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Assessment of public intention in polyethylene terephthalate (PET) plastic bottle waste sorting in Yogyakarta using the theory of planned behavior with a deposit refund system scheme

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ABSTRACT

The increasing amount of plastic waste in urban areas has become one of the major environmental challenges in Indonesia, including in Yogyakarta City. This study aims to analyze the factors influencing public intention to participate in the Deposit Return System (DRS) for Polyethylene Terephthalate (PET) bottle waste management using an extended Theory of Planned Behavior (TPB) framework. The study integrates additional variables, including environmental awareness, public information, religious or moral norms, economic consequences, convenience, social factors, technology, and institutional support. A quantitative explanatory approach was employed through the distribution of online questionnaires to 200 respondents in Yogyakarta City. Data were analyzed using Structural Equation Modeling based on Partial Least Squares (SEM-PLS). The results indicate that attitude, subjective norm, and perceived behavioral control positively and significantly influence intention to participate in the DRS program. Subjective norm was identified as the most dominant factor influencing intention. Environmental awareness significantly influenced attitude, while public information significantly influenced subjective norm and perceived behavioral control. Convenience and economic consequence also positively affected perceived behavioral control. However, religious or moral norms, technology, and institutional support did not show significant effects on several TPB constructs. The findings indicate that social influence, system convenience, and economic incentives are the main factors encouraging public participation in PET bottle recycling through the DRS program. This study contributes to the development of the Theory of Planned Behavior in the context of sustainable waste management and provides practical recommendations for policymakers in designing effective recycling programs.

INTRODUCTION

Sustainable waste management has become one of the most pressing environmental challenges worldwide, particularly in rapidly urbanizing regions of developing countries. Increasing population growth, consumption patterns, and urban activities have significantly increased municipal solid waste generation, while waste management infrastructure and recycling capacity often remain inadequate (Fan et al., 2019; Knickmeyer, 2020; Yuriev et al., 2020). In Indonesia, household waste constitutes the largest proportion of municipal solid waste, making public participation a critical factor

in achieving sustainable waste management objectives. Recent studies have emphasized that waste segregation at source is one of the most effective strategies for improving recycling efficiency, reducing landfill dependency, and supporting the transition toward a circular economy (Zhang et al., 2015; Feil et al., 2016; Trushna et al., 2024). Furthermore, systematic reviews indicate that behavioral interventions and public participation are essential components of successful waste segregation programs worldwide.

In the Special Region of Yogyakarta, waste management has become an increasingly urgent

issue due to growing waste generation and limited landfill capacity. To address this challenge, the Yogyakarta City Government introduced the Zero Inorganic Waste policy, encouraging waste reduction and segregation practices at the community level. However, achieving effective implementation requires not only adequate infrastructure but also strong public participation and behavioral change. Previous studies have demonstrated that waste segregation behavior is influenced by a combination of psychological, social, economic, and institutional factors, suggesting that technical solutions alone are insufficient to ensure sustainable waste management outcomes (Knickmeyer, 2020; Zhang et al., 2021; Lee et al., 2024).

One promising approach for increasing recycling rates is the Deposit Refund System (DRS), which provides financial incentives to consumers for returning used beverage containers. DRS has been successfully implemented in several countries and has demonstrated substantial improvements in collection and recycling rates for plastic bottles and other beverage packaging materials (Hogg et al., 2022; Amirudin et al., 2023). Evidence from European countries indicates that DRS can achieve return rates exceeding 90%, making it one of the most effective policy instruments for promoting circular economy practices and reducing plastic pollution. Recent experiences in Romania further demonstrate that a well-designed DRS supported by digital tracking systems, financial incentives, and institutional collaboration can significantly improve public participation in recycling programs.

To understand public participation in environmental programs, researchers have widely adopted the Theory of Planned Behavior (TPB). Numerous studies have confirmed that attitude, subjective norms, and perceived behavioral control significantly influence waste segregation, recycling, and other pro-environmental behaviors (Maichum et al., 2016; Wan et al., 2017; Kumar, 2019; Ayob et al., 2017; Jampala & Shivnani, 2024). Recent investigations in developing countries continue to support the applicability of TPB in explaining household waste sorting intentions and behaviors (Cao et al., 2022; Lou et al., 2022; Ly & Ly, 2022; Adu-Gyamfi et al., 2023). Furthermore, comparative studies involving different

demographic groups have shown that TPB variables remain robust predictors of waste separation intentions across various social contexts.

Despite its strong explanatory power, several scholars argue that the original TPB framework is insufficient to capture the complexity of environmental behavior because it primarily focuses on psychological determinants. Consequently, recent studies have extended TPB by incorporating additional variables such as environmental awareness, environmental concern, environmental knowledge, and consequence awareness (Emekci, 2019; Kumar, 2019; Razali et al., 2021; Pan & Liu, 2024). These studies consistently report that individuals with higher environmental awareness are more likely to engage in recycling and waste segregation activities. Meta-analytic evidence also suggests that knowledge and awareness play significant roles in strengthening behavioral intentions toward environmental practices.

In addition to environmental awareness, public information and environmental education have been identified as important determinants of recycling participation. Educational campaigns, access to environmental information, and public communication programs can enhance individuals' understanding of environmental issues and encourage sustainable behavior (Nguyen et al., 2022; Lee et al., 2024; Zhang et al., 2021). Systematic reviews further indicate that information-based interventions are among the most effective approaches for promoting waste segregation and recycling behavior at the household level.

Economic incentives are also recognized as critical drivers of pro-environmental behavior. Several studies have demonstrated that financial rewards, refund mechanisms, and perceived economic benefits positively influence recycling participation and waste recovery activities (Calcott & Walls, 2005; Hogg et al., 2022; Amirudin et al., 2023). The success of DRS programs in various countries highlights the importance of economic consequences in motivating individuals to return recyclable materials rather than disposing of them as waste. Similarly, convenience factors such as accessibility of collection facilities, ease of participation, and time efficiency have been shown to significantly affect recycling intentions and

actual behavior (Sidique et al., 2010; Knickmeyer, 2020; Ahmed & Khurram, 2025).

Recent literature also highlights the growing importance of technological support in waste management systems. Smart waste management technologies, digital platforms, reverse vending machines, mobile applications, and automated collection systems can improve system transparency, user convenience, and operational efficiency (Nemat et al., 2023; Suhardono et al., 2025). Integrated technology-based waste management frameworks have been identified as key enablers for increasing citizen engagement and supporting circular economy initiatives.

Institutional support likewise plays a significant role in shaping environmental behavior. Government regulations, educational institutions, community organizations, and policy interventions contribute to the development of environmental norms and social influence mechanisms that encourage public participation in waste management programs (Lee et al., 2024; Zhang et al., 2021; Adu-Gyamfi et al., 2023). Studies consistently report that institutional commitment strengthens public trust and enhances the effectiveness of environmental policies and recycling initiatives.

Several previous studies share similarities with the present research by applying the Theory of Planned Behavior (TPB) and its extensions to explain waste segregation, recycling, and pro-environmental intentions (Maichum et al., 2016; Ayob et al., 2017; Wan et al., 2017; Kumar, 2019; Cao et al., 2022; Lou et al., 2022; Ly & Ly, 2022; Adu-Gyamfi et al., 2023; Jampala & Shivnani, 2024). Similar to these studies, the current research seeks to explain public intention toward environmentally responsible behavior using TPB as the main theoretical foundation. Previous research has also highlighted the importance of environmental awareness, environmental knowledge, economic incentives, convenience, technological support, and institutional interventions in promoting recycling participation and sustainable waste management practices (Emekci, 2019; Nguyen et al., 2022; Hogg et al., 2022; Nemat et al., 2023; Lee et al., 2024; Bang et al., 2025). These findings suggest that both psychological and contextual factors play important roles in shaping pro-environmental behavior.

However, this study differs from previous research in several important aspects. First, most existing studies focus on general recycling behavior, household waste segregation, e-waste management, or green consumption behavior (Maichum et al., 2016; Kumar, 2019; Razali et al., 2021; Cao et al., 2022), whereas the present study specifically investigates public intention to participate in a Deposit Refund System (DRS) for PET bottle waste management. Second, previous studies generally examine behavioral, economic, technological, or institutional factors separately or only incorporate a limited number of external variables into the TPB framework (Yuriev et al., 2020; Adu-Gyamfi et al., 2023; Nemat et al., 2023). In contrast, this study develops a more comprehensive model by simultaneously integrating environmental awareness, public information, economic consequences, convenience, technology, social influence, and institutional support within an extended TPB framework. Third, while DRS has been extensively studied and implemented in developed countries (Hogg et al., 2022; Amirudin et al., 2023), empirical evidence regarding public acceptance and participation in DRS programs remains limited in Indonesia, particularly in urban areas experiencing waste management transitions such as Yogyakarta. Therefore, this study provides a unique contribution by examining the behavioral determinants of DRS participation within the Indonesian context and by offering a more holistic framework for understanding community participation in circular economy initiatives.

Although previous studies have provided valuable insights into recycling and waste segregation behavior, most research has examined behavioral, economic, technological, and institutional factors separately. Existing studies rarely integrate environmental awareness, public information, economic consequences, convenience, technology, social influence, and institutional support within a single analytical framework, particularly in the context of Deposit Refund System implementation in developing countries (Yuriev et al., 2020; Razali et al., 2021; Nemat et al., 2023). Moreover, empirical studies investigating public intention to participate in a PET bottle Deposit Refund System in Indonesian urban areas remain limited. This gap is particularly important in

cities undergoing waste management transitions, such as Yogyakarta.

Therefore, this study aims to develop an extended Theory of Planned Behavior model by integrating environmental awareness, public information, economic consequences, convenience, technology, social influence, and institutional support to explain public intention toward PET bottle waste management through a Deposit Refund System. Specifically, this study seeks to analyze the determinants of community participation in DRS implementation in Yogyakarta and provide evidence-based recommendations for strengthening circular economy policies and sustainable waste management practices in Indonesia.

METHODS

Research Design

This study employed a quantitative explanatory research design with a correlational approach to examine the relationships among latent variables influencing public intention to sort Polyethylene Terephthalate (PET) bottle waste through the Deposit Refund System (DRS). Quantitative explanatory research is appropriate for testing theoretical relationships and examining causal associations among constructs using empirical data (Creswell & Creswell, 2018). The conceptual model was developed based on the Theory of Planned Behavior (TPB) proposed by Ajzen (1991), which explains behavioral intention through attitude, subjective norm, and perceived behavioral control. To better capture the complexity of public participation in DRS, the original TPB framework was extended by incorporating environmental awareness, public information, religious/moral norms, economic consequences, convenience, social factors, technology, and institutional support, following previous studies on

recycling and waste management behavior (Amirudin et al., 2023; Lee et al., 2024).

Data Collection Methods

Data were collected using a structured online questionnaire distributed to residents of Yogyakarta City. Questionnaire-based surveys are widely used in behavioral and environmental studies because they enable efficient collection of standardized responses from a large population (Sekaran & Bougie, 2016). The measurement items were adapted from previously validated instruments related to TPB, recycling behavior, and Deposit Refund Systems (Ajzen, 1991; Amirudin et al., 2023; Lee et al., 2024). Responses were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), which is commonly applied in social science research to measure perceptions, attitudes, and intentions.

A total of 200 respondents participated in this study, which meets the recommended minimum sample size for Structural Equation Modeling based on Partial Least Squares (SEM-PLS). The sampling technique applied was non-probability sampling with a purposive sampling approach. Respondents were selected based on specific criteria, including residing in Yogyakarta City, being between 18 and 54 years old, having consumed beverages packaged in Polyethylene Terephthalate (PET) plastic bottles, and possessing basic knowledge or experience related to household waste management.

In addition to the main variables, the questionnaire also collected respondents' socio-economic profile data, including gender, age, educational level, occupation, and income level. This information provides an overview of respondent characteristics and supports the interpretation of research findings. A summary of the respondents' socio-economic profile is presented in Table 1.

Table 1. Respondents' socio-economic profile

Characteristics	Category	Frequency	Percentage (%)
Number of Responden		200	100,0
Gender	Male	96	48,0
	Female	104	52,0
Age (year)	18 – 30	61	30,5
	30 – 42	83	41,5
	42 – 54	56	28,0
Educational Level	School	58	29,0
	Bachelor	95	47,5
	Graduate	47	23,5
PET Bottle Consumption (items/week)	1 – 3	124	62,0
	4 – 6	52	26,0
	7 – 9	13	6,5
	> 9	11	5,5
Monthly Income (IDR)	< 2 million	74	37,0
	2 – 5 million	51	25,5
	5 – 10 million	50	25
	> 10 million	25	12,5
Acceptable range of Deposit	0	51	25,5
	500	53	26,5
	1000	58	29,0
	1500	38	19,0

Research Model and Hypotheses

The research model was developed based on the Theory of Planned Behavior (Ajzen, 1991), which posits that intention is determined by attitude, subjective norm, and perceived behavioral control. In line with recent studies, additional contextual variables were incorporated to improve the explanatory power of the model in the context of PET bottle waste management through DRS (Amirudin et al., 2023; Lee et al., 2024). The proposed hypotheses were formulated based on established theoretical relationships and empirical findings reported in previous studies on recycling behavior, environmental awareness, and circular economy participation.

The research model used in this study is presented in Fig. 1, which illustrates the structural relationships among variables within an extended Theory of Planned Behavior (TPB) framework. The model integrates internal psychological factors, attitude, subjective norm, and perceived behavioral control with several external variables, including environmental awareness, public information, religious or moral norms, economic consequences, convenience, social norms, technology, and institutional support. These variables are structured

to explain public intention to participate in plastic waste sorting through the Deposit Refund System (DRS).

As shown in Figure 1, environmental awareness is hypothesized to influence both attitude and subjective norm. Individuals with higher awareness of environmental issues, particularly plastic pollution, tend to develop more positive evaluations toward environmentally responsible behavior. Therefore, environmental awareness is expected to positively influence attitude toward DRS (H1) and subjective norm (H2), as individuals also perceive stronger social expectations to engage in such behavior.

Public information is another key factor in the model, as it enhances knowledge and understanding of the DRS mechanism. Adequate and accessible information can shape a more favorable attitude toward DRS (H3) and strengthen subjective norms by creating shared understanding within the community (H4). Additionally, public information increases individuals' confidence in their ability to participate, thereby positively influencing perceived behavioral control (H5).

Religious or moral norms are incorporated into the model to capture the influence of ethical and

spiritual values on behavior. In contexts where moral responsibility toward the environment is emphasized, individuals are more likely to develop positive attitudes toward DRS (H6) and experience stronger subjective norms due to perceived moral and social obligations (H7).

Convenience is hypothesized to directly influence perceived behavioral control. When DRS facilities are easily accessible and the process is simple, individuals perceive fewer barriers to participation. Thus, convenience positively affects perceived behavioral control (H8). Similarly, economic consequence is expected to influence perceived behavioral control (H9), as financial incentives such as deposit refunds increase individuals' perceived benefits and feasibility of engaging in the system.

Social norms also play a significant role in shaping behavior. Observing others' participation in waste sorting can foster positive attitudes toward DRS (H10) and strengthen subjective norms through increased social pressure to conform (H11). In addition, technology is included in the model as a facilitating factor. The use of digital systems and applications can simplify participation and improve

efficiency, thereby enhancing perceived behavioral control (H12).

Institutional support, particularly from educational institutions, is expected to influence both attitude and subjective norm. Educational programs and sustainability initiatives can foster positive perceptions of DRS (H13) and create social environments that encourage participation (H14).

Finally, consistent with the TPBL framework, attitude, subjective norm, and perceived behavioral control act as direct determinants of intention. A positive attitude toward DRS increases the likelihood of participation (H15), stronger subjective norms enhance social pressure to engage in the behavior (H16), and higher perceived behavioral control reflects greater confidence in one's ability to participate (H17).

Overall, the model presented in Fig. 1 demonstrates that intention to participate in the DRS system is influenced by a combination of psychological factors and external contextual variables, forming a comprehensive framework for analyzing public behavior in plastic waste management.

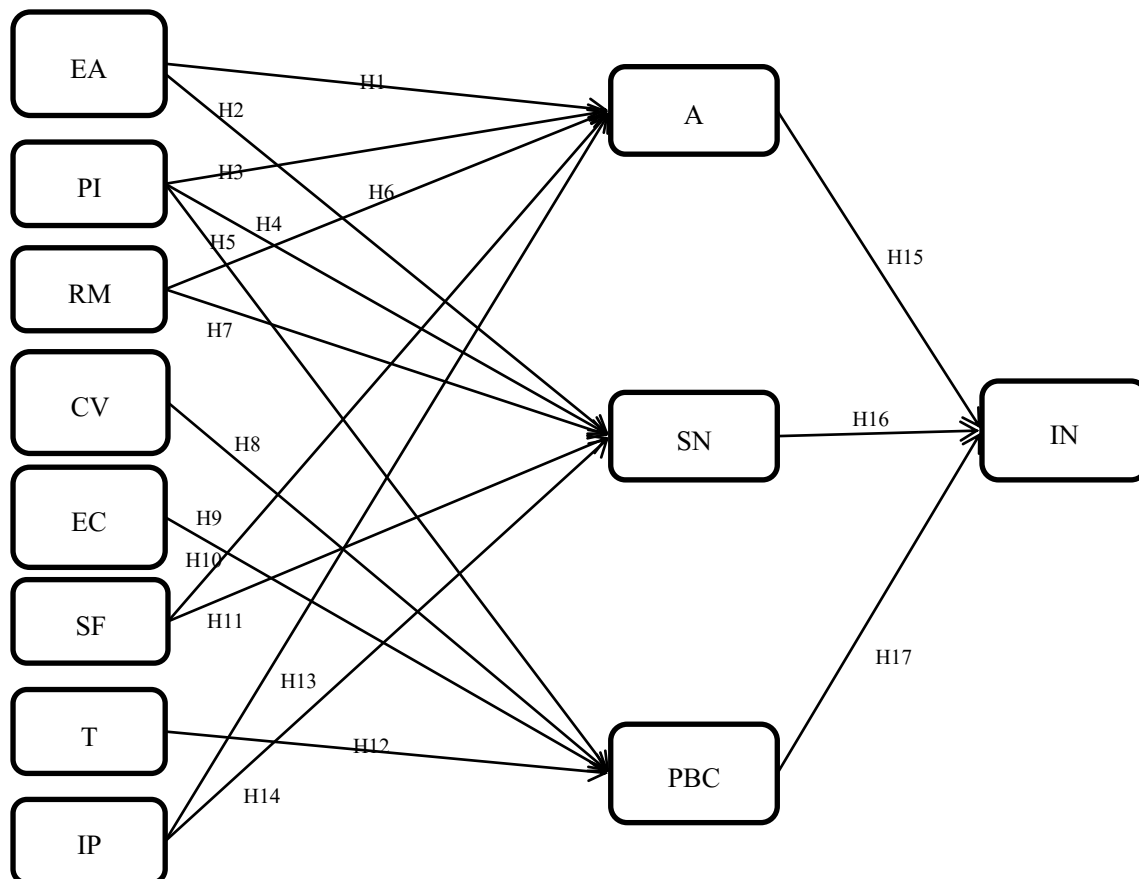


Figure 1. Research model

Instrument Validation

The content validity of the questionnaire was assessed using the Content Validity Ratio (CVR) proposed by Lawshe (1975) and the Item-Level Content Validity Index (I-CVI) recommended by Polit and Beck (2006). Three experts evaluated each questionnaire item based on relevance, clarity, and representativeness. According to Lawshe (1975), a higher CVR value indicates stronger agreement among experts regarding the essentiality of an item. Similarly, Polit and Beck (2006) suggested that I-CVI values close to 1.00 indicate excellent content validity. The questionnaire items used in this study were adapted from previously validated scales to ensure conceptual consistency and measurement accuracy (Ajzen, 1991; Amirudin et al., 2023; Lee et al., 2024). This validation process involved three experts with extensive experience in environmental management, circular economy, and behavioral research, each having more than five years of professional or academic expertise in their respective fields.

Each expert evaluated all questionnaire items based on their relevance to the corresponding construct using a structured rating scale. The evaluation criteria included clarity of wording, conceptual relevance, and the ability of each item to accurately measure the intended latent variables within the framework of the Theory of Planned Behavior (TPB) and the Deposit Refund System (DRS).

The results of expert judgment were analyzed using the Content Validity Ratio (CVR) and Item-level Content Validity Index (I-CVI). The analysis showed that all indicators achieved a CVR value of 1 and an I-CVI value of 1, indicating unanimous agreement among experts that all items were essential and highly relevant. Therefore, no items were removed or revised, and all indicators were retained for the final data collection.

To provide a clear overview of the measurement instrument, the list of questionnaire items used in this study is presented in Table 2.

Table 2. List of variables and questionnaire items related to intention for DRS in PET bottle waste.

Variable	Variable Definition	Questionnaire Items	Reference
<i>Attitude (A)</i>	Individual positive or negative evaluation toward sorting PET bottle waste using DRS.	1. I believe that sorting PET waste helps protect the environment. 2. I feel happy when participating in the DRS system. 3. Returning plastic bottles for recycling is beneficial.	(Lee et al., 2024)
<i>Subjective Norm (SN)</i>	Perceived social pressure from important others to participate in DRS.	1. My family encourages me to sort PET waste. 2. My friends and neighbors think sorting waste is important. 3. I feel encouraged because people around me also sort waste.	(BLanlg et al., 2025)
<i>Perceived Behavioral Control (PBC)</i>	Individual perception of ease or difficulty in performing waste sorting behavior.	1. I am capable of sorting and returning PET waste easily. 2. I know where to return plastic bottles. 3. I am confident I can participate in DRS without difficulty.	(Lee et al., 2024)
<i>Environmental Awareness (EA)</i>	Level of knowledge, concern, and awareness about environmental issues.	1. I understood the negative impacts of plastic waste on the environment. 2. I care about environmental sustainability. 3. I believe DRS can reduce plastic pollution.	(Amirudin et al., 2023)

Variable	Variable Definition	Questionnaire Items	Reference
Public Information (PI)	Availability and clarity of information received about DRS.	1. I receive sufficient information about the DRS program. 2. The information I receive increases my willingness to participate. 3. Information about plastic waste management is clear and understandable.	(Amirudin et al., 2023)
Religious/ Moral Norm (RM)	Religious and moral values influencing environmental responsibility.	1. My religion teaches the importance of protecting the environment. 2. I feel guilty if I litter. 3. Sorting waste is part of my moral responsibility.	(Amirudin et al., 2023)
Economic Consequences (EC)	Perceived economic benefits obtained from DRS.	1. Financial incentives motivate me to participate in DRS. 2. Incentives increase my enthusiasm to sort waste. 3. DRS can help increase income.	(Amirudin et al., 2023)
Convenience (CV)	Perceived ease of accessing and using the DRS system.	1. Return locations for plastic bottles are easily accessible. 2. The return process is simple and fast. 3. Operational hours of DRS facilities are flexible.	(Amirudin et al., 2023)
Social Factors (SF)	Influence of social environment on waste sorting behavior.	1. I am motivated to sort waste because others do it. 2. I feel embarrassed if I do not sort waste. 3. Social support increases my intention to participate in DRS.	(Lee et al., 2024; Wardanli et al., 2025)
Technology (T)	Perception of technology supporting DRS implementation.	1. Digital systems help me find DRS locations. 2. Technology simplifies waste collection and recycling. 3. I am more interested in DRS if it is integrated with digital systems.	(Suhardonlo et al., 2025)
Institutional Support (IP)	Institutional support from educational organizations in promoting pro-environmental behavior.	1. Educational institutions actively promote DRS programs. 2. Institutions encourage students and staff to participate in DRS. 3. Institutions should implement policies supporting DRS.	(Linlg et al., 2025; Lee et al., 2024)
Intention (IN)	The willingness and readiness of individuals to participate in PET bottle waste separation through DRS.	1. I am interested in DRS initiatives. 2. I intended to return PET bottle waste through the DRS program. 3. I am willing to participate in environmental movement programs related to recycling.	(Amirudin et al., 2023)

Data Analysis Technique

Data analysis was conducted using Structural Equation Modeling based on Partial Least Squares

(SEM-PLS). SEM-PLS is suitable for predictive and exploratory research involving complex models with multiple latent constructs and does not require

strict assumptions of multivariate normality (Hair et al., 2022). In addition, SEM-PLS has been widely adopted in sustainability, environmental management, and circular economy research because of its ability to estimate complex causal relationships, handle relatively small sample sizes, and maximize the explained variance of endogenous constructs (Sarstedt et al., 2022; Cepeda-Carrion et al., 2019). Recent studies also emphasize that PLS-SEM provides robust predictive performance and is particularly appropriate when the primary objective is theory development and prediction rather than covariance reproduction (Rigdon et al., 2023).

The analysis consisted of two stages: evaluation of the measurement model (outer model) and evaluation of the structural model (inner model). Convergent validity was assessed using outer loading values (>0.70) and Average Variance Extracted (AVE >0.50), while reliability was evaluated using Cronbach's Alpha and Composite Reliability (>0.70) (Hair et al., 2022; Henseler et al., 2015). Discriminant validity was further confirmed using the Heterotrait-Monotrait (HTMT) ratio, which has become the recommended criterion for assessing construct distinctiveness in variance-based SEM (Henseler et al., 2015). Hypothesis testing was performed using the bootstrapping procedure recommended by Hair et al. (2022), with significance determined by t-statistics greater than 1.96 and p-values below 0.05.

Research Framework

The research framework integrates the original Theory of Planned Behavior (Ajzen, 1991) with contextual determinants identified in previous studies on recycling and environmental behavior. Environmental awareness, public information, religious/moral norms, economic consequences, convenience, social factors, technology, and institutional support were modeled as antecedents of attitude, subjective norm, and perceived behavioral control. These constructs subsequently influence behavioral intention to participate in the Deposit Refund System.

The integration of contextual variables into the TPB framework is consistent with recent international studies demonstrating that pro-environmental behavior is shaped not only by individual psychological factors but also by institutional, technological, economic, and social conditions that facilitate sustainable actions (Yuriev

et al., 2020; Amirudin et al., 2023; Lee et al., 2024). Furthermore, research on circular economy practices has shown that environmental awareness, policy support, and access to recycling infrastructure significantly strengthen individuals' intention to participate in waste recovery systems (Kirchherr et al., 2023; Geissdoerfer et al., 2020; Wang et al., 2023). Therefore, incorporating these contextual determinants into the TPB framework is expected to provide a more comprehensive explanation of public behavioral intention toward participating in the Deposit Refund System.

RESULTS AND DISCUSSION

Descriptive Statistical Analysis

Table 1 presents the socio-economic profile of 200 respondents involved in this study. The sample consists of 96 male respondents (48.0%) and 104 female respondents (52.0%), indicating a relatively balanced gender distribution. In terms of age, the majority of respondents fall within the productive age group, with 41.5% aged between 30–42 years, followed by 30.5% aged 18–30 years, and 28.0% aged 42–54 years. This distribution suggests that most respondents are mature individuals who are likely to make independent decisions regarding environmental behavior.

Regarding educational background, most respondents hold a bachelor's degree (47.5%), followed by school-level education (29.0%) and graduate-level education (23.5%). This indicates that the sample is relatively well-educated, which is important in understanding awareness and participation in environmental programs such as the Deposit Refund System (DRS).

In terms of PET bottle consumption, the majority of respondents (62.0%) consume between 1–3 bottles per week, while 26.0% consume 4–6 bottles per week. A smaller proportion consumes 7–9 bottles (6.5%) and more than 9 bottles (5.5%) per week. These findings indicate that PET bottle usage is common among respondents, although generally at a moderate level.

For monthly income, most respondents earn less than IDR 2 million (37.0%), followed by those earning between IDR 2–5 million (25.5%) and IDR 5–10 million (25.0%). Only 12.5% of respondents have an income above IDR 10 million. This suggests that the sample represents a diverse

economic background, with a dominance of lower-to middle-income groups.

Regarding the acceptable deposit value for PET bottle waste, 25.5% of respondents prefer no deposit (IDR 0), while 26.5% consider IDR 500 acceptable. A larger proportion of respondents (29.0%) prefer a deposit value of IDR 1000, and 19.0% prefer IDR 1500. These results indicate that most respondents are willing to accept a deposit scheme within the range of IDR 500 to IDR 1000. This finding provides important insights for policymakers in determining an appropriate deposit value that can encourage public participation in the DRS program.

Hypothesis Testing Result

The results of the hypothesis testing presented in Table 3 indicate that not all relationships between variables have significant effects. The analysis was conducted using the bootstrapping method in SEM-PLS by examining the path coefficient, T-statistic, and P-values. Relationships between variables are considered significant when the P-values are below 0.05 and the T-statistic values exceed 1.96. The path coefficient value indicates the direction and strength of the relationship between variables. A higher path coefficient reflects a stronger influence of one variable on another, while a positive coefficient indicates a positive relationship between variables.

Based on the results presented in Table 3, Environmental Awareness (EA) has a positive and significant effect on Attitude (A), with a path coefficient of 0.421 and a P-value of 0.000. This finding indicates that higher environmental awareness leads to a more positive attitude toward the implementation of the Deposit Return System (DRS). This result is consistent with the study conducted by Amirudin et al. (2023), which also found a significant effect of environmental awareness on attitude with a higher coefficient value of 0.667. However, in this study, EA does not significantly influence Subjective Norm (SN), which differs from the findings of Amirudin et al. (2023). This suggests that environmental awareness in the present study mainly shapes personal attitudes rather than social pressure or perceived social expectations.

Public Information (PI) does not significantly affect Attitude (A), which contrasts with Amirudin et al. (2023), who reported a significant relationship

between public information and attitude. Nevertheless, PI has a positive and significant influence on Subjective Norm (SN) and Perceived Behavioral Control (PBC). These findings indicate that information regarding DRS is more effective in strengthening social encouragement and individuals' confidence to participate in the system rather than directly shaping personal attitudes.

Religious/Moral Norm (RM) also does not significantly influence Attitude (A) or Subjective Norm (SN) in this study. This finding differs from Amirudin et al. (2023), who found significant positive relationships between religious norms, attitude, and subjective norm. The difference suggests that respondents in the present study are more influenced by practical and social considerations than by moral or religious values in waste sorting behavior.

Convenience (CV) and Economic Consequence (EC) positively and significantly influence Perceived Behavioral Control (PBC). These results are consistent with Amirudin et al. (2023), confirming that accessible facilities, simple return procedures, and financial incentives are important factors that increase individuals' confidence in participating in DRS activities. The findings imply that practical convenience and economic benefits remain essential determinants in promoting recycling behavior.

Social Factors (SF) do not significantly affect Attitude (A), but they have a strong positive influence on Subjective Norm (SN), with one of the highest path coefficient values in the model. This finding indicates that social environments, including family, friends, and surrounding communities, play a major role in shaping perceived social pressure regarding participation in DRS programs. Compared with Amirudin et al. (2023), the present study highlights the stronger dominance of social influence in encouraging recycling intention.

Technology (T) does not significantly influence Perceived Behavioral Control (PBC), indicating that digital support systems are not yet considered a primary factor in facilitating waste sorting behavior. Likewise, Institutional Support (IS/IP) does not significantly influence Attitude (A) or Subjective Norm (SN), suggesting that institutional programs related to DRS implementation may not yet be sufficiently visible or effective among respondents.

Regarding the main constructs of the Theory of Planned Behavior (TPB), Attitude (A), Subjective Norm (SN), and Perceived Behavioral Control (PBC) all positively and significantly influence Intention (IN). However, unlike the findings of Amirudin et al. (2023), where attitude was the strongest predictor of intention, the present study shows that Subjective Norm has the strongest influence on intention. This finding suggests that social influence and environmental pressure are more dominant factors in shaping individuals' intentions to participate in DRS programs than personal attitudes alone.

Overall, the findings presented in Table 3 demonstrate that Subjective Norm is the most dominant factor influencing individuals' intention to participate in the Deposit Return System (DRS), followed by Attitude and Perceived Behavioral Control. These results indicate that social support, environmental influence, and perceived ease of participation are important determinants in encouraging public participation in PET bottle waste management through recycling-based DRS programs.

Table 3. Hypothesis result

Hypothesis	Path coefficient	Standard deviation (STDEV)	T statistic (O/STDEV)	P values	Interpretation
H1 EA -> A	0.421	0.106	3.985	0.000	Supported
H2 EA -> SN	0.012	0.075	0.156	0.876	Not Supported
H3 PI -> A	0.026	0.077	0.333	0.739	Not Supported
H4 PI -> SN	0.259	0.063	4.112	0.000	Supported
H5 PI -> PBC	0.259	0.080	3.227	0.001	Supported
H6 RM -> A	0.158	0.089	1.771	0.077	Not Supported
H7 RM -> SN	0.024	0.070	0.348	0.728	Not Supported
H8 CV -> PBC	0.309	0.081	3.792	0.000	Supported
H9 EC -> PBC	0.209	0.080	2.615	0.009	Supported
H10 SF -> A	0.086	0.103	0.833	0.405	Not Supported
H11 SF -> SN	0.487	0.069	7.014	0.000	Supported
H12 T -> PBC	0.095	0.079	1.204	0.229	Not Supported
H13 IP -> A	0.075	0.083	0.910	0.363	Not Supported
H14 IP -> SN	0.084	0.077	1.093	0.274	Not Supported
H15 A -> IN	0.297	0.057	5.186	0.000	Supported
H16 SN -> IN	0.497	0.069	7.151	0.000	Supported
H17 PBC -> IN	0.202	0.068	2.959	0.003	Supported

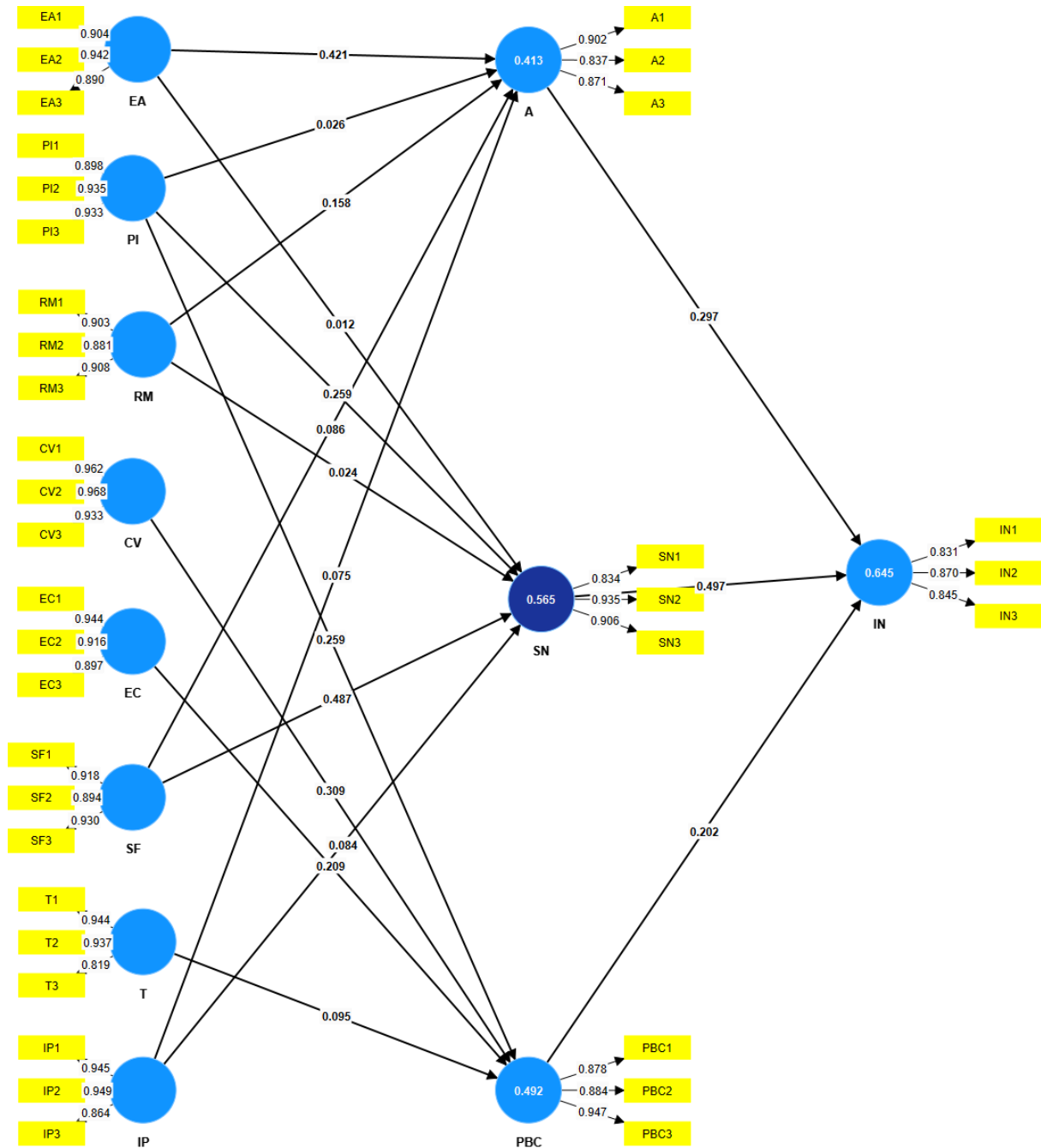


Figure 2. Structural model developed and analyzed using SmartPLS 4 software

The Theory of Planned Behavior (TPB) explains that an individual's intention to perform a particular behavior is influenced by attitude, subjective norm, and perceived behavioral control. In this study, residents' intention to participate in the Deposit Return System (DRS) for PET bottle waste management was analyzed through various external and internal factors influencing recycling behavior. This discussion is based only on the hypothesis testing results presented in Table 3 by examining the path coefficients, T-statistics, and P-values to explain the relationships among variables.

The results showed that Environmental Awareness (EA) had a positive and significant effect on Attitude (A) ($\beta = 0.421$, $p < 0.001$), while its effect on Subjective Norm (SN) was not significant ($\beta = 0.012$, $p > 0.05$). These findings indicate that environmental awareness contributes directly to the formation of favorable attitudes toward PET bottle waste sorting through the DRS, but it does not significantly influence social pressure or expectations from others. This result suggests that individuals who possess greater knowledge and concern regarding environmental

issues tend to develop stronger personal beliefs about the importance of recycling and waste sorting. Respondents who understand the environmental consequences of plastic waste and recognize the potential benefits of DRS are more likely to evaluate the behavior positively. However, environmental awareness appears to operate primarily at the individual level and is insufficient to generate social influence within the community. This finding is consistent with Amirudin et al. (2023), who reported that environmental awareness strengthens pro-environmental attitudes and encourages participation in waste management activities.

The results indicated that Public Information (PI) did not significantly affect Attitude (A) ($\beta = 0.075$, $p > 0.05$). However, PI had a positive and significant effect on Subjective Norm (SN) and Perceived Behavioral Control (PBC) ($\beta = 0.244$ and $\beta = 0.315$, respectively; $p < 0.05$). These findings suggest that information related to the DRS program has not yet been sufficient to shape respondents' personal evaluations of PET bottle sorting. Nevertheless, the dissemination of information has successfully enhanced individuals' perceptions of social expectations and increased their confidence in participating in the program. Information regarding the environmental benefits of DRS, return procedures, and waste management practices helps individuals better understand the system and perceive it as easier to implement. This finding supports Amirudin et al. (2023), who emphasized that public information and awareness campaigns play an important role in strengthening community participation in recycling-based waste management programs.

The results showed that Religious/Moral Norm (RM) did not have a significant effect on either Attitude (A) or Subjective Norm (SN) ($p > 0.05$). These findings indicate that religious and moral considerations were not the primary determinants of PET bottle waste sorting behavior among the respondents. Although environmental stewardship is often associated with moral and religious responsibilities, such values did not significantly influence either personal evaluations of the behavior or perceived social expectations regarding participation in DRS. One possible explanation is that respondents may perceive waste sorting as a

practical environmental activity rather than a moral or religious obligation. This finding differs from that of Amirudin et al. (2023), who found that religious norms significantly influenced waste management behavior in their study context.

The results revealed that Economic Consequence (EC) had a positive and significant effect on Perceived Behavioral Control (PBC) ($\beta = 0.209$, $p < 0.05$). This finding indicates that economic incentives increase respondents' confidence in their ability to participate in the DRS program. Financial rewards obtained from returning PET bottles may reduce perceived barriers and encourage individuals to engage in waste sorting activities. As a result, respondents feel that participation in the DRS system is more feasible and beneficial. This finding is consistent with Amirudin et al. (2023), who reported that economic benefits can enhance perceived behavioral control and motivate participation in recycling and waste management programs.

The results showed that Convenience (CV) had a positive and significant effect on Perceived Behavioral Control (PBC) ($\beta = 0.309$, $p < 0.001$). This finding indicates that higher levels of convenience in the Deposit Refund System (DRS) increase individuals' perceived ability to participate in PET bottle waste sorting activities. Easy access to bottle return locations, simple return procedures, and flexible operating hours of DRS facilities contribute to strengthening residents' confidence in performing the desired behavior. In other words, the more convenient the system is perceived to be, the greater the level of control individuals feel they have over participating in the program. This result is consistent with the study of Amirudin et al. (2023), which highlighted the importance of convenience and supporting infrastructure in encouraging public participation and ensuring the successful implementation of DRS programs.

The results showed that Social Factors (SF) did not significantly influence Attitude (A) ($\beta = 0.086$, $t = 0.833$, $p = 0.405$). However, SF had a positive and significant effect on Subjective Norm (SN) ($\beta = 0.487$, $t = 7.014$, $p < 0.001$), representing the strongest predictor of SN among all antecedent variables. These findings indicate that social influences play a greater role in shaping perceived social expectations than in forming personal

evaluations toward PET bottle waste sorting behavior. Family members, friends, and surrounding communities can create social pressure that encourages individuals to participate in the DRS program. When people observe others supporting and engaging in recycling activities, they are more likely to feel encouraged to do the same. This finding is consistent with Lee et al. (2024) and Wardani et al. (2025), who reported that social support and community influence are important determinants of subjective norms and environmentally responsible behavior.

The results also indicated that Technology (T) did not significantly influence Perceived Behavioral Control (PBC) ($\beta = 0.095$, $t = 1.204$, $p = 0.229$). This finding suggests that technological support within the DRS system has not yet become a key factor in enhancing individuals' perceptions of their ability to participate in PET bottle waste sorting activities. Although digital technologies can facilitate access to information, return locations, and waste management processes, respondents may still place greater importance on physical accessibility and convenience. Consequently, technological features alone are insufficient to strengthen perceived behavioral control. This finding differs from Suhardono et al. (2025), who found that digital technologies improve waste management efficiency and encourage public participation in environmental programs. The discrepancy may indicate that the technological aspects of DRS implementation have not yet been widely adopted or perceived as beneficial by the community.

Furthermore, Institutional Support (IP) did not significantly influence either Attitude (A) ($\beta = 0.075$, $t = 0.910$, $p = 0.363$) or Subjective Norm (SN) ($\beta = 0.084$, $t = 1.093$, $p = 0.274$). These findings indicate that support from educational institutions, government agencies, and other organizations has not yet exerted a substantial influence on respondents' attitudes or perceived social expectations regarding participation in the DRS program. Although institutions have promoted environmental awareness and sustainability initiatives, these efforts may not yet be sufficiently intensive or visible to affect public perceptions and behavior. This finding differs from Ling et al. (2025) and Lee et al. (2024), who reported that institutional support can encourage pro-

environmental behavior through policies, educational programs, and sustainability campaigns. Therefore, stronger institutional involvement and more targeted public engagement strategies may be necessary to increase public acceptance of DRS.

Regarding the core constructs of the Theory of Planned Behavior, the results showed that Attitude (A), Subjective Norm (SN), and Perceived Behavioral Control (PBC) all had positive and significant effects on Intention (IN). Attitude positively influenced intention ($\beta = 0.297$, $t = 5.186$, $p < 0.001$), indicating that individuals who perceive PET bottle waste sorting as beneficial are more likely to participate in the DRS program. Subjective Norm exhibited the strongest effect on intention ($\beta = 0.497$, $t = 7.151$, $p < 0.001$), suggesting that social expectations and support from family, friends, and the community play a dominant role in motivating participation. In addition, Perceived Behavioral Control significantly influenced intention ($\beta = 0.202$, $t = 2.959$, $p = 0.003$), indicating that individuals who perceive waste sorting as easy and manageable are more likely to engage in the behavior. These findings support the Theory of Planned Behavior proposed by Ajzen (1991), which posits that attitude, subjective norm, and perceived behavioral control are key determinants of behavioral intention. Among these constructs, subjective norm emerged as the most influential predictor of intention, highlighting the importance of social influence in encouraging participation in PET bottle waste sorting through the DRS system.

Overall, the findings indicate that Subjective Norm is the most dominant factor influencing residents' intention to participate in the Deposit Return System (DRS), followed by Attitude and Perceived Behavioral Control. These findings suggest that the successful implementation of DRS depends not only on environmental awareness but also on social support, system convenience, and economic benefits obtained by the community through the program.

CONCLUSION

This study aimed to analyze the factors influencing public intention to participate in the Deposit Return System (DRS) for PET bottle waste management in Yogyakarta using an extended

Theory of Planned Behavior (TPB) framework. The findings demonstrate that Attitude (A), Subjective Norm (SN), and Perceived Behavioral Control (PBC) significantly and positively influence Intention (IN) to participate in the DRS program. Among these variables, Subjective Norm was identified as the strongest predictor of intention, indicating that social influence from family, friends, and surrounding communities plays a dominant role in encouraging individuals to engage in PET bottle waste sorting behavior.

The results also reveal that Environmental Awareness (EA) significantly influences Attitude (A), suggesting that individuals with greater environmental concern tend to develop more positive perceptions toward DRS participation. Public Information (PI) significantly affects Subjective Norm (SN) and Perceived Behavioral Control (PBC), indicating that clear and accessible information regarding DRS implementation can strengthen social encouragement and increase individuals' confidence in participating in the program. In addition, Convenience (CV) and Economic Consequences (EC) positively influence Perceived Behavioral Control (PBC), emphasizing the importance of accessible facilities, simple procedures, and financial incentives in supporting public participation in recycling activities.

On the other hand, Religious/Moral Norm (RM), Technology (T), and Institutional Support (IP) were found to have no significant influence on several TPBL constructs. These findings suggest that moral values, digital technological support, and institutional involvement have not yet become dominant factors affecting recycling intention in the context of DRS implementation in Yogyakarta. This may indicate that the existing technological systems and institutional programs related to DRS are still not sufficiently visible or effective in influencing public behavior.

Overall, this study confirms that behavioral intention toward DRS participation is not only influenced by personal environmental awareness but also strongly shaped by social influence, convenience, and perceived economic benefits. Therefore, policymakers and stakeholders should prioritize strategies that strengthen community-based social campaigns, improve public access to DRS facilities, provide clear information dissemination, and offer attractive economic

incentives to enhance public participation in PET bottle waste recycling programs.

Theoretically, this study contributes to the development of the Theory of Planned Behavior by integrating additional external variables, including technology, institutional support, social factors, and economic considerations, into the DRS context. Practically, the findings provide important insights for local governments, educational institutions, and environmental organizations in designing effective waste management policies and sustainable recycling programs in urban areas such as Yogyakarta.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

REFERENCES

- Adu-Gyamfi, Gibbson, Derkyi, M. A. A., Ayarkwa, J., Agyekum, K. (2023). Reducing waste management challenges: Empirical assessment of waste sorting intention among corporate employees in Ghana. *Journal of Retailing and Consumer Services*.
- Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
- Amirudin, A., Inoue, C., & Grause, G. (2023). Assessment of factors influencing Indonesian residents' intention to use a deposit e refund scheme for PET bottle waste. *Circular Economy*, 2(4), 100061.
- Ayob, S. F., Low, S. T., Jalil, R. A., & Chin, H. C. (2017). Key determinants of waste separation intention: Empirical application of TPB. *Facilities*, 35(11/12), 696–708.
- Babu, M., & Shivnani, T. (2024). Investigating behavior, attitude and intention towards waste segregation in tier II cities of India using theory of planned behavior. *Cleaner Waste Systems*, 9(November), 100188.
- Bang, N., Thi, Y., Nguyen, H., Luong, L., & Ngan, N. (2025). Social Sciences & Humanities Open Towards sustainable education : Investigating waste source sorting behavior among students in Vietnam. *Social Sciences & Humanities Open*, 11(November 2024), 101446.
- Blosnjak, M., Ajzen, I., Schmidt, P. (2020). The

- Theory of Planned Behavior: Selected recent advances and applications. *Europe's Journal of Psychology*, 16(3), 352–356.
- Cao, J., Yu, X., Zhong, Y., Li, M. (2022). Determinants of residents' waste separation intentions: An extended TPB perspective. *International Journal of Environmental Research and Public Health*, 19(9), 5276.
- Cepeda-Carrión, G., Cegarra-Navarro, J. G., Cillo, V. (2019). Tips to use partial least squares structural equation modelling (PLS-SEM) in knowledge management. *Journal of Knowledge Management*, 23(1), 67–89.
- Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th ed.). SAGE Publications.
- Emekci, S. (2019). Green consumption behaviours of consumers within the scope of TPB. *Journal of Consumer Marketing*, 36(3), 410–417.
- Fan, B., Yang, W., Shen, X. (2019). A comparison study of 'motivation–intention–behavior' model on household solid waste sorting in China. *Journal of Cleaner Production*, 211, 442–454.
- Feil, A., Pretz, T., Jansen, M., Thoden van Velzen, E. U. (2016). Separate collection of plastic waste, better than technical sorting from municipal solid waste? *Waste Management & Research*, 35(2), 172–180.
- Geissdoerfer, M., Savaget, P., Bocken, N. M. P., Hultink, E. J. (2020). The Circular Economy – A new sustainability paradigm. *Journal of Cleaner Production*.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (3rd ed.). SAGE Publications.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A New Criterion for Assessing Discriminant Validity in Variance-Based Structural Equation Modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135.
- Hogg, D., Elliott, T., Sherrington, C., Vergunst, T., Morton, R. (2022). Deposit return systems for beverage containers: International experiences and lessons learned. *Deposit Return Systems for Beverage Containers: International Experiences and Lessons Learned*, 40(8), 1033–1045.
- Hu, J., Longfor, N. R., Dong, L., & Qian, X. (2026). Beyond theory of planned behavior: A meta-analysis of psychological and contextual determinants of household waste separation. *Environmental Impact Assessment Review*, 116, 108087.
- Jampala, S., & Shivnani, R. (2024). Investigating behavior, attitude and intention towards waste segregation in tier II cities of India using theory of planned behavior. *Cleaner Waste Systems*, 9, 100188.
- Jr, J. F. H., Black, W. C., Babin, B. J., Anderson, R. E., Black, W. C., & Anderson, R. E. (2018). *Multivariate Data Analysis*. CENGAGE.
- Kirchherr, J., Reike, D., Hekkert, M. (2023). Conceptualizing the circular economy: An analysis of 100 definitions. *Resources, Conservation and Recycling*.
- Knickmeyer, D. (2020). Social factors influencing household waste separation: A literature review on good practices to improve recycling performance. *Journal of Cleaner Production*, 245, 118605.
- Kumar, A. (2019). Exploring young adults' e-waste recycling behaviour using an extended TPB model. *Resources, Conservation and Recycling*, 141, 378–389.
- Lawshe, C. H. (1975). A Quantitative Approach to Content Validity. *Personnel Psychology*, 28(4), 563–575.
- Lee, Y., Kim, H., Park, J. (2024). Environmental education and institutional support in promoting sustainable waste management behavior. *Sustainability*, 16(4), 1892.
- Ling, P., Yong, K., Lee, M., Ling, L., & Ting, I. Y. (2025). Students' intention to bring reusable containers: An integrated framework based on theory of planned behaviour and norm activation model. *Cleaner Waste Systems*, 12(February), 100340.
- Lou, X., Wang, Q., Zhang, M. (2022). Understanding residents' waste sorting intentions through an integrated behavioral framework. *Resources, Conservation and Recycling*, 180, 106176.
- Ly, T. P., Ly, P. T. M. (2022). Determinants of household waste sorting intention in developing economies. *Sustainability*, 14(5), 2867.

- Maichum, K., Parichatnon, S., Peng, K. C. (2016). Application of the extended TPB model to investigate purchase intention of green products. *Sustainability*, 8(10), 1077.
- Nemat, B., Baig, M. A., & Hussain, S. (2023). Smart waste management systems and citizen participation in circular economy initiatives. *Sustainable Cities and Society*, 94, 104550.
- Nguyen, T. T., Lobo, A., Greenland, S. (2022). Environmental knowledge and information influence on recycling intentions. *Journal of Environmental Planning and Management*, 65(7), 1234–1252.
- Novanda, R. R., Malau, L. R. E., Yulni, T. (2026). A meta-analysis of waste sorting behavior: Examining the theory of planned behavior and the role of contextual factors. *Environmental Development*, 58, 101426.
- Pakpour, A. H., Zeidi, I. M., Emamjomeh, M. M. (2014). Household waste behaviours among a community sample in Iran: An application of the TPB. *Waste Management*, 34(6), 980–986.
- Polit, D. F., & Beck, C. T. (2006). The Content Validity Index: Are You Sure You Know What's Being Reported? *Research in Nursing & Health*, 29(5), 489–497.
- Promalessy, D., Ulhasanah, N., Suryawan, I. W. K. (2025). Environmental awareness and recycling intention in urban communities. *Sustainability*, 17(3), 1124.
- Putri, N. A., Wibowo, A., Nugraha, D. (2024). Determinants of household waste sorting intention in Indonesian cities. *Journal of Material Cycles and Waste Management*, 26(2), 891–905.
- Rahman, M. A. (2025). Psychological and contextual factors affecting waste segregation behavior: A systematic review. *Journal of Environmental Management*, 371.
- Razali, F., Daud, D., Weng-Wai, C., Jiram, W. R. A. (2021). Waste separation behavior among urban households: Extending TPB with environmental concern. *Sustainability*, 13(4), 2207.
- Rigdon, E. E., Sarstedt, M., Ringle, C. M. (2023). Why PLS-SEM remains an important analytical method in social science research. *Journal of Business Research*.
- Sarstedt, M., Ringle, C. M., Hair, J. F. (2022). Partial Least Squares Structural Equation Modeling. In *Handbook of Market Research*. Springer.
- Suhardono, S., Lee, C., Thanh, T., Phan, T., & Koko, I. W. (2025). Resident action in smart waste management during landfill disclosure transition: Insights from Yogyakarta's smart city initiatives. *Cleaner Production Letters*, 8(January), 100093.
- Valentin, A. P. M., Bonifacio, P. B. S. D., Isabel, S., Castro, C. O., Ruiz, J. C. A., Sy, T. I. L., & Trinidad, E. L. O. (2024). Predicting waste management behaviors using an extended theory of reasoned action model. 9(September).
- Wan, C., Shen, G. Q., Choi, S. (2017). Experiential and instrumental attitudes: Interaction effect of attitude and subjective norm on recycling intention. *Journal of Environmental Psychology*, 50, 69–79.
- Wang, X., Li, Y., Zhang, H., Chen, Y. (2023). Determinants of residents' recycling intention under circular economy policies: An extended Theory of Planned Behavior approach. *Resources, Conservation and Recycling*.
- Wardani, D. K., Wahyono, B., Indira, F. R., Rahmawati, D. R., & Andriyati, R. (2025). Circular economy in education: Determinants of school recycling intentions and behaviors for inorganic waste. *Cleaner Waste Systems*, 100420.
- Yong, K., Lee, M., Ling, P., Ling, L., Shen, Y., Huei, G., Chiu, M., & Phang, X. (2024). Food waste separation intention among the residential students: Moderation role of university support. *Cleaner Waste Systems*, 9(September), 100174.
- Yuriev, A., Boiral, O., Francoeur, V., Paillé, P. (2020). Overcoming barriers to pro-environmental behaviors: A systematic review. *Journal of Cleaner Production*, 291, 125950.
- Yuriev, A., Dahmen, M., Paillé, P., Boiral, O., Guillaumie, L. (2020). No Title. *Journal of Cleaner Production*, 276, 124.
- Zhang, D., Huang, G., Yin, X., Gong, Q. (2016). Residents' waste separation behaviors at the source: Using SEM with TPB. *Waste*

Management, 45, 153–162.

Zhang, X., Wang, F., Zhu, D. (2021). Institutional support and environmental behavior: Evidence from urban waste management programs. *Environmental Science and Policy*, 118, 1–10.