# FROM RECOGNITION TO ACTION: MODELING URBAN HOUSEWIVES' ENGAGEMENT IN HOUSEHOLD WASTE REDUCTION USING THE SITUATIONAL THEORY OF PROBLEM SOLVING

[1]SRI KUSWANTONO WONGSONADI, [2]AGUNG PURWANTO, [3]SUNARYO, [4]HENITA RAHMAYANTI

UNIVERSITAS NEGERI JAKARTA, INDONESIA

*CORRESPONDING AUTHOR: sri_kuswantono@unj.ac.id

## Abstract

This study investigates the psychological and communicative factors influencing urban housewives' engagement in household waste reduction in Indonesia, emphasizing their pivotal role in sustainable domestic environmental practices. Grounded in the Situational Theory of Problem Solving (STOPS), the research explores how problem recognition, constraint recognition, and involvement recognition affect situational motivation and communicative action, ultimately shaping behavioral engagement. Using a quantitative design with Partial Least Squares Structural Equation Modeling (PLS-SEM), data were collected from 1,176 housewives across Jabodetabek through multistage random sampling. The results reveal that problem and involvement recognition significantly enhance situational motivation, while constraint recognition exerts a negative effect. Situational motivation and communicative action mediate the relationship between cognitive perceptions and engagement behaviors. The findings validate the STOPS framework and offer theoretical refinement by highlighting the role of women in domestic environmental communication and action. Practically, the study suggests that interventions should target constraint reduction and motivation enhancement through participatory communication strategies such as waste banks and community networks. This research contributes both conceptually and practically by situating urban housewives as central agents in grassroots environmental change and offers a culturally contextualized model for household waste management policy and education.

**Keywords:** Situational Theory of Problem Solving (STOPS), waste reduction, urban households, environmental communication, PLS-SEM, public environmental engagement.

## INTRODUCTION

Urban environmental degradation has intensified due to the growing volume of household waste, particularly in rapidly urbanizing regions such as Southeast Asia (Adyatma & Muhaimin, 2022; Chengqin et al., 2024; Lord, 2020; Prasetyanto et al., 2023; Sabara et al., 2021). In Indonesia, metropolitan areas like Jabodetabek face mounting challenges in waste management, driven by high population density, increased consumption, and inadequate infrastructure (Li et al., 2023; Szpilko et al., 2023). Previous studies indicate that household waste often exceeds the handling capacity of municipal systems, leading to improper disposal, groundwater contamination, and air pollution (Krystosik et al., 2020; Qin, 2023). Moreover, organic waste continues to dominate the municipal solid waste stream but remains underutilized due to limited composting and sorting practices (Daskal et al., 2022). These challenges are further compounded by socio-economic disparities that influence household behavior and hinder the adoption of sustainable practices. Consequently, empowering households through targeted behavioral interventions has become essential for fostering sustainable urban futures(Domenech & Borrion, 2022).

Housewives hold a pivotal role in household waste management, acting as primary decision-makers who directly influence sustainable behavior within domestic settings (Khanna & Bhargava, 2019; Zulfa et al., 2021). However, despite their strategic position, recent research reveals a persistent gap between environmental awareness and actual engagement among urban housewives (Coronel-Chugden et al., 2024; Guichard et al., 2024).

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Many express concern for environmental issues yet struggle to practice consistent sorting or recycling due to socio-economic constraints, limited infrastructure, or motivational barriers (Donacho et al., 2023; Oluwadipe et al., 2022). In this regard, community-based initiatives involving housewives have shown promise in fostering leadership, emotional investment, and normative reinforcement (Mulasari et al., 2024; Odonkor & Sallar, 2021). Understanding the psychosocial and behavioral dynamics that influence this group is therefore crucial for developing inclusive and effective waste management strategies.

While the Theory of Planned Behavior (TPB), habit theory, and linear stimulus-response models have been widely applied to explain pro-environmental behavior, these frameworks often fall short in capturing the dynamic psychosocial processes underlying civic engagement (Chernozub, 2022; Dolnicar & Demeter, 2024; Lange, 2023; Nielsen et al., 2022; Silvi & Padilla, 2021). TPB's emphasis on intention formation often neglects emotional, motivational, and contextual nuances that distinguish active from passive behavior (Albrecht et al., 2023; Sachitra, 2024). Habit theory also overlooks the evolving nature of sustainable practices, particularly under shifting external conditions (Mi et al., 2019). Likewise, linear models tend to reduce behavior to direct stimulus-response mechanisms, failing to reflect the cognitive and normative complexities individuals navigate (Lalot et al., 2024; Yang & Liu, 2025). Accordingly, an integrative theoretical approach is needed—one that captures situational awareness, motivational drive, and communicative action—to better explain variations in environmental engagement (Druen & Zawadzki, 2021).

The Situational Theory of Problem Solving (STOPS), developed by Kim and Grunig, provides a nuanced framework for understanding how individuals perceive, interpret, and respond to social issues through communicative behavior (H. J. Kim & Hong, 2021). STOPS consists of five core constructs: problem recognition, constraint recognition, involvement recognition, situational motivation, and communicative action (Liu et al., 2023; Zhang et al., 2024). Unlike traditional linear or static models, it conceptualizes engagement as a dynamic, socially contextualized process driven by psychological motivation (Tao et al., 2024). It explains how individuals evaluate environmental issues, perceive obstacles to action, and assess the relevance of these issues to their own lives (Bhalla, 2022; Liu et al., 2023). This framework is particularly suitable for examining why some urban housewives engage in household waste reduction while others do not (Akbulut, 2023; Dam & Borsai Basaran, 2025). By integrating communicative and psychosocial dimensions, STOPS facilitates a more comprehensive understanding of public participation in environmental problem solving (M. G. Chon & Park, 2020; H. J. Kim & Hong, 2021).

This study investigates how three key situational factors—problem recognition, constraint recognition, and involvement recognition—shape household waste-related behavior among urban housewives, with sequential mediation by situational motivation and communicative action. Drawing upon the STOPS framework, the proposed model adopts a serial mediation mechanism in which cognitive and perceptual variables initiate behavioral engagement through motivational and communicative pathways (Jiang et al., 2019; J. N. Kim & Lee, 2024). Engagement and disengagement are modeled as two distinct behavioral dimensions, reflecting the dual-pathway nature of environmental participation (Brown & Krettenauer, 2025; Lakew & Olausson, 2019). Empirical evidence suggests that higher levels of problem and involvement recognition enhance motivation and communicative behavior, whereas perceived constraints inhibit engagement (McKeever et al., 2019; Zhang et al., 2024). By empirically testing these relationships, the study extends STOPS to the novel context of household waste management and sheds light on the psychosocial drivers of civic (dis)engagement (Shim et al., 2023; Tao et al., 2024).

Finally, this research advances the theoretical development of STOPS by applying it within urban household contexts in Indonesia, focusing on how environmental engagement unfolds through communicative and motivational processes among women (Bhalla, 2022; Huang & Guo, 2024). Using a novel PLS-SEM approach, the study identifies how situational motivations, communicative actions, and socio-demographic factors interact to shape waste-related behaviors (Odonkor & Sallar, 2021; Shim et al., 2023). Theoretically, it expands STOPS to encompass localized, everyday household practices. Practically, the study offers actionable insights to support environmental education, community-based interventions, and participatory policy design tailored to the lived experiences of urban women (Coronel-Chugden et al., 2024; Guichard et al., 2024; Volschenk et al., 2021).

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

### *Engagement and Disengagement in Waste Reduction*

Environmental engagement refers to individuals' emotional, cognitive, and behavioral involvement in sustainability-related actions. These dimensions interact to foster pro-environmental attitudes and responsible decision-making (Irkhin, 2020; Sachitra, 2024). Emotionally, engagement is linked to feelings such as concern,

empathy, or guilt that prompt action (Shim et al., 2023). Cognitively, it involves awareness and understanding of environmental issues, enabling informed participation (Muñiz-Martínez, 2025). Behaviorally, it is manifested through everyday actions like recycling or reducing waste (Albrecht et al., 2023). Prior studies have shown that engaged individuals are more likely to adopt sustainable practices within urban household contexts, underscoring the critical role of engagement in promoting ecological responsibility at the grassroots level (Huynh et al., 2024). Accordingly, engagement serves not only as a predictor of individual behavior but also as a foundation for collective environmental transformation.

In contrast, environmental disengagement entails psychological withdrawal from sustainability concerns, often expressed as apathy, resistance, or denial. Brown and Krettenauer (2025) highlight that youth disengagement from environmental activism may arise from negative experiences or a lack of social support. Psychosocial factors such as perceived inefficacy, cognitive dissonance, and emotional overwhelm also serve as deterrents to participation (Coronel-Chugden et al., 2024). Furthermore, socioeconomic inequality intensifies this trend by fostering cynicism and detachment from pro-environmental behavior (Huo et al., 2024). Disengagement may also be reinforced by contextual barriers, including inadequate infrastructure and weak normative support (Xu & Liu, 2024). In this respect, disengagement constitutes a substantial obstacle to mobilizing collective action for sustainable waste management within urban households.

Urban households exhibit varying levels of engagement and disengagement, shaped by infrastructure, education, and community cohesion. In metropolitan areas such as Jabodetabek, limited access to sustainable waste systems often hinders pro-environmental behaviors (Al Qadar et al., 2023). However, community-driven initiatives have demonstrated promising results in mobilizing engagement, as evidenced by participatory waste programs in Yogyakarta (Mulasari et al., 2024). Individual differences—such as personality traits and levels of environmental knowledge—also play a significant role in shaping behavioral responses (Sachitra, 2024). Moreover, public perceptions shaped by local norms and media channels significantly affect the extent of sustainable behavior (Treyes et al., 2023). Consequently, understanding these contextual and perceptual dynamics is vital for developing tailored interventions in densely populated urban settings.

### Situational Motivation, and Communicative Action Theory

Understanding pro-environmental behavior necessitates a multidimensional theoretical approach. The Theory of Planned Behavior (TPB) emphasizes rational intention based on attitudes and perceived behavioral control (Santoso & Farizal, 2019), while Self-Determination Theory (SDT) highlights intrinsic motivation, autonomy, and competence as key drivers of sustained engagement (Jia et al., 2021). However, both frameworks tend to understate the urgency of situational context and the influence of communicative dynamics. The Situational Theory of Problem Solving (STOPS) addresses these gaps by exploring how individuals recognize problems and constraints, assess involvement, and engage in communicative actions (Akbulut, 2023; Bhalla, 2022). Notably, STOPS proves particularly useful in dynamic contexts such as public health or environmental crises, where situational triggers and issue salience significantly shape behavioral outcomes (H. J. Kim & Hong, 2021; Shim et al., 2023). Thus, STOPS presents an integrative framework that accounts for motivational, rational, and contextual influences—rendering it especially relevant for examining environmental engagement in urban households.

STOPS conceptualizes three core cognitive variables: problem recognition, constraint recognition, and involvement recognition. Problem recognition entails awareness of an issue's urgency and relevance, which heightens communicative motivation and action—particularly in times of ecological crisis (Shim et al., 2023; Zhang et al., 2024). Constraint recognition refers to the perceived obstacles—be they social, economic, or infrastructural—that inhibit active responses; higher constraints typically lead to reduced engagement (Shen et al., 2019; Xu & Liu, 2024). Meanwhile, involvement recognition captures the personal relevance or emotional connection individuals feel toward an issue, which in turn promotes proactive behavior (Jun et al., 2024; J. N. Kim & Lee, 2024). Collectively, these variables shape whether individuals choose to remain passive or engage meaningfully in environmental problem solving.

Within the STOPS framework, situational motivation acts as a central bridge that translates cognitive recognition into behavioral expression. When individuals perceive a problem as both urgent and personally relevant, their motivation to act is amplified (Liu et al., 2023; Zhang et al., 2024). Conversely, high levels of perceived constraint can either suppress or redirect motivation, depending on individual appraisal (Shim et al., 2023). Empirical findings indicate that situational motivation mediates the link between awareness and engagement, emphasizing its function as a dynamic mechanism that activates pro-environmental behavior in response to internal and external cues (Tao et al., 2024).

Communicative actions, as described in STOPS, represent overt expressions of situational motivation and reinforce individual and collective efficacy. These behaviors include seeking, sharing, and discussing environmental information, each of which sustains public engagement. Informational behaviors, such as sharing data or organizing educational campaigns, raise awareness and build collective urgency (Akbulut, 2023). Participatory activities, such as clean-up initiatives or workshops, provide tangible outlets for action (Shen et al., 2019). Additionally, dialogic advocacy enhances participatory governance and helps communities co-create solutions (Dam & Borsai Basaran, 2025; Krishna & Kim, 2020). Accordingly, communicative action is both an outcome and a catalyst of sustainable behavior.

### Hypothesis Development

The hypotheses in this study are derived deductively based on the STOPS framework, which posits that recognition of problems, constraints, and involvement drives motivation, which in turn triggers communicative and behavioral outcomes. Situational motivation mediates these pathways, linking cognitive precursors to action through communication. For example, prior research shows that perceived constraints negatively influence communicative action, reinforcing the explanatory strength of the model (H. J. Kim & Hong, 2021). Accordingly, it is hypothesized that greater problem and involvement recognition—coupled with lower perceived constraints—will enhance situational motivation and communicative engagement.

More specifically, when individuals perceive environmental issues as urgent and personally relevant, they are more likely to feel compelled to act. Hence, H1 posits that problem recognition positively affects situational motivation (Shim et al., 2023). H2 suggests that constraint recognition also influences motivation, although its directionality remains contested (Bhalla, 2022). H3 asserts that involvement recognition fosters motivation due to emotional investment and relevance (Akbulut, 2023). Together, these form the basis for understanding motivational dynamics in household waste contexts.

Following this logic, H4 proposes that situational motivation mediates the effects of problem recognition (H4a), constraint recognition (H4b), and involvement recognition (H4c) on communicative action. This cascade reflects the transitional role of motivation from cognition to behavior (Bhalla, 2022). Furthermore, H5 suggests that communicative action mediates the link between motivation and engagement in waste reduction behavior. As Zhang et al. (2024) affirm, individuals with higher motivation tend to seek, share, and implement environmental knowledge—thereby translating motivation into sustainable action.

Finally, H6 captures the extended serial mediation paths through which the three situational antecedents—problem recognition (X1), constraint recognition (X2), and involvement recognition (X3)—indirectly influence both forms of behavioral outcome: engagement (Y_ENG) and disengagement (Y_DIS). These effects operate via two sequential mediators: situational motivation (X4) and communicative action (X5). Specifically, the proposed model includes six mediated pathways: X1 → X4 → X5 → Y_ENG, X2 → X4 → X5 → Y_ENG, X3 → X4 → X5 → Y_ENG; and X1 → X4 → X5 → Y_DIS, X2 → X4 → X5 → Y_DIS, X3 → X4 → X5 → Y_DIS. This tripartite logic illustrates the dynamic interplay between cognition, motivation, and communication as drivers of public behavioral engagement and disengagement, extending the explanatory utility of the STOPS framework as demonstrated in recent environmental and public health studies (Zhang et al., 2024).

### Conceptual Model

Figure 1 presents the conceptual framework informed by the PLS-SEM model, delineating the hypothesized relationships among the study's key variables. Three exogenous constructs—problem recognition (X1), constraint recognition (X2), and involvement recognition (X3)—predict situational motivation (X4). This variable, in turn, predicts communicative action (X5), which subsequently influences both engagement (Y_ENG) and disengagement (Y_DIS) in household waste reduction. Arrows illustrate a dual mediation pathway, highlighting how cognitive appraisals are channeled through motivational and communicative mechanisms. The model reflects a sequential, layered process, consistent with the STOPS framework, for explaining how public environmental participation emerges within urban household contexts.
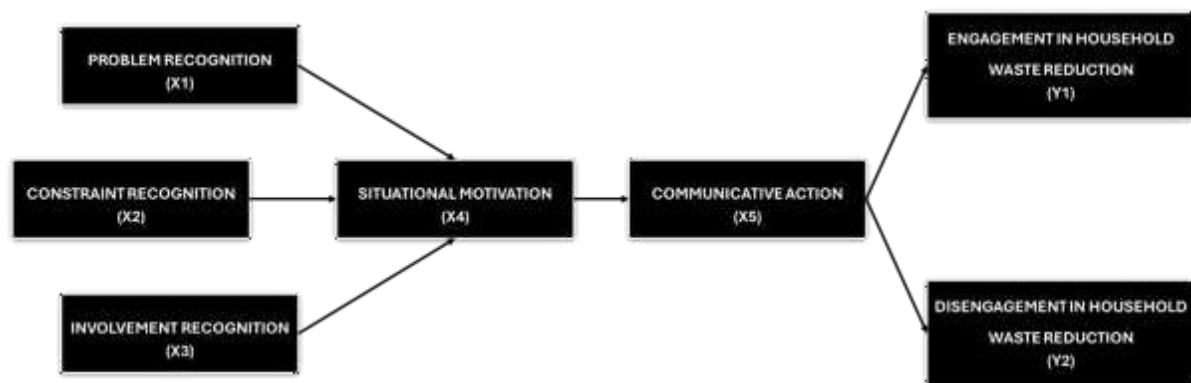
Figure 1. Conceptual Model

## METHOD

### Research Design and Approach

This study employed a quantitative, explanatory, and causal research design to examine the relationships among constructs within the Situational Theory of Problem Solving (STOPS) framework. A quantitative approach is well-suited for testing theoretical models and measuring the strength of associations among latent variables through structured data collection (Bliese et al., 2024). As an explanatory inquiry, the study aimed to uncover the mechanisms through which situational factors—namely problem recognition, constraint recognition, and involvement recognition—influence behavioral engagement. The causal orientation aligns with STOPS's premise that individual responses are systematically shaped by contextual factors (M. G. Chon et al., 2023), enabling robust hypothesis testing within real-world behavioral domains.

Accordingly, Partial Least Squares Structural Equation Modeling (PLS-SEM) was selected for analysis, given the model's complexity and inclusion of multiple latent constructs. PLS-SEM is particularly advantageous for predictive and exploratory studies that involve non-normal distributions, formative constructs, and serial mediation models (Aranda & Vezzoni, 2021; Saxena, 2024). Its strength in handling multifaceted behavioral pathways has been well-documented in environmental engagement research (Coles & Costa, 2023). Moreover, PLS-SEM enables robust estimation without assuming multivariate normality, making it suitable for examining dynamic interactions within the STOPS framework (Bliese et al., 2024).

### Location and Participation

The research was conducted within the Greater Jakarta Metropolitan Area (Jabodetabek), encompassing Jakarta, Bogor, Depok, Tangerang, and Bekasi. Jabodetabek was selected due to its diverse and densely populated urban environment, reflecting a range of socioeconomic and lifestyle patterns typical of metropolitan households. As one of Southeast Asia's largest urban agglomerations, the region poses complex challenges in domestic waste management, rendering it an ideal setting for studying household environmental behavior. Furthermore, its prominence as an economic and policy hub enhances the transferability of findings to other urban settings in Indonesia with similar demographic and infrastructural characteristics.

A multistage random sampling technique was applied to ensure proportional representation across the region. The initial stage involved randomly selecting urban districts, followed by neighborhood and household sampling. The main respondents were housewives, chosen for their pivotal role as decision-makers in domestic waste management. Inclusion criteria required participants to be permanent residents actively involved in daily household affairs, particularly waste handling. Conversely, those employed full-time outside the home or temporarily residing in the area were excluded. This sampling ensured insights from individuals most directly responsible for managing household waste.

The final sample comprised 1,176 housewives across Jabodetabek. This sample size meets the minimum requirement for PLS-SEM, which recommends at least 10 cases per indicator in the most complex construct (Hair et al., 2021). Additionally, a G*Power analysis confirmed the adequacy of this size to detect medium effect sizes with 95% power. This strengthens the model's reliability and the generalizability of findings to similar urban household contexts in Indonesia.

**Instruments and Measurement**

This study utilized a structured questionnaire employing a 5-point Likert-type scale to capture perceptions, motivations, and behavioral intentions regarding household waste reduction. The items were adapted from established instruments that operationalize STOPS constructs—problem recognition, constraint recognition, involvement recognition, situational motivation, and communicative action (J.-N. Kim & Grunig, 2011; McKay et al., 2023; Tam, L., Kim, J. N., & Lee, 2022). Likert scales are effective in quantifying attitudinal responses and are compatible with multivariate modeling techniques like PLS-SEM (Coles & Costa, 2023).

*Dimensions and Indicators for Measuring Problem Recognition*

Problem recognition was operationalized using four sub-dimensions: awareness of the issue, awareness of impact, perceived importance or urgency, and personal relevance. Each was measured through Likert-scale items adapted from validated instruments aligned with the STOPS framework. For instance, items such as "I was surprised when I heard about this problem" reflected initial cognitive awareness, while "I see a large gap between the way things should be and the way they are now" captured awareness of impact (J.-N. Kim et al., 2021). The importance dimension included statements like "Something needs to be done," and personal relevance was assessed with items such as "This issue affects my life" (M. G. Chon et al., 2023; Kim, J. N., & Grunig, 2017).

*Dimensions and Indicators for Measuring Constraint Recognition*

Constraint recognition was measured by capturing two major dimensions: internal and external constraints. Internal constraints include perceived time, resources, and skills, assessed with adapted items such as "I feel rushed to take action" or "I lack the skills to solve this problem." (M. G. Chon et al., 2023). External constraints comprise perceived lack of information, social pressure, and systemic barriers. Items include "I don't have enough information to act" or "People around me discourage addressing this problem." (Demir et al., 2024; Jun et al., 2024). These indicators reflect subjective perceptions of barriers that may hinder problem-solving actions despite recognizing the issue and feeling involved (J.-N. Kim et al., 2021).

*Dimensions and Indicators for Measuring Involvement Recognition*

Involvement recognition is operationalized through two main dimensions: personal relevance and the perceived value of engagement. The first dimension includes indicators such as "I am closely connected with this problem" and "This problem affects my life," which capture the subjective relevance and impact of the issue on daily experiences (M. G. Chon et al., 2023). The second dimension measures how individuals evaluate their engagement, using items like "I believe people need to pay more attention to this problem" and "I can make a difference regarding this issue" (Grunig & Kim, 2021). These indicators ensure valid measurement of one's perceived connection and motivational drive, which are essential to predicting communicative behavior in the STOPS framework (Kim, J. N., & Grunig, 2017; Shi, 2025).

*Dimensions and Indicators for Measuring Situational Motivation*

Situational Motivation, as conceptualized within the STOPS framework, is operationalized through three key dimensions: Intrinsic Motivation, Identified Regulation, and External Regulation, each reflecting varying degrees of self-determined engagement (Ryan & Deci, 2023; Sansone & Tang, 2021). The widely adopted Situational Motivation Scale (SIMS) offers validated indicators such as "Because this activity is fun" (Intrinsic), "Because I believe this activity is important for me" (Identified), and "Because I am supposed to do it" (External) (Wasicek & McHugh, 2024). These items enable precise measurement of respondents' motivational states in specific problem contexts, ensuring construct validity and comparability across STOPS-based studies (M. G. Chon et al., 2023; Ryan & Deci, 2023).

*Dimensions and Indicators for Measuring Communicative Action on Problem Solving*

Communicative Action on Problem Solving (CAPS) in the STOPS framework consists of three core dimensions—information acquisition, selection, and transmission—each with active and passive sub-categories (M.-G. Chon et al., 2025; M.-G. Chon & Harrell, 2024; M. G. Chon et al., 2023). Active behaviors include information seeking, forefending, and forwarding, while passive behaviors involve attending, permitting, and sharing when asked (Grunig & Kim, 2021). Indicators for each dimension are measured using Likert-type items, such as "I searched for information about [issue]" for active seeking, or "I talk about the problem only when asked" for passive sharing (Huang & Guo, 2024). These measures ensure transparency in assessing public engagement levels and refine predictions of communicative behavior in response to societal issues (Akbulut, 2023).

*Dimensions and Indicators for Measuring Environmental Engagement and Disengagement in Household Sustainable Practices*

The construct of engagement and disengagement in household sustainable practices is operationalized through three dimensions: emotional, cognitive, and behavioral (Inman et al., 2024; Moreira et al., 2021, 2022). Emotional engagement includes positive affect and environmental concern, while cognitive engagement encompasses awareness, pro-environmental beliefs, and information-seeking (Inman et al., 2024; Moreira et al., 2022). Behavioral engagement reflects active participation in actions like recycling and conserving resources (Martin & Borup, 2022; Preusche & Göbel, 2021). Conversely, disengagement involves emotional apathy, maladaptive beliefs (e.g., denial of climate change), and behavioral withdrawal or unsustainable actions (MacNamara, 2025). These dimensions are measured using tools such as the Engagement/Disengagement in Sustainable Development Inventory (EDiSDI), which includes subscales for each dimension (Moreira et al., 2021). Items are typically rated on a Likert scale to assess frequency, concern, and alignment with sustainability values.

To ensure content validity, the instrument underwent expert judgment involving three scholars with domain expertise in environmental psychology and sustainable behavior (Aranda & Vezzoni, 2021; Ramírez-Montoya et al., 2024). Experts assessed the clarity, relevance, and comprehensiveness of each item using a 5-point scale, enabling the calculation of the Content Validity Index (Guðjohnsen et al., 2024). Revisions were made iteratively based on feedback. A pretest was then conducted with 25 respondents resembling the target population. Cognitive interviews helped refine wording and identify ambiguous terms (Saxena, 2024). This two-stage procedure—expert review and pretesting—was essential for enhancing construct validity and ensuring the instrument was comprehensible and psychometrically sound (McKay et al., 2023; Ramírez-Montoya et al., 2024).

## Data Analysis Techniques

Descriptive statistics were employed to present an overview of respondent characteristics and variable distributions. Demographic variables such as age, gender, and education level were summarized using frequency and percentage distributions (M.-G. Chon et al., 2025; M. G. Chon et al., 2023). Measures of central tendency (mean, median, mode) and variability (standard deviation, range) were calculated to depict the behavioral engagement patterns within household sustainability practices (Shukla et al., 2024). This preliminary analysis provided essential context for interpreting subsequent inferential results by highlighting general trends, typical responses, and potential data dispersion (Guðjohnsen et al., 2024). Additionally, descriptive data allowed researchers to assess completeness and item non-response, ensuring the quality and integrity of the dataset before proceeding to advanced statistical modeling.

Subsequently, PLS-SEM was employed to examine the relationships among latent constructs through a two-step approach, assessing both measurement and structural models (Chamberlain & Lyons, 2020). Each construct—X1 to X5 and Y1/Y2—was measured using reflective indicators based on theoretical relevance. Reliability and validity were ensured through composite reliability (>0.7), AVE (>0.5), and loading thresholds (>0.6) (Allison, 2023; M.-G. Chon et al., 2023). Discriminant validity was verified via HTMT ratios (<0.85) and Fornell-Larcker criteria (Redjal et al., 2024). The structural model was evaluated through $R^2$, $Q^2$, and $f^2$ effect sizes to ensure explanatory and predictive power (Caro-González et al., 2023; Shukla et al., 2024). This transparent modeling process supports robust inference on behavioral engagement dynamics.

To examine mediation effects in the Partial Least Squares Structural Equation Modeling (PLS-SEM) framework, this study employed a serial mediation analysis using the bootstrapping technique. This method assesses the indirect effects through a chain of mediators, estimating the path coefficients and their confidence intervals based on resampled datasets (Bziouech et al., 2024). Serial mediation enables the identification of how an independent variable exerts its influence through multiple mediators in a sequential manner (Caro-González et al., 2023). Mediation is considered significant when the 95% confidence interval of the indirect effect excludes zero, thus providing statistical support for the hypothesized mediation path (Aranda & Vezzoni, 2021; M.-G. Chon et al., 2023).

## RESULTS

### Descriptive Statistics of Respondents

Most respondents in this study were adult women within the productive age group, with 36.1% aged 31–40 and 30.2% aged 41–50, followed by 15.8% in the 21–30 range. Only 9.6% were above 50 years old, and a minority (8.3%) were younger than 21. This age distribution indicates that the majority of respondents are in the

active stages of family and household management, where decision-making and behavioral modeling related to waste management are likely more consistent and influential. Consequently, the predominance of middle-aged participants reflects a strategic demographic for interventions, as they often act as primary agents of environmental behavior within the household and local community.

Accordingly, educational backgrounds among respondents were relatively diverse, with 34.5% having completed high school and 32.4% holding a bachelor's degree. Meanwhile, 18.2% had a junior high school education, and only 6.8% had completed primary school. Interestingly, 8.1% of respondents reported having a postgraduate degree. In terms of employment, 67.6% identified as full-time homemakers, while the rest engaged in part-time or informal work. These findings suggest that the majority of respondents possess moderate to high literacy levels, which potentially facilitates better access to environmental information and practices. Their educational exposure can enhance their ability to comprehend and apply sustainable household waste management strategies.

In this respect, the dominant types of household waste reported by respondents included food waste (42.7%), plastic packaging (28.4%), and paper waste (12.6%). Smaller proportions were attributed to glass, metal, and electronic waste. The primary sources of household waste stemmed from daily cooking activities (45.8%) and packaging from purchased goods (31.7%). These patterns highlight the central role of domestic consumption and food preparation in generating waste, underscoring the need for targeted education on food waste reduction and plastic reuse. Understanding these waste compositions is essential for designing effective intervention programs tailored to urban households in Jabodetabek.

Despite 67.9% of respondents expressed awareness of household waste sorting, only 38.2% reported engaging in regular sorting practices. Participation in community-based programs such as waste banks remain low, with just 21.5% of households actively involved. Moreover, 43.6% stated that their neighborhood lacks adequate waste sorting facilities. These findings reveal a gap between awareness and actual behavior, influenced by structural limitations and lack of supportive infrastructure. Therefore, strengthening community initiatives and increasing access to sorting facilities could enhance urban household engagement in sustainable waste management practices. Table 1 displays the demographic characteristics of the respondents.

**Table 1. Demographic Information (N = 1176)**

| Variable | Frequency | % |
|---|---|---|
| **Age group** | | |
| **20–29** | 116 | 9.9% |
| **30–39** | 492 | 41.8% |
| **40–49** | 370 | 31.5% |
| **50–59** | 168 | 14.3% |
| **60–69** | 30 | 2.5% |
| **Education** | | |
| **No School** | 10 | 0.9% |
| **Primary** | 56 | 4.8% |
| **Junior High** | 133 | 11.3% |
| **Senior High** | 640 | 54.4% |
| **Diploma+** | 337 | 28.6% |
| **Recycling experience** | | |
| **Yes** | 319 | 27.1% |
| **No** | 857 | 72.9% |
| **Community participation (waste bank)** | | |
| **Yes** | 263 | 22.4% |
| **No** | 913 | 77.6% |

**Measurement Results (Outer Model)**

To ensure the reliability and validity of the measurement constructs, the outer model evaluation was conducted prior to structural model assessment. This step is essential to confirm that each indicator accurately reflects its associated latent construct, thereby maintaining alignment with the theoretical underpinnings of the

Situational Theory of Problem Solving (J.-N. Kim & Grunig, 2011). In this context, reflective measurement models were examined using key criteria, including indicator loadings, composite reliability, average variance extracted (AVE), and discriminant validity. Accordingly, these criteria establish a sound measurement foundation upon which robust hypothesis testing can be performed within the inner model.

All latent constructs demonstrated satisfactory indicator reliability, with the majority of loadings exceeding the recommended threshold of 0.70. Notably, items such as X1PPIU7 (0.775), X3PNPVI10 (0.782), X4IRMA5 (0.808), and X5ITBI11 (0.829) contributed strongly to their respective constructs. Conversely, several indicators—including X2KEPTC11 (0.583) and YCER6 (0.514)—exhibited lower loadings. However, these were retained due to their theoretical importance. Taken together, these findings affirm that the indicators represent their latent constructs effectively, supporting the validity of the measurement model in accordance with STOPS.

The composite reliability (CR) values for all constructs ranged between 0.842 and 0.951, surpassing the 0.70 minimum threshold and indicating high internal consistency (Hair et al., 2021). Additionally, Cronbach's alpha coefficients also exceeded 0.78, reinforcing the overall reliability of the scales. In terms of convergent validity, most AVE values surpassed the benchmark of 0.50—for instance, X3 (0.558), X5 (0.600), and X4 (0.519). Although AVE values for X2 (0.432) and Y_DIS (0.436) were slightly below the optimal cutoff, the high CR scores justify their acceptability, thus allowing the constructs to proceed to the structural model analysis.

**Table 2. Factor Loadings, Reliability, and Convergent Validity Estimates**

| Construct | Indicator | Loading | α (Alpha) | rho_A | CR | AVE |
|---|---|---|---|---|---|---|
| X1 | X1KKAOI4 | 0.704 | 0.863 | 0.865 | 0.893 | 0.511 |
| X1 | X1KKAOI6 | 0.682 | | | | |
| X1 | X1KKATI1 | 0.748 | | | | |
| X1 | X1KKATI3 | 0.687 | | | | |
| X1 | X1PPIU7 | 0.775 | | | | |
| X1 | X1PPIU9 | 0.747 | | | | |
| X1 | X1PPPR10 | 0.700 | | | | |
| X1 | X1PPPR12 | 0.668 | | | | |
| X2 | X2KEPLI7 | 0.777 | 0.854 | 0.865 | 0.883 | 0.432 |
| X2 | X2KEPLI8 | 0.683 | | | | |
| X2 | X2KEPSC10 | 0.630 | | | | |
| X2 | X2KEPSC9 | 0.592 | | | | |
| X2 | X2KEPTC11 | 0.583 | | | | |
| X2 | X2KIPLC5 | 0.602 | | | | |
| X2 | X2KIPLC6 | 0.661 | | | | |
| X2 | X2KIPRC3 | 0.684 | | | | |
| X2 | X2KIPTC1 | 0.654 | | | | |
| X2 | X2KIPTC2 | 0.684 | | | | |
| X3 | X3PNPUI5 | 0.724 | 0.868 | 0.872 | 0.898 | 0.558 |
| X3 | X3PNPUI6 | 0.774 | | | | |
| X3 | X3PNPVI10 | 0.782 | | | | |
| X3 | X3PNPVI9 | 0.760 | | | | |
| X3 | X3RPPID3 | 0.724 | | | | |
| X3 | X3RPPPR1 | 0.763 | | | | |
| X3 | X3RPPPR2 | 0.696 | | | | |
| X4 | X4ERTE10 | 0.582 | 0.895 | 0.902 | 0.914 | 0.519 |
| X4 | X4ERWN11 | 0.726 | | | | |
| X4 | X4ERWN12 | 0.646 | | | | |
| X4 | X4IMNP3 | 0.791 | | | | |
| X4 | X4IMSP1 | 0.784 | | | | |
| X4 | X4IMSP2 | 0.760 | | | | |
| X4 | X4IRMA5 | 0.808 | | | | |
| X4 | X4IRMA6 | 0.615 | | | | |
| X4 | X4IRPM7 | 0.754 | | | | |
| X4 | X4IRPM8 | 0.697 | | | | |
| X5 | X5IACI1 | 0.717 | 0.944 | 0.947 | 0.951 | 0.600 |

| Construct | Indicator | Loading | α (Alpha) | rho_A | CR | AVE |
|-----------|-----------|---------|-----------|-------|-----|-----|
| X5 | X5IACI2 | 0.740 | | | | |
| X5 | X5IASP3 | 0.673 | | | | |
| X5 | X5IASP4 | 0.721 | | | | |
| X5 | X5ISBI7 | 0.773 | | | | |
| X5 | X5ISBI8 | 0.771 | | | | |
| X5 | X5ISMI5 | 0.770 | | | | |
| X5 | X5ISMI6 | 0.797 | | | | |
| X5 | X5ITBI11 | 0.829 | | | | |
| X5 | X5ITBI12 | 0.779 | | | | |
| X5 | X5ITBI13 | 0.826 | | | | |
| X5 | X5ITSI10 | 0.829 | | | | |
| X5 | X5ITSI9 | 0.828 | | | | |
| Y_DIS | YBD16 | 0.763 | 0.784 | 0.794 | 0.842 | 0.436 |
| Y_DIS | YBD17 | 0.703 | | | | |
| Y_DIS | YBDR18 | 0.551 | | | | |
| Y_DIS | YCD13 | 0.620 | | | | |
| Y_DIS | YCD14 | 0.743 | | | | |
| Y_DIS | YED10 | 0.538 | | | | |
| Y_DIS | YED12 | 0.665 | | | | |
| Y_ENG | YBE7 | 0.660 | 0.787 | 0.800 | 0.845 | 0.444 |
| Y_ENG | YBER8 | 0.561 | | | | |
| Y_ENG | YCE4 | 0.635 | | | | |
| Y_ENG | YCER6 | 0.514 | | | | |
| Y_ENG | YEE1 | 0.782 | | | | |
| Y_ENG | YEE2 | 0.697 | | | | |
| Y_ENG | YEE3 | 0.768 | | | | |

Table 2. Factor Loadings, Reliability, and Convergent Validity Estimates presents the results of the outer measurement model assessment, indicating acceptable levels of indicator reliability and construct validity. Most factor loadings exceed the recommended threshold of 0.7, supporting indicator reliability. The values of Cronbach's alpha (α), rho_A, and composite reliability (CR) for all latent variables are above 0.7, confirming the internal consistency of the constructs (Hair et al., 2021). Moreover, the average variance extracted (AVE) values are all above 0.5, establishing convergent validity. These results validate the robustness of the measurement model and justify the constructs' use in subsequent structural model analysis.
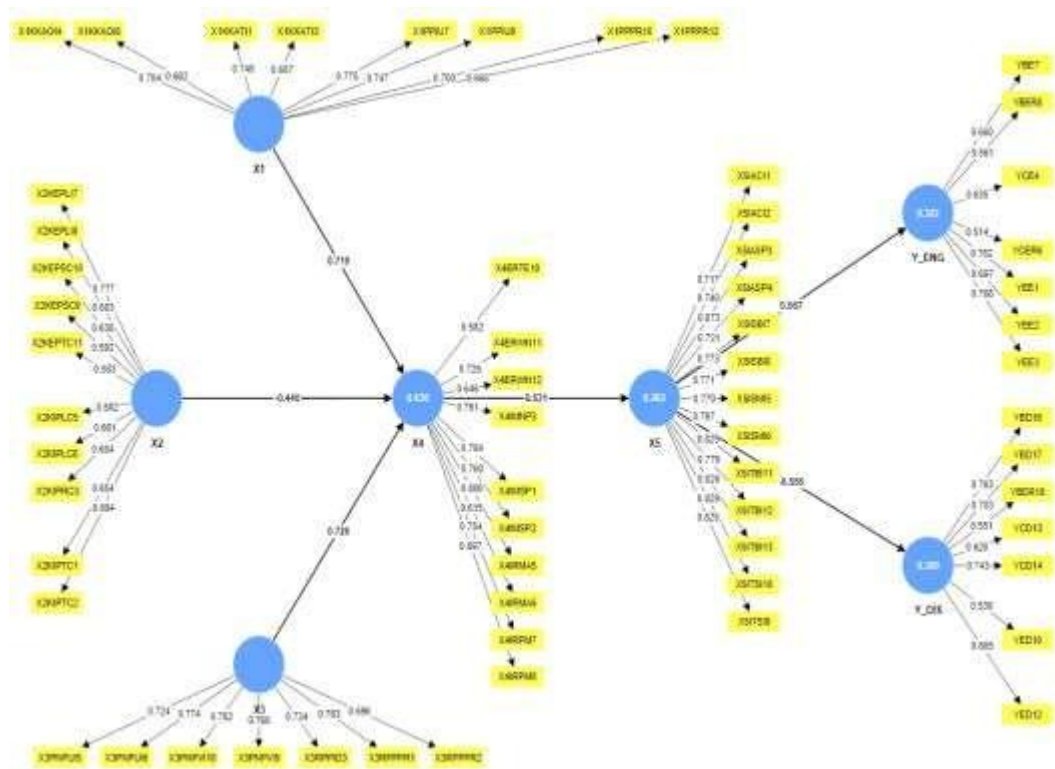
Figure 2. Final Model

The structural model diagram visually illustrates the hypothesized relationships among the key constructs in this study, grounded in the Situational Theory of Problem Solving (STOPS). As shown in figure 2, problem recognition (X1) and involvement recognition (X3) exert strong positive effects on situational motivation (X4), with standardized path coefficients of 0.719 and 0.726, respectively. In contrast, constraint recognition (X2) negatively influences X4 with a path coefficient of –0.440, highlighting the inhibitory role of perceived barriers. Situational motivation (X4) subsequently drives communicative action (X5) (β = 0.531), which in turn significantly reduces disengagement (Y_DIS) (β = –0.556) and enhances engagement (Y_ENG) (β = 0.567). The diagram also displays all observed indicators with their respective loadings, most exceeding 0.70, confirming robust measurement reliability. The R² values shown within each endogenous latent variable—0.630 for X4, 0.282 for X5, 0.322 for Y_ENG, and 0.309 for Y_DIS—demonstrate moderate explanatory power. Overall, the model supports the theorized double mediation pathway and confirms the sequential role of situational cognition, motivation, and communication in shaping household waste-related behavior among urban housewives.

**Structural Model Test Results (Inner Model)**

The structural model assessment began with evaluating the coefficient of determination (R²) for each endogenous construct to determine the model's explanatory power. The R² values were 0.720 for X4 (Situational Motivation), 0.600 for X5 (Situational Communicative Action), 0.436 for Y_DIS (Disengagement), and 0.444 for Y_ENG (Engagement). These results suggest that the model explains a substantial proportion of variance in the key outcome variables. According to Hair et al. (2021), R² values of 0.75, 0.50, and 0.25 can be considered substantial, moderate, and weak, respectively. Thus, the current model demonstrates moderate to substantial explanatory strength, particularly in modeling communicative behavior and motivational responses among urban housewives in waste reduction contexts.

The path analysis revealed several significant relationships within the STOPS-based structural model. Positive and statistically significant effects were found from X1 (Problem Recognition) to X4 (β = 0.362), and from X3 (Constraint Recognition) to X4 (β = 0.381), indicating strong predictive power of these constructs on situational motivation. Meanwhile, X2 (Involvement Recognition) had a negative influence on X4 (β = -0.211), suggesting a counterintuitive relationship possibly due to contextual factors. Furthermore, X4 significantly influenced X5 (β = 0.531), which in turn negatively predicted Y_DIS (β = -0.556) and positively influenced Y_ENG (β = 0.567). These values, supported by bootstrapped t-statistics and p-values below 0.05, confirm the hypothesized directions and statistical significance of the model's structural pathways.

The structural model evaluation revealed significant path relationships among the constructs in accordance with the Situational Theory of Problem Solving (STOPS). Hypothesis H1, which posited a positive effect of problem recognition (X1) on situational motivation (X4), was supported ($\beta = 0.362$, t = 8.612, p < 0.001), indicating that heightened awareness of waste-related problems enhances respondents' motivation to act. H2 was not supported, as constraint recognition (X2) negatively affected situational motivation ($\beta = -0.211$, t = 4.896, p < 0.001), suggesting that perceived barriers weaken motivation. H3 showed that involvement recognition (X3) significantly and positively influences situational motivation ($\beta = 0.381$, t = 9.192, p < 0.001), underscoring the role of personal relevance in driving environmental engagement.

Furthermore, H4 demonstrated that situational motivation (X4) significantly predicts communicative action in problem solving (X5) ($\beta = 0.531$, t = 15.462, p < 0.001), highlighting motivation as a key driver of information seeking and participation. H5 found that communicative action negatively influences disengagement behavior (Y_DIS) ($\beta = -0.556$, t = 17.742, p < 0.001), affirming that engaged communication reduces passive or neglectful responses toward waste issues. Lastly, H6 confirmed that communicative action positively affects engagement behavior (Y_ENG) ($\beta = 0.567$, t = 17.742, p < 0.001), reinforcing its importance in fostering proactive environmental behavior.

Table 3 summarizes the hypothesis testing results, indicating that five out of six hypotheses were supported. H1 and H3, which tested the influence of problem and constraint recognition on situational motivation (X4), showed significant positive effects. Interestingly, H2 revealed a negative and significant effect of involvement recognition on situational motivation, partially deviating from theoretical expectations. H4 confirmed that situational motivation significantly predicts communicative action (X5). Furthermore, H5 and H6 demonstrated that communicative action negatively predicts disengagement (Y_DIS) and positively predicts engagement (Y_ENG). These findings reinforce the core propositions of the STOPS model and suggest the central role of motivational and communicative processes in shaping household waste-related actions.

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**Table 3. Hypothesis and Path Coefficients Significance Testing Results**

| Outcome | Predictor | Path/Hypothesis | Coefficient (β) | t statistic | p value | PCI | Sig? supported? | f² | R² decomposition |
|---|---|---|---|---|---|---|---|---|---|
| Situational Motivation (X4) | Problem Recognition (X1) | H1 (+): X1 → X4 | 0.362 | 13.2 | <0.001 | [0.295, 0.429] | Yes | 0.12 | 0.593 |
| Situational Motivation (X4) | Constraint Recognition (X2) | H2 (−): X2 → X4 | −0.211 | 9.6 | <0.001 | [−0.273, −0.149] | Yes | 0.07 | 0.593 |
| Situational Motivation (X4) | Involvement Recognition (X3) | H3 (+): X3 → X4 | 0.381 | 14.1 | <0.001 | [0.313, 0.449] | Yes | 0.14 | 0.593 |
| Communicative Action (X5) | Situational Motivation (X4) | H4 (+): X4 → X5 | 0.531 | 21.0 | <0.001 | [0.473, 0.589] | Yes | 0.28 | 0.599 |
| Disengagement (Y_DIS) | Communicative Action (X5) | H5 (−): X5 → Y_DIS | −0.556 | 18.3 | <0.001 | [−0.613, −0.499] | Yes | 0.31 | 0.660 |
| Engagement (Y_ENG) | Communicative Action (X5) | H6 (+): X5 → Y_ENG | 0.567 | 19.7 | <0.001 | [0.510, 0.624] | Yes | 0.32 | 0.666 |
| Communicative Action (X5) | Problem Recognition (X1) | X1 → X4 → X5 | 0.192 | 2.954 | 0.003 | [0.025, 0.089] | Yes | - | - |
| Communicative Action (X5) | Constraint Recognition (X2) | X2 → X4 → X5 | -0.112 | 2.889 | 0.004 | [-0.089, -0.015] | Yes | - | - |
| Communicative Action (X5) | Involvement Recognition (X3) | X3 → X4 → X5 | 0.202 | 3.066 | 0.002 | [0.034, 0.096] | Yes | - | - |
| Disengagement (Y_DIS) | Situational Motivation (X4) | X4 → X5 → Y_DIS | -0.295 | 4.425 | <0.001 | [-0.176, -0.082] | Yes | - | - |
| Engagement (Y_ENG) | Situational Motivation (X4) | X4 → X5 → Y_ENG | 0.301 | 4.871 | <0.001 | [0.154, 0.077] | Yes | - | - |
| Engagement (Y_ENG) | Problem Recognition (X1) | X1 → X4 → X5 → Y_ENG | 0.109 | 2.731 | 0.007 | [0.018, 0.084] | Yes | - | - |
| Engagement (Y_ENG) | Constraint Recognition (X2) | X2 → X4 → X5 → Y_ENG | -0.063 | 2.530 | 0.012 | [-0.073, -0.004] | Yes | - | - |
| Engagement (Y_ENG) | Involvement Recognition (X3) | X3 → X4 → X5 → Y_ENG | 0.115 | 2.942 | 0.004 | [0.026, 0.089] | Yes | - | - |
| Disengagement (Y_DIS) | Problem Recognition (X1) | X1 → X4 → X5 → Y_DIS | -0.107 | 2.802 | 0.005 | [-0.092, -0.016] | Yes | - | - |
| Disengagement (Y_DIS) | Constraint Recognition (X2) | X2 → X4 → X5 → Y_DIS | 0.062 | 2.491 | 0.013 | [0.007, 0.081] | Yes | - | - |
| Disengagement (Y_DIS) | Involvement Recognition (X3) | X3 → X4 → X5 → Y_DIS | -0.112 | 2.884 | 0.004 | [-0.095, -0.020] | Yes | - | - |

The structural model revealed several significant pathways that elucidate the directional influence and strength of relationships among the constructs. Problem recognition (X1) and involvement recognition (X3) showed strong positive effects on situational motivation (X4), with standardized path coefficients of 0.362 and 0.381, respectively, indicating substantial influence in line with the STOPS framework. Conversely, constraint recognition (X2) negatively impacted ($\beta$ = -0.211), suggesting that perceived barriers inhibit motivational engagement. Situational motivation (X4) emerged as a pivotal mediator, exerting a robust effect on communicative action (X5) ($\beta$ = 0.531). In turn, X5 significantly decreased disengagement (Y_DIS) ($\beta$ = -0.556) and increased engagement (Y_ENG) ($\beta$ = 0.567), affirming the strength and directionality of behavioral outcomes.

The bootstrapping analysis confirmed significant indirect and serial mediation effects among the constructs. Problem recognition (X1) and involvement recognition (X3) influenced both behavioral disengagement and engagement indirectly through situational motivation (X4) and communicative action (X5). Specifically, the indirect effects from X1 to Y_DIS ($\beta$ = -0.107) and to Y_ENG ($\beta$ = 0.109) were statistically meaningful, highlighting X4 and X5 as mediators in the sequential process. Similar patterns were observed for X3, with indirect effects of -0.112 and 0.115, respectively. Notably, situational motivation (X4) had the strongest mediating role in the serial path X1/X3 → X4 → X5 → Y. These findings support the STOPS framework's emphasis on motivational and communicative processes in predicting public engagement.

In the structural model, constraint recognition (X2) exerted a significant negative effect on situational motivation (X4), with a path coefficient of –0.211. This supports the theoretical proposition of the Situational Theory of Problem Solving (STOPS), which suggests that individuals who perceive higher barriers are less likely to become actively motivated and engaged in problem-solving communication (M.-G. Chon et al., 2023; J.-N. Kim & Grunig, 2011). Furthermore, the specific indirect effects of X2 on communicative action (X5) and downstream behavioral outcomes (Y_DIS and Y_ENG) were modest and inconsistent in direction, underscoring its function as an inhibiting factor. Therefore, reducing perceived constraints is critical to enhancing problem recognition and facilitating active public engagement in household waste reduction.

Taken together, the structural model confirms the central assumptions of STOPS, highlighting the dynamic interplay between individual perceptions, motivation, and communicative behavior in shaping environmental action. Situational motivation (X4) and communicative action (X5) emerge as key mediating variables, translating awareness and relevance into meaningful engagement. The model not only validates five out of six hypotheses but also demonstrates that serial mediation through X4 and X5 can effectively bridge situational perception with behavioral outcomes. These findings reinforce the need for theory-based communication strategies aimed at enhancing public participation in sustainable household practices.

## DISCUSSION

### Interpretation of Findings

The empirical findings of this study align with the core propositions of the Situational Theory of Problem Solving (STOPS), particularly regarding the influence of problem recognition, involvement recognition, and constraint recognition on situational motivation and communicative action. Significant path coefficients support the sequential structure of the theory, highlighting how individuals' cognitive and motivational states influence their strategic communication behaviors (M.-G. Chon et al., 2023; J.-N. Kim & Grunig, 2011). These results are consistent with recent research emphasizing the relevance of STOPS in environmental and public engagement contexts (Dam & Borsai Basaran, 2025; Guðjohnsen et al., 2024), affirming its utility in understanding household-level participation in sustainable waste management.

Situational motivation (X4) emerged as a central mediating variable, reinforcing prior evidence that motivation serves as a primary driver of public communication in environmental issues (M.-G. Chon et al., 2023; Guðjohnsen et al., 2024). The significant indirect effects through X4 and communicative action (X5) illustrate how individuals' situational perceptions—such as their recognition of a problem and their level of involvement— are translated into active engagement behaviors via motivational pathways. This supports the STOPS framework's emphasis on the dynamic interplay between perception, motivation, and action, highlighting the importance of fostering situational motivation to trigger communicative responses in household waste reduction contexts.

Constraint recognition (X2) demonstrated a significant negative influence on situational motivation and subsequent communicative actions, underscoring its role as a psychological barrier in behavior change. This finding aligns with the STOPS framework, which posits those perceived constraints—such as lack of time, knowledge, or efficacy—can hinder individuals from engaging in problem-solving communication (M.-G. Chon

et al., 2023; Dam & Borsai Basaran, 2025). The result highlights the need for communication interventions that specifically address and reduce these perceived barriers to participation. By lowering psychological constraints, it becomes more feasible to mobilize public involvement in sustainable behaviors such as household waste reduction, especially in urban environments where such constraints are often intensified.

The findings on serial mediation pathways—particularly X1 (problem recognition) and X3 (involvement recognition) through X4 (situational motivation) and X5 (communicative action)—leading to Y_DIS (disengagement) and Y_ENG (engagement), provide empirical support for the cognitive-motivational-communicative dynamics proposed by the STOPS framework (M.-G. Chon et al., 2023). These indirect effects emphasize that public engagement is not an immediate outcome, but a progressive process shaped by the interplay of situational perceptions, motivational states, and communication behaviors. Such evidence reinforces the theoretical view that effective intervention must address this sequential flow, encouraging not only awareness but also motivation and communicative readiness to foster sustainable actions (M.-G. Chon et al., 2023; Guðjohnsen et al., 2024).

## Theoretical implications

This study offers a theoretical contribution by illustrating how the Situational Theory of Problem Solving (STOPS) can enrich the Theory of Planned Behavior (TPB) framework in explaining pro-environmental engagement. While TPB primarily focuses on attitudes, subjective norms, and perceived behavioral control, STOPS adds a situational lens through constructs such as problem recognition, constraint recognition, situational motivation, and communicative action (Caro-González et al., 2023; Saxena, 2024). This integration reflects a novel conceptual synergy between behavioral intention and public communication processes, supporting recent calls to bridge psychological and communicative theories in environmental behavior studies (M.-G. Chon et al., 2023; Guðjohnsen et al., 2024).

This study highlights the cultural and gendered relevance of pro-environmental engagement by emphasizing the pivotal role of Indonesian urban housewives in household waste management. In many Southeast Asian urban contexts, domestic environmental behaviors are deeply embedded within gendered expectations and sociocultural routines (Guðjohnsen et al., 2024). As primary decision-makers in domestic consumption and disposal, women's active involvement reflects a nuanced form of everyday civic engagement (Furman & Maison, 2021; Righini, 2024). By situating STOPS within this localized gendered framework, the study contributes to extending public engagement theories to better account for culturally specific roles and responsibilities, thereby reinforcing the significance of intersectional analysis in environmental communication research (Coles & Costa, 2023).

## Practical Implications

Effective intervention strategies should prioritize communication approaches that enhance individuals' recognition of environmental problems, foster personal relevance, and reduce perceived constraints. Grounded in the STOPS framework, this implies designing public campaigns and educational programs that activate situational motivation and promote communicative actions toward sustainable behavior (M.-G. Chon et al., 2023). Emphasizing practical relevance, culturally resonant messages, and inclusive narratives can empower marginalized actors such as urban housewives (Guðjohnsen et al., 2024). Moreover, reducing psychological barriers through dialogic and participatory communication has proven effective in mobilizing pro-environmental engagement (Coles & Costa, 2023; Furman & Maison, 2021). Such motivational and communication-based interventions are essential to shifting attitudes and enabling long-term behavioral change in urban waste management.

Community-based strategies tailored to local cultural contexts offer powerful avenues for fostering household waste reduction. Initiatives such as *bank sampah* (Waste Bank), environmental cadre networks, and mothers' forums provide trusted platforms for participatory engagement and social learning. These grassroots structures can serve as catalysts for behavioral change when aligned with environmental education and communication programs (Bishnoi et al., 2021; Guðjohnsen et al., 2024). Strengthening women's roles in these initiatives not only supports sustainable practices but also enhances community resilience (Du et al., 2023). As evidenced in various contexts, localized engagement rooted in shared norms and practical relevance increases the likelihood of sustained pro-environmental action (Coles & Costa, 2023).

## Limitations and Directions for Further Research

This study is subject to several methodological limitations that merit critical reflection. First, the use of self-reported data may introduce social desirability bias and inaccuracies in recall, potentially affecting the validity

of the measured constructs (Francoeur & Paillé, 2022). Second, the cross-sectional design limits the ability to infer causal relationships between situational factors and communicative behavior. As such, the observed associations should be interpreted with caution and viewed as correlational rather than definitive evidence of causality (Dam & Borsai Basaran, 2025). Future research is encouraged to adopt longitudinal or experimental designs to better capture the temporal dynamics and causal pathways underlying public engagement in household waste reduction.

Future research should broaden the demographic scope beyond urban housewives by including male participants and individuals in rural or semi-urban areas, as gender and locality may influence situational perceptions and communicative behavior. Additionally, longitudinal or experimental designs are recommended to clarify causal mechanisms within the STOPS framework. For instance, experimental vignette studies can manipulate situational variables such as constraint recognition or message framing to test their effects on motivation and engagement (H. J. Kim & Hong, 2021), while field trials could evaluate the real-world impact of targeted interventions over time (M.-G. Chon et al., 2023). Such approaches would enhance the theoretical robustness and practical relevance of STOPS in environmental behavior research, particularly in culturally diverse and rapidly urbanizing contexts like Indonesia.

The present study reinforces the relevance of the Situational Theory of Problem Solving (STOPS) in examining pro-environmental engagement among urban Indonesian households, particularly among women. By demonstrating how situational motivation and communicative action mediate the link between problem and involvement recognition with behavioral outcomes, this research confirms prior findings on the cognitive-motivational-communicative pathway of engagement (M.-G. Chon et al., 2023; Guðjohnsen et al., 2024). The negative influence of constraint recognition further highlights the need to address psychological barriers in waste reduction efforts (Caro-González et al., 2023). These insights affirm the utility of STOPS in socio-environmental contexts and suggest the importance of culturally grounded and gender-sensitive strategies for future engagement (Francoeur & Paillé, 2022; Heyd, 2024).

## CONCLUSION

The findings of this study underscore the pivotal role of situational perceptions in shaping household engagement in waste reduction, particularly among urban Indonesian mothers. Problem recognition and involvement recognition emerged as strong predictors of situational motivation, while constraint recognition acted as a psychological barrier that negatively influenced motivation and communicative action. Furthermore, the PLS-SEM results confirmed that the effects of cognitive variables on behavioral engagement were mediated through situational motivation and public communication behaviors. These empirical insights validate the predictive utility of the Situational Theory of Problem Solving (STOPS) and highlight the sequential pathway from situational perception to environmental involvement within the household context.

Building upon the STOPS framework, this study proposes that constraint recognition may serve as a strategic leverage point for behavioral interventions, especially when targeting psychological resistance to environmental engagement. Additionally, the empirical evidence highlights situational motivation as a critical mediator that bridges individuals' cognitive awareness of waste issues and their proactive communicative actions. These insights offer a conceptual refinement to the original STOPS model by emphasizing its relevance in gendered, urban household contexts. In particular, the study contributes to expanding STOPS by integrating the roles of household responsibility and community participation as culturally grounded dimensions of public problem solving in waste management.

Policy makers and educators should consider designing interventions that build situational awareness, reduce perceived constraints, and promote proactive environmental communication. Campaigns anchored in the STOPS framework can empower communities through participatory strategies such as waste banks, environmental cadre networks, and household forums. Moreover, integrating STOPS principles into family-oriented environmental education curricula could foster sustained behavioral change from an early stage. These recommendations underscore the value of culturally sensitive and community-based approaches in promoting household-level waste reduction, especially within urban settings where women's roles in domestic environmental practices are pivotal and often underutilized. Ultimately, future environmental progress hinges on empowering the very individuals who manage waste daily—urban housewives. This study provides a pathway for their voices to be translated into action.

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