5	7	5	3.5	<b>0.43</b>
Q38			7	7	7	3.5	<b>1.00</b>
Q39			7	7	7	3.5	<b>1.00</b>
Q40		1	6	7	6	3.5	<b>0.71</b>
Q41		2	5	7	5	3.5	<b>0.43</b>
Q42		1	6	7	6	3.5	<b>0.71</b>
Q43			7	7	7	3.5	<b>1.00</b>
Q44			5	7	5	3.5	<b>0.43</b>

Items	Essentiality			N (total number of experts)	Ne (number of experts indicating "essential")	N/2	CVR
	Not essential (0)	Useful, but not essential (1)	Essential (2)				
Q45		1	6	7	6	3.5	<b>0.71</b>
Q46		1	6	7	6	3.5	<b>0.71</b>
Q47		1	6	7	6	3.5	<b>0.71</b>
Q48		1	6	7	6	3.5	<b>0.71</b>
Q49		2	5	7	5	3.5	<b>0.43</b>
Q50			7	7	7	3.5	<b>1.00</b>
Q51		1	6	7	6	3.5	<b>0.71</b>
							<b>0.75</b>

**Table 2: The relevance ratings on the item scale by seven experts**

Item Number	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7		Expert in Agreement (out of 7)	I-CVI	UA
Q1	1	1	1	1	1	1	1		7	1	1
Q2	0	1	1	1	1	1	1		6	0.857143	0
Q3	0	1	1	1	1	1	1		6	0.857143	0
Q4	1	1	1	1	1	1	1		7	1	1
Q5	1	1	1	1	1	1	1		7	1	1
Q6	0	1	1	1	1	1	1		6	0.857143	0
Q7	1	1	1	1	1	1	1		7	1	1
Q8	1	1	1	1	1	1	1		6	0.857143	1
Q9	1	1	1	1	1	1	1		6	0.857143	1
Q10	1	1	1	1	1	1	1		7	1	1
Q11	0	1	1	1	1	1	1		6	0.857143	0
Q12	1	1	1	1	1	1	1		6	0.857143	1
Q13	1	1	1	1	1	1	1		7	1	1
Q14	1	1	1	1	1	1	1		7	1	1
Q15	0	1	1	1	1	1	1		6	0.857143	0
Q16	1	1	1	1	1	1	1		7	1	1
Q17	1	1	1	1	1	1	1		7	1	1
Q18	0	1	1	1	1	1	1		6	0.857143	0
Q19	0	1	1	1	1	1	1		6	0.857143	0
Q20	1	1	1	1	1	1	1		7	1	1
Q21	1	1	1	1	1	1	1		7	1	1
Q22	1	1	1	1	1	1	1		7	1	1
Q23	1	1	1	1	1	1	1		7	1	1
Q24	0	1	1	1	1	1	1		6	0.857143	0
Q25	1	1	1	1	1	1	1		7	1	1

Item Number	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7		Expert in Agreement (out of 7)	I-CVI	UA
Q26	1	1	1	1	1	1	1		7	1	1
Q27	0	1	1	1	1	1	1		6	0.857143	0
Q28	1	1	1	1	1	1	1		7	1	1
Q29	1	1	1	1	1	1	1		7	1	1
Q30	1	1	1	1	1	1	1		7	1	1
Q31	1	1	1	1	1	1	1		7	1	1
Q32	0	1	1	1	1	1	1		6	0.857143	0
Q33	1	1	1	1	1	1	1		7	1	1
Q34	0	1	1	1	1	1	1		6	0.857143	0
Q35	1	1	1	1	1	1	1		7	1	1
Q36	0	1	1	1	1	1	1		6	0.857143	0
Q37	0	1	1	1	1	1	1		6	0.857143	0
Q38	1	1	1	1	1	1	1		7	1	1
Q39	1	1	1	1	1	1	1		7	1	1
Q40	0	1	1	1	1	1	1		6	0.857143	0
Q41	1	1	1	1	1	1	1		7	1	1
Q42	1	1	1	1	1	1	1		7	1	1
Q43	1	1	1	1	1	1	1		7	1	1
Q44	1	1	1	1	1	1	1		7	1	1
Q45	1	1	1	1	1	1	1		7	1	1
Q46	1	1	1	1	1	1	1		7	1	1
Q47	1	1	1	1	1	1	1		7	1	1
Q48	1	1	1	1	1	1	1		7	1	1
Q49	1	1	1	1	1	1	1		7	1	1
Q50	1	1	1	1	1	1	1		7	1	1
Q51	1	1	1	1	1	1	1		7	1	1
	37	51	51	51	51	51	51		S-CVI/Ave	0.95	37
	0.71	0.98	0.98	0.98	0.98	0.98	0.98	0.942308	S-CVI/UA (Universal Agreement)		0.71

**Table 3: Socio-demographic details**

Demographic	Category	Frequency	Percent (%)
<b>Age (in years)</b>	18-30	344	77.3
	31-40	71	16
	41-50	25	5.6
	51-60	4	0.9
	60 and above	1	0.2
<b>Gender</b>	Male	174	39.1
	Female	271	60.9

Demographic	Category	Frequency	Percent (%)
<b>Education</b>	Illiterate	1	0.2
	Primary school	1	0.2
	Middle school	3	0.7
	High school	47	10.6
	Intermediate/Diploma	66	14.8
	Graduate	259	58.2
	Professional degree	68	15.3
<b>Occupation</b>	Unemployed	233	52.4
	Elementary occupation	56	12.6
	Plant and machine operators	1	0.2
	Craft and related trade workers	9	2
	Skilled agricultural workers	7	1.6
	Skilled workers, sales workers	36	8.1
	Clerk	10	2.2
	Technicians/Associate professionals	11	2.5
	Professional	68	15.3
	Legislators, managers	14	3.1
<b>Monthly Family Income</b>	= Rs. 6,767	41	9.2
	Rs. 6,768 - Rs. 20,273	42	9.4
	Rs. 20,274 - Rs. 33,792	51	11.5
	Rs. 33,793 - Rs. 50,559	89	20
	Rs. 50,560 - Rs. 67,586	92	20.7
	Rs. 67,587 - Rs. 1,35,168	63	14.2
	= Rs. 1,35,169	67	15.1
<b>Marital Status</b>	Single	309	69.4
	Married	132	29.7
	Divorced	2	0.4
	Separated	2	0.4
<b>Family Type</b>	Nuclear	269	60.4
	Joint	176	39.6
<b>Socio-Economic Status (SES)</b>	Lower (V)	12	2.7
	Upper Lower (IV)	55	12.4
	Lower Middle (III)	101	22.7
	Upper Middle (II)	234	52.6
	Upper (I)	43	9.7

**Table 4: Summary of the measurement model.**

Construct	Indicator	Factor Loading	Cronbach's Alpha	Composite Reliability (rho_a)	Composite reliability (rho_c)	Square Root of Average Variance Extracted (SqrtAVE)
<b>ATT_Attitude</b>	ATT 1	0.529	0.811	0.815	0.808	0.615
	ATT 2	0.672				
	ATT 3	0.587				
	ATT 4	0.538				
	ATT 5	0.566				
	ATT 6	0.682				
	ATT 7	0.706				

Construct	Indicator	Factor Loading	Cronbach's Alpha	Composite Reliability (rho_a)	Composite reliability (rho_c)	Square Root of Average Variance Extracted (SqrtAVE)
<b>CoC_Co-Creation</b>	CoC 1	0.585	0.863	0.863	0.858	0.566
	CoC 2	0.514				
	CoC 3	0.567				
	CoC 4	0.532				
	CoC 5	0.467				
	CoC 6	0.543				
	CoC 7	0.583				
	CoC 8	0.584				
	CoC 9	0.686				
	CoC 10	0.451				
	CoC 11	0.533				
	CoC 12	0.675				
	CoC 13	0.596				
<b>INT_Intention</b>	INT 1	0.331	0.719	0.734	0.723	0.526
	INT 2	0.616				
	INT 3	0.575				
	INT 4	0.525				
	INT 5	0.509				
	INT 6	0.527				
	INT 7	0.553				
<b>PBC_Perceived Behavioural Control</b>	PBC 1	0.687	0.616	0.630	0.616	0.593
	PBC 2	0.586				
	PBC 3	0.493				
<b>RCB_Responsible Consumer Behaviour</b>	RCB 1	0.601	0.768	0.768	0.750	0.508
	RCB 2	0.582				
	RCB 3	0.494				
	RCB 4	0.379				
	RCB 5	0.470				
	RCB 6	0.601				
	RCB 7	0.553				
	RCB 8	0.537				
	RCB 9	0.363				
<b>SN_Subjective Norms</b>	SN 1	0.638	0.819	0.819	0.817	0.653
	SN 2	0.583				
	SN 3	0.663				
	SN 4	0.667				
	SN 5	0.691				
	SN 6	0.674				
<b>CoC_Co-Creation x INT Intention</b>		1.000				

**Table 5: Discriminant validity assessment (HTMT).**

	ATT_Attitude	CoC_Co-Creation	INT_Intention	PBC_Perceived Behavioural Control	RCB_Responsible Consumer Behaviour	SN_Subjective Norms	CoC_Co-Creation x INT_Intention
<b>ATT_Attitude</b>							
<b>CoC_Co-Creation</b>	0.596						
<b>INT_Intention</b>	0.625	0.576					
<b>PBC_Perceived Behavioural Control</b>	0.558	0.525	0.697				
<b>RCB_Responsible Consumer Behaviour</b>	0.629	0.731	0.716	0.869			
<b>SN_Subjective Norms</b>	0.335	0.461	0.711	0.677	0.520		
<b>CoC_Co-Creation x INT_Intention</b>	0.128	0.319	0.194	0.085	0.283	0.063	

**Table 6: Hypothesis testing**

	Path Coefficient	Standard deviation (STDEV)	Standard Error (SE)	T statistics ( O/STDEV )	P values	Results
H1: ATT_Attitude -> INT_Intention	<b>0.371</b>	0.043	0.00204	7.252	0.000	Supported
H2: SN_Subjective Norms -> INT_Intention	<b>0.485</b>	0.044	0.0021	9.078	0.000	Supported
H3: PBC_Perceived Behavioural Control -> INT_Intention	<b>0.162</b>	0.047	0.00223	3.373	0.001	Supported
H4: INT_Intention -> RCB_Responsible Consumer Behaviour	<b>0.443</b>	0.046	0.00219	7.220	0.000	Supported
H5: CoC_Co-Creation -> RCB_Responsible Consumer Behaviour	<b>0.438</b>	0.043	0.00204	9.807	0.000	Supported
H6: CoC_Co-Creation x INT_Intention -> RCB_Responsible Consumer Behaviour	<b>0.086</b>	0.027	0.00129	2.759	0.006	Supported

**Table 7: Model Fitness**

	Saturated model	Estimated model
SRMR	0.081	0.083
d_ULS	6.766	7.102
d_G	1.674	1.721
Chi-square	3654.822	3731.910
NFI	0.574	0.565

Figure 1: Research Framework

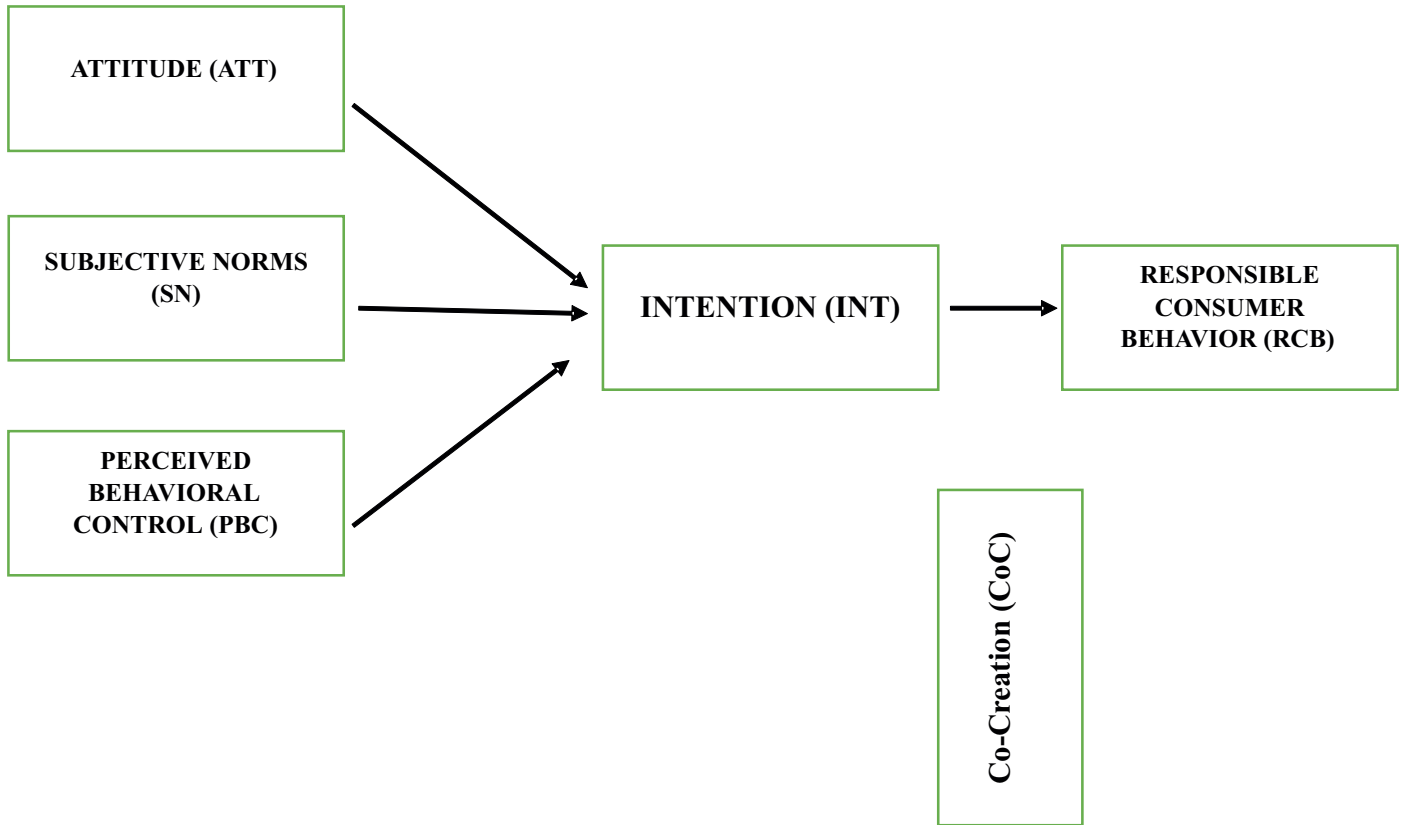


Figure 2: Measurement Model

