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# Behavior of Consumers in Chiang Mai Province Towards Management of Post-used Beverage Packaging Disposal

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## ABSTRACT

The issue of beverage packaging waste is a significant environmental concern, particularly in Chiang Mai, where high tourism activity contributes to increasing waste levels. This study aims to examine consumer behavior in managing post-consumed beverage packaging using the Theory of Planned Behavior (TPB) as the primary analytical framework. The study focuses on three key factors: Attitude Toward Behavior, Subjective Norms, and Perceived Behavioral Control influencing consumer intentions and actions. This research employs a qualitative approach through in-depth interviews with 30 consumers residing in Chiang Mai. Data was analyzed using Thematic Analysis, revealing that consumers with a positive attitude and social support are more likely to engage in proper waste management practices. Additionally, convenience and perceived behavioral control significantly influence actual behavior. Key challenges identified include the complexity of waste separation, lack of knowledge on recycling, and low confidence in waste management systems, leading some consumers to opt out of waste separation practices. The findings highlight opportunities to promote sustainable packaging waste management through education on the 3Rs (Reduce, Reuse, Recycle), improvements in waste management infrastructure, and encouraging

businesses to adopt eco-friendly packaging. The insights from this study can inform public policy development and marketing strategies to enhance consumer participation in reducing beverage packaging waste.

**Keywords:** Attitude Towards Behavior, Subjective Norm, Perceived Behavioral Control, Waste Management, Beverage Packaging

# พฤติกรรมของผู้บริโภคในจังหวัดเชียงใหม่ในการจัดการบรรจุภัณฑ์เครื่องดื่มหลังการใช้งาน

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## บทคัดย่อ

ปัญหาขยะจากบรรจุภัณฑ์เครื่องดื่มนับเป็นหนึ่งในประเด็นด้านสิ่งแวดล้อมที่สำคัญ โดยเฉพาะในจังหวัดเชียงใหม่ซึ่งมีระดับกิจกรรมด้านการท่องเที่ยวที่สูง ส่งผลให้ปริมาณขยะเพิ่มขึ้นอย่างต่อเนื่อง งานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาพฤติกรรมของผู้บริโภคในการจัดการบรรจุภัณฑ์เครื่องดื่มหลังการบริโภค โดยใช้ทฤษฎีพฤติกรรมตามแบบแผนเป็นกรอบในการวิเคราะห์ โดยเน้นพิจารณาปัจจัยหลัก 3 ประการ ได้แก่ ทัศนคติต่อพฤติกรรม การคล้อยตามกลุ่มอ้างอิง และการรับรู้ความสามารถในการควบคุมพฤติกรรม ที่มีอิทธิพลต่อเจตนาและการกระทำของผู้บริโภค งานวิจัยนี้ใช้วิธีวิจัยเชิงคุณภาพผ่านการสัมภาษณ์เชิงลึกกับผู้บริโภคจำนวน 30 รายในจังหวัดเชียงใหม่ และนำข้อมูลที่ได้มาวิเคราะห์โดยใช้วิธี Thematic Analysis ผลการศึกษาแสดงให้เห็นว่า ผู้บริโภคที่มีทัศนคติเชิงบวกและได้รับแรงสนับสนุนจากสังคมมีแนวโน้มที่จะปฏิบัติตามแนวทางการจัดการขยะอย่างเหมาะสมมากขึ้น อีกทั้งปัจจัยด้านความสะดวกและการรับรู้ว่าตนเองสามารถควบคุมพฤติกรรมได้ ก็มีอิทธิพลอย่างมีนัยสำคัญต่อการกระทำจริงของผู้บริโภค อย่างไรก็ตาม ปัญหาหลักที่พบ ได้แก่ ความซับซ้อนของกระบวนการแยกขยะ ความรู้ที่จำกัดเกี่ยวกับการรีไซเคิล และความไม่มั่นใจในระบบการจัดการขยะของภาครัฐ ซึ่งส่งผลให้ผู้บริโภคบางส่วนเลือกที่จะไม่แยกขยะ ผลการศึกษาชี้ให้เห็นถึงโอกาสในการส่งเสริมการจัดการบรรจุภัณฑ์อย่างยั่งยืนผ่านการให้ความรู้เรื่อง 3Rs (Reduce, Reuse, Recycle) การปรับปรุงโครงสร้างพื้นฐานด้านการจัดการขยะ และการส่งเสริมให้ภาคธุรกิจหันมาใช้บรรจุภัณฑ์ที่เป็นมิตรกับสิ่งแวดล้อม ข้อมูลเชิงลึกจากงานวิจัยนี้สามารถนำไปใช้ประโยชน์ในการกำหนดนโยบายสาธารณะและกลยุทธ์ทางการตลาดเพื่อส่งเสริมการมีส่วนร่วมของผู้บริโภคในการลดปัญหาขยะจากบรรจุภัณฑ์เครื่องดื่ม

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## 1. INTRODUCTION

The increasing volume of post-consumption waste, especially from plastic packaging, presents a growing environmental challenge. Among various contributors, the beverage industry is one of the most significant, particularly due to the extensive use of single-use plastic bottles. In Thailand, over 4 billion plastic bottles were consumed annually as of 2018, with only 25% being recycled or reused (Thai PBS, 2018). Chiang Mai—Thailand's second-highest province in daily waste generation (Department of Mineral Fuels, Ministry of Energy, 2020)—exemplifies this issue, producing up to 340 tons of solid waste daily in 2023 (Thai PBS, 2023). Improper segregation and low public awareness exacerbate these problems, leading to drainage blockages, flooding, and the spread of microplastics into marine ecosystems (Panyayong, 2022).

While leading beverage brands have responded with eco-conscious packaging innovations (e.g., recyclable, label-free bottles by Singha; Prachachat Business, 2024), the adoption of sustainable packaging management by consumers remains limited. Packaging options—ranging from glass, plastic, paper cartons to aluminum—each present distinct environmental trade-off (Wildpack Beverage, 2022). However, consumer choices and behaviors surrounding their post-consumption disposal remain under-explored, particularly in a local context such as Chiang Mai.

Prior studies on waste management behavior have been largely quantitative, focusing primarily on recycling and often limited to plastic bottles. For example, Phattaratikhom (2022) found that attitude and perceived behavioral control influenced recycling intention, while subjective norms did not—contradicting Ajzen's (1991) Theory of Planned Behavior (TPB). Other studies, such as Khan et al. (2019), Widayat et al. (2021), and Borusiak et al. (2021), have confirmed that all three TPB factors—attitude, subjective norms, and perceived behavioral control—play key roles in driving sustainable behavior. Nonetheless, these works lack qualitative depth and fail to address underlying emotional, habitual, and contextual factors, particularly in relation to broader 3Rs practices: Reduce, Reuse, and Recycle.

This study addresses that gap by qualitatively exploring consumer behavior in Chiang Mai concerning post-consumption beverage packaging management. Using the Theory of Planned Behavior (Ajzen, 2006) as the conceptual lens, the research investigates how consumers form attitudes toward packaging disposal, how their behavior is influenced by reference groups such as family, peers, and institutions, and how they perceive their ability to control and manage post-use packaging effectively. The study aims to contribute both theoretically—by expanding TPB with real-world insights—and practically—by informing communication strategies and public interventions that encourage sustainable consumer behavior.

## 2. LITERATURE REVIEW

### 2.1 Theory of Planned Behavior

The Theory of Planned Behavior (TPB) was developed by Icek Ajzen in 1985 as a framework within social psychology. It was later refined in 2002 based on the Theory of Reasoned Action (TRA) to address specific limitations of the original model. TPB is widely used to explain human behavior by emphasizing the intention to act, which is influenced by three core belief components: attitude toward the behavior, subjective norms, and perceived behavioral control.

Attitude toward the behavior refers to a person's positive or negative evaluation of performing a specific behavior. This attitude stems from the belief about the outcomes of that behavior. If an individual believes that engaging in the behavior will lead to favorable results, a positive attitude is formed. Conversely, if the anticipated outcome is negative, the person will likely develop an unfavorable attitude. For instance, if consumers believe that packaging management can generate income, they are more likely to adopt a positive attitude toward post-consumption packaging behavior.

Subjective norms reflect the perceived social pressure from significant others, such as family, friends, coworkers, or opinion leaders, that influence whether a behavior should or should not be performed. When an individual is surrounded by people who actively manage beverage packaging, they are more likely to follow that behavior pattern as well.

Perceived behavioral control pertains to an individual's perception of the ease or difficulty in performing the behavior, which is shaped by past experiences and anticipated obstacles. If a person believes that separating and managing beverage packaging is easy and within their control, they are more likely to repeat the behavior. For example, if one can successfully sort packaging materials with little effort, the perceived ease reinforces the intention to do so regularly.

Recent qualitative study use TPB to understand recycling intention by examining how attitudes, subjective norms, and perceived behavioral control influence individuals' plans to recycle (e.g. Islam, 2021). One of a recent study (Amirudin & Ramadhani, 2024) finds that perceived behavioral control-the belief in one's ability to perform recycling-is often the strongest predictor of recycling intention, highlighting the importance of both self-efficacy and external factors in shaping recycling behaviors. Additionally, some research extends the TPB framework by integrating moral norms and place attachment, showing that these factors indirectly affect recycling intention through their influence on attitudes and perceived control (Pathak et al., 2023).

In summary, TPB offers a comprehensive lens to understand human behavior. It posits that attitude, social influence, and perceived control interact to shape behavioral intention. When individuals hold positive attitudes, receive encouragement from their social environment, and feel confident in their ability to perform a behavior, they are more likely to act upon that intention (Ajzen, 2006).

**2.2 Waste Management and the 3Rs Concept**

As a global crisis phenomenon, UN-Habitat (2024) calls for cities around the world to adopt sustainable practices to build resilience against climate risks. In line with this urgent plan, the Department of Mineral Fuels, Ministry of Energy (2020) also puts forward and encourages recycling intention among urban residents, while seeking more innovative approaches to address city waste management. Waste management is a critical phase in the consumption cycle, referring to the disposal of residual waste. In Thailand, landfilling and incineration are the most common disposal methods. Global waste generation is expected to reach 3.4 billion tons by 2050. Improper waste management threatens public health and the environment.

For example, UN-Habitat (2024) reported that in areas lacking proper waste management, the incidence of diarrhea was twice as high, and acute respiratory infections were six times more frequent.

From the consumer's perspective, post-consumption waste management can be achieved effectively through the 3Rs framework.

Reduce: Refusing to use harmful packaging, avoiding unnecessary purchases, or buying in bulk to minimize waste.

Reuse: Prolonging the life of packaging through multiple uses, such as using reusable glass bottles or stainless-steel cups instead of single-use plastic containers.

Recycle: Converting used materials into new products, such as recycling PET bottles into textiles or melting down aluminum cans into new containers. Recycling saves energy and reduces resource extraction.

Applying the 3Rs promotes efficient and sustainable resource usage while minimizing environmental impact.

### 2.3 Types of Beverage Packaging

In the beverage industry, packaging is an indispensable element due to the physical properties of liquids, which require containment to preserve form and ensure product quality. Without proper packaging, beverage contents are vulnerable to deterioration, contamination, or nutrient loss. As such, selecting the right type of packaging plays a vital role not only in product preservation and transportation but also in enhancing brand value and promoting sustainability.

Beverage packaging can generally be categorized into four main material types: plastic, glass, aluminum, and paper. Each type has distinct physical properties, along with specific advantages and disadvantages from both commercial and environmental perspectives.

Plastic packaging particularly polyethylene terephthalate (PET) is the most used material in beverages such as bottled water, soft drinks, and juices. Plastic is lightweight, durable, low in production cost, and moldable into various shapes to meet both producer and consumer demands. Recently, innovations such as recycled PET and bio-based plastics have been introduced to mitigate environmental impact (Royal Crown Cola International, 2023). Plastic bottles offer benefits such as impact resistance and cost-efficiency in transportation due to their light weight (Thai Beverage Can, 2024). However, plastic is also a significant environmental threat due to its long decomposition period, which spans hundreds of years, and its low overall recycling rate. Even with bioplastics incorporated in the production process, improper disposal can result in environmental contamination, including the spread of microplastics and harm to marine life such as sea turtles (Royal Crown Cola International, 2023).

Glass packaging is among the oldest and most traditional forms of beverage containment. It is typically produced using materials such as silica sand and dolomite (Siam Cement Group, 2021). Glass is appreciated for its rigidity, clarity, and ability to preserve both taste and aroma. Aesthetically, its smooth and transparent surface enhances product appeal, often elevating the product's premium image (Canpack, 2020). Glass containers are also 100% recyclable (Tetra Pak, 2023). However, drawbacks include their heavyweight, which increases transportation costs, and fragility, which raises the risk of breakage during shipping or consumption. Moreover, the initial production of glass requires significant energy, contributing to environmental emissions (Royal Crown Cola International, 2023).

Aluminum packaging, commonly used in beverage cans, is regarded as an environmentally friendly alternative. Aluminum cans are fully recyclable without quality degradation and provide excellent protection against sunlight and oxygen exposure. Their lightweight yet durable nature makes them particularly desirable in cold beverages, as they cool faster than other packaging types (Thai Beverage Can, 2024). Advantages include moisture resistance, portability, and high recyclability. In fact, the recycling process for aluminum requires less energy than producing new cans. However, challenges remain, such as the higher production cost compared to plastic and the potential for deformation or leakage upon impact. Additionally, improper handling may result in heavy metal pollution (Thai Beverage Can, 2024).

Paper cartons, often used in aseptic packaging, are considered one of the most eco-efficient options. They are designed to maintain the nutritional quality of beverages while minimizing exposure to ultraviolet light. These cartons are typically made from layered materials including paper, plastic, aluminum, and foil to prevent leakage and spoilage. Benefits include their lightweight structure, which reduces shipping costs and extends product shelf life (Tetra Pak, 2023). However, paper cartons pose challenges in terms of recycling complexity, as multiple layers of materials must be separated prior to reprocessing. Moreover, production costs are relatively high compared to plastic bottles, and improper disposal can lead to environmental degradation due to the inclusion of non-biodegradable components such as foil and plastic (Royal Crown Cola International, 2023).

Each type of beverage packaging responds to different product and market needs. The selection of appropriate materials depends on factors such as product characteristics, distribution requirements, environmental impact, and brand positioning strategies. A deeper understanding of these trade-offs is essential for manufacturers aiming to align product design with sustainability objectives.

## 3. RESEARCH METHODOLOGY

This qualitative study investigates consumer behavior in Chiang Mai Province regarding the management of beverage packaging waste after consumption, using the Theory of Planned Behavior (TPB) as a guiding framework (Ajzen, 2006). The research was conducted through in-depth interviews, which served as the primary data collection method. Interviewees were purposively selected to reflect a range of age groups: 20–29, 30–39, and 40–49 years. Previous studies (López-Mosquera et al., 2014; Barr et al., 2011; Stern, 2000) support our justification that individuals in the 20-29, 30-39, and 40-49 age ranges are particularly engaged in recycling and other sustainability-related behaviors.

The aim was to explore how attitudes, social norms, and perceived behavioral control influence consumer behavior related to post-consumption packaging management, including practices involving plastic, glass, aluminum, and paper containers. The fieldwork took place from August to October 2024

### 3.1 Research Questions

This study seeks to understand consumer behavior in Chiang Mai regarding the management of beverage packaging after use, employing the Theory of Planned Behavior (TPB) as the theoretical framework. The research aims to explore how attitudes, social influences, and perceived behavioral control interact to shape packaging disposal practices within the broader context of sustainable behaviors such as Reduce, Reuse, and Recycle.

### 3.2 Data

The primary data for this study were derived exclusively from in-depth interviews with thirty Thai participants residing in Chiang Mai. Participants were purposively selected to represent three distinct age segments aligned with research on environmentally conscious consumers. All respondents were regular beverage consumers, with a frequency of at least once per week, and provided informed consent prior to participation. Interviews were conducted face-to-face in Thai, typically lasting between 30 to 60 minutes. Each session was audio-recorded with participant permission, transcribed, and translated into English to support a rigorous qualitative analysis.

### 3.3 Triangulations of Data

To enhance the trustworthiness and credibility of the findings, the study adopted a multiple analyst triangulation approach. Three independent researchers were involved in the thematic analysis of the qualitative data collected from field interviews. Each researcher conducted a separate analysis of the same dataset, generating initial codes, developing themes, and identifying core insights based on the TPB framework. Once the individual analyses were complete, the researchers met to compare and discuss their interpretations. Through this collaborative review, convergent findings were identified, and consensus was established to strengthen the validity of the final results. This process minimized individual bias, encouraged reflexivity, and ensured a well-rounded understanding of the data from multiple analytical lenses.

### 3.4 Data Analysis

Data were analyzed using thematic analysis based on Braun and Clarke's (2006) six-phase model. The process began with transcription and close reading of the interview data to build familiarity. Initial codes were generated both inductively and deductively, guided by the research questions and previous TPB constructs. These codes were grouped into broader conceptual themes, which were reviewed and refined to ensure clarity and internal coherence.

To enhance transparency and traceability, **Tables 1 to 3** were developed to show how specific codes and themes align with the core components of the Theory of Planned Behavior (TPB), including attitude, subjective norms, and perceived behavioral control. This mapping process ensured that the data interpretation was grounded in both theory and participants' lived experiences. To establish trustworthiness, we applied Lincoln and Guba's (1985) four criteria: credibility, transferability, dependability, and confirmability. The use of multiple researchers in the coding process, along with literature-guided analysis, supports methodological rigor.

Each theme was then clearly named and described in relation to the research objectives and supported by representative quotations from the interview transcripts. The findings were synthesized to highlight key motivational drivers, behavioral barriers, and social influences related to post-consumption packaging practices. These interpretations were mapped to TPB's theoretical dimensions, thereby contributing to both academic theory and practical applications in sustainability communication and policy.

## 4. RESULT AND DISCUSSION

### 4.1 Results

This section presents the qualitative findings derived from thematic analysis of 30 in-depth interviews conducted in Chiang Mai Province. The results are structured around the three components of the Theory of Planned Behavior (TPB), while also reflecting local consumer practices related to the 3Rs (Reduce, Reuse, Recycle). Themes are presented using a layered structure: first-order themes (direct participant quotations), second-order interpretations, and aggregated dimensions. This structure increases readability, analytic clarity, and traceability of insights.

#### 4.1.1 Attitude Toward Beverage Packaging Management Behavior

Participants exhibited a generally positive attitude toward recycling and reuse, particularly in terms of perceived value, convenience, and satisfaction. A common theme was the belief that packaging, when properly managed, could create value. One participant stated, “I believe packaging like this can create value after use through recycling.” This reflects the participants' perception of packaging as a valuable resource once it is recycled or reused. Another participant shared, “At home, we separate plastic bottles, glass bottles, cans, and cartons to sell,” demonstrating the perceived financial value of waste materials when they are properly sorted. The convenience of waste management was another prominent theme. Several participants mentioned that sorting waste in advance made it easier for waste collectors. As one participant remarked, “If we sort properly, others can further utilize it.” Others felt personal satisfaction from participating in recycling efforts, with one stating, “I feel that even a small act can help reduce waste,” and another saying, “I feel proud. I see my own contribution as part of a larger effort.” This highlights the intrinsic motivation some participants feel when they contribute to sustainable behavior. However, some participants raised concerns about the difficulty of managing waste, particularly in terms of hygiene. One participant noted, “The hygiene issue—sometimes it’s not clean enough for me to want to handle it,” showing that perceived barriers like cleanliness can negatively influence recycling behavior.

**Table 1** Show the thematic analysis table of attitude towards beverage packaging management

| First Order | Second Order | Aggregated |
|---|---|---|
| "Sell or reuse as something else."<br>"At home, we separate plastic bottles, glass bottles, cans, and cartons to sell."<br>"I believe packaging like this can create value after use through recycling." | Perceived Value from Packaging | Positive Attitude |
| "Makes it easier for waste collectors if waste is already sorted."<br>"If we sort properly, others can further utilize it."<br>"Helps others reuse directly without needing to sort again." | **Convenience in Management** | |
| "I feel that even a small act can help reduce waste."<br>"I feel skilled at sorting and managing waste."<br>"I feel proud."<br>"I see my own contribution as part of a larger effort." | Satisfaction from Participation | |

**4.1.2 Influence of Reference Groups (Subjective Norms)**

Participants' recycling behaviors were significantly influenced by family, peers, and coworkers. Many respondents attributed their habits to teachings from their families. For example, one participant explained, "I think I believe that if it can be sold, it's probably something Mom influenced me about." Similarly, others mentioned the influence of parents, with one participant saying, "Dad and Mom taught us since we were little." This demonstrates the strong impact family values and lessons have on shaping recycling behaviors.

Peer influence also played a major role. One participant shared, “My friend said, ‘Just rinse and sort it out, easy,’” indicating that simple advice from friends can normalize recycling practices. Additionally, coworkers were cited as strong influencers, with one participant mentioning, “My coworkers are strict about waste sorting; they divide it into personal categories,” highlighting how workplace culture can drive sustainable practices. Furthermore, educational institutions contributed to shaping environmental consciousness. As one participant noted, “My child recommends new methods from school,” reflecting the role of schools in instilling environmental values in younger generations.

**Table 2** Show the thematic analysis table of Subjective norms

| First Order | Second Order | Aggregated |
|---|---|---|
| “I think I believe that if it can be sold, it’s probably something Mom influenced me about.”<br>“Dad and Mom taught us since we were little.”<br>“My child recommends new methods from school.” | **Family Influence** | People Around |
| “My friend said, ‘Just rinse and sort it out, easy.’”<br>“My coworkers are strict about waste sorting; they divide it into personal categories.”<br>“My coworkers are all foodies—they love using proper containers.” | **Friends and Coworkers** | |

#### 4.1.3 Perceived Behavioral Control

The perceived ease of recycling, such as the habit of rinsing and reusing items, was a key enabler for participants. One participant mentioned, “It’s easy because we can just rinse and recycle bottles or cartons—it’s useful,” showing that simplicity and habit significantly influence recycling behavior. Another participant stated, “It’s easy for me because I can do it myself,” indicating that individual control over the process can lead to sustained recycling behavior. However, participants also identified several barriers. For example, a participant noted, “The bins are too far away, and it’s hard to carry all that waste,” highlighting logistical

challenges that hinder effective recycling. Concerns about cleanliness were also voiced, with one participant sharing, “The hygiene issue—sometimes it’s not clean enough for me to want to handle it.” This indicates that without proper infrastructure or support, even motivated individuals might struggle to recycle effectively. The influence of campaigns and brand support was recognized, with participants acknowledging that these efforts made recycling more manageable. One participant said, “Campaigns make it easier, as they remind me to separate waste and offer convenient sorting bins.” This suggests that external support and public campaigns can play a pivotal role in encouraging sustainable behavior.

**Table 3** Show the thematic analysis table of Perceived Behavioral Control

| | | |
|---|---|---|
| “It’s easy because we can just rinse and recycle bottles or cartons—it’s useful.”<br>“It’s easy for me because I can do it myself.”<br>“I’ve done it for years; it’s become second nature.”<br>“It’s not hard. Everyone can do it. It’s just a habit.” | Non-Redundant Process | Easy to Perform |

### 4.2 Discussion

The findings align with previous literature affirming the influence of positive environmental attitudes on behavioral intentions. For instance, Borusiak et al. (2021) and Widayat et al. (2021) showed how these attitudes reduce the use of single-use plastics and support sorting behavior. Likewise, Khan et al. (2019) and Phattaratikhom (2022) affirmed attitude as a key predictor of waste separation.

Subjective norms especially from family, peers, and schools emerged as significant drivers. This matches Khan et al. (2019), who emphasized social group influence, and Widayat et al. (2021), who stressed early environmental education. Interestingly, our results diverge from Phattaratikhom (2022), who found no significant norm influence in urban contexts, possibly due to higher diversity and weaker social cohesion. Perceived behavioral control also emerged as key, particularly when reinforced by supporting infrastructure and habit formation.

This is consistent with findings by Phattaratikhom (2022), Widayat et al. (2021), and Khan et al. (2019), who found that infrastructure gaps and inconvenience were major barriers.

## 5. CONCLUSION AND RECOMMENDATIONS

This study demonstrates that consumer behavior toward post-consumption beverage packaging management is significantly influenced by the three core components of the Theory of Planned Behavior: attitude, subjective norm, and perceived behavioral control. Each factor is shaped by nuanced second-order dimensions, which provide valuable insights for developing effective waste management interventions. Attitude influences behavior through four primary themes: perceived value from packaging, ease and convenience, emotional satisfaction, and environmental awareness. These attitudes reflect consumers' recognition of the economic and ecological value of packaging when managed properly. Furthermore, participants expressed a strong sense of responsibility and emotional fulfillment when engaging in recycling practices. To leverage this, municipalities can focus on educational campaigns that emphasize the personal and environmental rewards of waste management, while brands can incentivize positive behaviors through rewards or promotional offers.

Subjective norms were influenced by three main reference groups: family, peers and coworkers, and educational/social institutions. Family members, especially parents and children, played a crucial role in forming long-term waste sorting habits. Peers and coworkers contributed to social reinforcement, particularly in shared spaces, while educational institutions were significant early influencers of environmental awareness. These findings suggest that interventions could target these groups through tailored messaging and community initiatives. For example, local authorities could collaborate with schools to integrate sustainability practices into curricula, while brands can work with workplaces to offer recycling programs.

Perceived behavioral control was identified as both an enabler and barrier to sustainable behavior. Consumers who faced simple, non-redundant waste sorting processes, received institutional or brand support, and felt intrinsically motivated, were more likely to engage in sustainable practices. However, challenges such as infrastructure limitations, insufficient knowledge, and concerns over hygiene or the effort required, hindered behavior.

These findings suggest that addressing infrastructure gaps (e.g., providing more recycling bins or clearer waste sorting systems) and offering educational resources could increase participation. Additionally, brands could play a role by supporting consumers with clear, accessible instructions or by incentivizing more convenient recycling options.

While this study provides rich insights into sustainable consumer behavior, it is limited by its localized focus and reliance on self-reported data. Future research could expand to include comparative studies across different provinces or demographic groups to explore how behavioral drivers may vary in different contexts. Incorporating psychological variables like guilt, pride, or social anxiety could deepen our understanding of the motivations behind waste management practices. Furthermore, expanding the data sources to include observational studies, community trials, or user-generated content could offer a more holistic view of sustainable behavior and provide a stronger foundation for policy development and brand strategy.

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