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The Influence of Norms, Environmental Attitudes, and Perceived Behavioral Control on Plastic Bag Use: A Behavioral-Economic Perspective

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Abstract: Despite local regulations banning their use, single-use plastic bags remain widely consumed in Denpasar City. This study uses the Theory of Planned Behavior (TPB) to explore how subjective norms, environmental attitudes, and perceived behavioral control influence consumer intention and actual behavior, with intention acting as a mediating factor. The results suggest that a sense of control, environmental awareness, and social pressure play important roles in reducing plastic bag usage through behavioral intention. More importantly, the continued reliance on plastic bags imposes real economic costs—ranging from increased public spending on waste management to environmental damage that threatens tourism and fisheries. These hidden costs underline the urgency of combining regulatory measures with behavioral and economic strategies. Policies that support reusable alternatives, provide targeted incentives, and reshape social norms are essential not only for protecting the environment but also for ensuring long-term economic sustainability.

Introduction

The escalating use of single-use plastic (SUP) bags has emerged as a critical environmental issue worldwide, contributing significantly to terrestrial and marine pollution (Mugobo & Ntuli, 2022). Globally, billions of plastic bags are produced annually, many of which end up in landfills, waterways, or oceans due to improper waste management, causing harm to wildlife, blocking drainage systems, and degrading natural ecosystems (Cavaliere et al., 2020). The convenience, low cost, and widespread availability of SUP bags have entrenched their use in daily life, making behavioral change challenging despite their well-documented environmental consequences.

Beyond its environmental implications, the persistence of single-use plastic consumption also generates measurable economic externalities. The improper disposal of plastic imposes indirect financial burdens on governments through the rising costs of waste collection, drainage maintenance, and coastal clean-up operations. Nahman et al., (2025) estimate that plastic leakage into South Africa's marine environment leads to economic losses equivalent to 0.05–0.5% of the country's annual GDP, reflecting the tangible costs of ecosystem degradation and reduced service delivery. These findings emphasize that plastic pollution represents not only an ecological crisis but also a case of market failure, where private consumption benefits create social costs borne collectively by society.

From a broader economic perspective, Cordier et al., (2024) highlight that the unchecked production and disposal of plastics distort market efficiency by ignoring the social cost of pollution. In classical economic theory, when the total social cost (private plus external costs) exceeds the private benefits enjoyed by consumers, the market outcome becomes inefficient. Thus, government interventions such as levies, taxes, or incentives for reusable alternatives are economically justified to internalize these negative externalities and restore welfare equilibrium. Similarly, Aretoulaki et al., (2021)reveal that the economic value of marine-based industries, including fisheries, tourism, and shipping estimated at USD 1.5 trillion annually depends heavily on healthy ecosystems, which are now under threat from plastic waste accumulation. The loss of these ecosystem services and tourism revenues illustrates how environmental degradation directly undermines economic productivity.

Moreover Diggle and Walker (2022) argue that the current linear model of plastic production—"take, make, and dispose"—has produced not only ecological waste but also economic inefficiency through resource loss and unrealized recycling potential. The transition toward a circular economy is therefore an economic imperative, where consumer behavioral change toward reusable bags contributes to reducing social costs and increasing material efficiency. In this context, analyzing the behavioral drivers behind plastic use is not merely an environmental concern but a fundamental step toward achieving economic sustainability and policy effectiveness.

Building upon this economic foundation, the Theory of Planned Behavior (TPB) aligns closely with the emerging insights of behavioral economics, which recognize that human decisions are rarely based on perfect rationality. (Zhong, 2025)emphasizes, cognitive biases such as present bias, loss aversion, and status quo bias lead consumers to prioritize short-term convenience over long-term environmental and economic benefits. These biases explain why consumers continue to use plastic bags even when they are aware of their environmental harm or when regulations exist. Behavioral economics thus bridges traditional economic models and psychological realities by highlighting the roles of social norms, default choices, and comparative feedback in shaping sustainable behavior.

Complementing this view, Antinyan et al., (2023)provide experimental evidence from a large-scale field study in Armenia showing that behavioral interventions such as nudges and competitive financial bonuses significantly reduce single-use plastic bag consumption compared to control groups. Their findings suggest that soft interventions—including information framing, peer comparison, and incentive-compatible reward systems—can effectively shift consumer behavior without restricting freedom of choice. Together, these insights demonstrate that TPB can be interpreted as a behavioral-economic framework, where attitudes, perceived control, and social norms interact with bounded rationality and emotional heuristics. Understanding these behavioral tendencies provides policymakers with

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practical tools—such as eco-taxes, green defaults, and nudge-based incentives—to close the gap between environmental intention and economic behavior.

In response, many countries have implemented policy interventions ranging from awareness campaigns to outright bans or levies on SUP products. However, the success of these policies depends largely on public willingness to adopt sustainable alternatives, such as reusable shopping bags. Research grounded in the Theory of Planned Behavior (TPB) has demonstrated that attitudes toward the environment, subjective norms, and perceived behavioral control play pivotal roles in shaping pro-environmental intentions (Ajzen, 1985; Yang et al., 2020).

Recent studies have extended the TPB framework by incorporating additional psychological and social factors, such as environmental concern (Kamalanon et al., 2022), normative and informational social influence (Sun & He, 2023), and media communication strategies (Yang et al., 2020). These factors have been shown to not only influence the intention to adopt sustainable behaviors but also to mediate or moderate the strength of the relationships proposed in the TPB. For example, social comparison feedback has been found to motivate individuals to reduce single-use plastic consumption, even when their initial performance was average or above average (Bruchmann et al., 2021).

In the Indonesian context, the issue of SUP bag usage remains pressing, particularly in urban centers such as Denpasar. Despite local regulations aimed at restricting plastic bag distribution, many consumers continue to rely on them due to habitual behavior, perceived convenience, or a lack of strong normative pressure. Understanding how subjective norms, environmental attitudes, and perceived behavioral control—mediated by behavioral intention—affect the adoption of reusable bags is essential for designing targeted interventions. This study aims to examine these relationships within the TPB framework, providing empirical evidence to guide policy and public awareness strategies in reducing SUP bag consumption in Denpasar City.

Although previous studies have examined psychological factors in reducing single-use plastics using the Theory of Planned Behavior (TPB), there is still limited research that explores the integration of TPB with behavioral economics within the local Indonesian context, particularly in Denpasar City, which has specific regulations regarding plastic bans. Bruchmann et al., (2021)showed that social comparison-based interventions can influence pro-environmental behavioral intention, but few studies have structurally examined the direct relationship between subjective norms and actual behavior. Meanwhile, the experimental study by Antinyan et al., (2023) in Armenia emphasized the importance of combining incentives and education to change plastic bag usage behavior, but it did not employ the TPB framework to explain the mechanism. In addition, Batooli et al., (2022) found that perceived behavioral control has a strong influence on the intention to use cloth bags compared to plastic bags, but they did not simultaneously test the mediating effect of intention on actual behavior.

Guided by the Theory of Planned Behavior (Ajzen, 1985), this study proposes that individuals' decisions to use or avoid single-use plastic bags are influenced by three key psychological and social determinants such as subjective norms, environmental attitudes, and perceived behavioral control which operate through behavioral intention as a mediating factor. Specifically, it is hypothesized that when people perceive strong social approval from important referents such as family, friends, or community members, their intention to use single-use plastics will increase. Likewise, individuals who hold more favorable attitudes toward plastic bags, considering them practical, cheap, and convenient are more likely to

maintain the intention to use them. In contrast, when individuals experience higher perceived behavioral control, reflected in easy access and minimal constraints to plastic usage, their intention to use plastics tends to strengthen as well. Finally, the intention itself is expected to serve as a proximal predictor of actual plastic bag usage behavior, consistent with TPB's postulate that intention is the most immediate antecedent of action. These hypotheses collectively position intention as the key psychological bridge linking attitudes, norms, and perceived control to actual consumer behavior in the context of single-use plastics.

Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB), developed by Ajzen (1985), extends the Theory of Reasoned Action (TRA) by adding perceived behavioral control (PBC) to address behaviors not fully under volitional control. TPB posits that behavioral intention—the motivational readiness to perform a behavior—is the most immediate predictor of actual behavior, and is influenced by three determinants: attitude toward the behavior (AT), subjective norms (SN), and PBC (Ajzen, 1985; Miller, 2017).

Attitude refers to an individual's favorable or unfavorable evaluation of performing the behavior. In the context of reducing single-use plastic bag (SUPB) consumption, this may reflect beliefs about environmental benefits and personal convenience of using reusable bags. Subjective norms capture the perceived social pressure to engage or not engage in the behavior, such as encouragement from family, friends, or the community to avoid SUPBs. PBC reflects the perceived ease or difficulty of adopting the behavior, influenced by the availability, affordability, and practicality of reusable alternatives (Dorce et al., 2021).

Empirical studies demonstrate TPB's effectiveness in predicting environmentally responsible behaviors. For example, Shalender and Sharma (2021) found that AT, SN, and PBC each had significant positive relationships with adoption intention in the context of electric vehicles, and that extending TPB with moral norm and environmental concern improved its predictive power. Similarly, Dorce et al. (2021) showed that AT was the strongest predictor of intention to purchase organic food, followed by PBC and SN, highlighting the varying influence of TPB components across contexts.

TPB also allows for the direct influence of PBC on actual behavior, which is particularly relevant when external barriers limit individuals' control over their actions (Ajzen, 1985; Miller, 2017). This suggests that in Denpasar, efforts to reduce SUPB usage should focus not only on fostering positive attitudes and supportive social norms but also on enhancing perceived control by ensuring accessible and affordable reusable alternatives.

II.2 Subjective Norms

Subjective norms, as defined in the Theory of Planned Behavior (TPB), refer to an individual's perception of social pressure from significant others to perform or not to perform a specific behavior (Ajzen, 1985). They are shaped by the expectations of referent groups—such as family, friends, and community—whose approval or disapproval can influence decision-making (Xu et al., 2022)In the context of pro-environmental behavior, subjective norms have been widely recognized as an important determinant of behavioral intentions ((Niemiec et al., 2020).

Previous research indicates that subjective norms may affect environmentally friendly consumption by creating a sense of obligation to conform to social expectations (G. Li et al., 2019). For instance, in green product purchasing, the perception that one's peers approve of sustainable choices can enhance the likelihood of such behavior. Similarly, (Dash, 2021)found

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that subjective norms significantly influence attitudes toward adopting eco-friendly products such as electric vehicles in India.

However, the impact of subjective norms is not always consistent across contexts. Huang and Ge, (2019) observed that in Beijing's electric vehicle market, subjective norms did not have a significant direct influence on purchase intention, suggesting that their effect might be mediated by other factors such as attitudes or perceived behavioral control. Conversely, Xu et al., (2022) demonstrated that subjective norms can positively influence green purchase intention when combined with moral-emotional factors, such as environmental indebtedness.

In the specific case of reducing single-use plastic bag consumption in Denpasar, subjective norms could manifest through community-level campaigns, governmental regulations, and peer influence encouraging the use of reusable bags. As Niemiec et al. (2020) emphasized, normative messages can be a powerful tool to encourage conservation behaviors, particularly when they align with cultural values and are reinforced by visible role models. This suggests that enhancing the perception of social approval for reusable bag use could be an effective strategy to strengthen behavioral intentions in this setting.

II.3 Environmental Attitude

Environmental attitude refers to an individual's collection of beliefs, affect, and behavioral intentions toward activities or issues related to the environment. It represents the psychological tendency expressed by evaluating the natural environment with some degree of favor or disfavor (Bøhlerengen & Wiium, 2022). Positive environmental attitudes are often linked to stronger pro-environmental behaviors, including waste reduction, recycling, and reduced consumption of single-use products such as plastic bags (X. Zhang & Dong, 2020).

Empirical evidence suggests that direct experiences in nature can significantly enhance environmental attitudes, which in turn foster pro-environmental behaviors (Rosa & Collado, 2019). Such attitudes are crucial in urban areas like Denpasar, where environmental degradation from single-use plastics is a growing problem. Strengthening individuals' emotional connection to the environment has been shown to increase their willingness to engage in sustainable practices, such as adopting reusable shopping bags (Bøhlerengen & Wiium, 2022).

Environmental knowledge also plays a key role, but its effect on behavior is often indirect—mediated by environmental attitudes and behavioral intentions (M. T. Liu et al., 2020). Knowledge about the ecological harm caused by plastic pollution can foster more favorable environmental attitudes, which subsequently motivate changes in consumption behavior. However, some studies note that positive attitudes alone do not always lead to behavior change unless supported by motivational factors and enabling contexts (Tian et al., 2020).

In organizational contexts, pro-environmental attitudes have been found to predict both required and voluntary green behaviors, mediated by autonomous and controlled motivations (Tian et al., 2020). While this research focuses on workplaces, the mechanisms are transferable to community and household behaviors: individuals with strong environmental attitudes are more likely to adopt sustainable shopping habits, such as refusing single-use plastic bags, when supported by social norms and infrastructure.

Furthermore, exposure to environmental education and green marketing can strengthen attitudes toward sustainable consumption (Zhang & Dong, 2020). Campaigns that highlight the environmental costs of single-use plastics and the benefits of reusable

alternatives can enhance environmental attitudes, which are a key predictor of intention to act sustainably ((M. T. Liu et al., 2020; Rosa & Collado, 2019)).

Perceived Behavioral Control

Perceived Behavioral Control (PBC) refers to an individual's perception of the ease or difficulty in performing a particular behavior, influenced by both internal abilities and external constraints (Ajzen, 1985). Within the Theory of Planned Behavior, PBC is a critical predictor of both behavioral intentions and actual behaviors, as it reflects not only perceived skills and resources but also situational factors that may facilitate or hinder action (Ayar & Gürbüz, 2021).

In the context of sustainable consumption, studies have shown that stronger PBC increases the likelihood of adopting eco-friendly behaviors, including reducing the use of single-use plastic bags (Yulius et al., 2024)). Factors such as the availability of alternatives, perceived convenience, and confidence in one's ability to adopt sustainable practices directly impact PBC (Ardhiyansyah et al., 2023). For example, consumers who believe they can easily access reusable bags are more likely to refuse plastic bags at checkout.

In Indonesia, policy interventions such as mandatory paid plastic bag programs and outright bans have been implemented to influence behavioral determinants including PBC. Research in Denpasar found that while awareness and positive attitudes toward plastic reduction are high among sellers, actual behavioral change is limited when perceived control is low—often due to convenience factors or customer demand (Nathania & Purnama, 2020).

Cultural and social contexts further influence PBC. Studies highlight that in communities where sustainable behaviors are socially supported and reinforced, individuals perceive greater control over adopting those behaviors (Ardhiyansyah et al., 2023; Yulius et al., 2024). Conversely, in areas where plastic use remains normalized, perceived control over avoiding it diminishes.

Research Method

Research Site

This research was conducted in Denpasar City, the capital of Bali Province, Indonesia. Denpasar is one of the most densely populated urban areas in Bali and generates the highest volume of plastic waste in the province. Data collection was carried out in traditional markets such as Pasar Badung and Pasar Kreneng, as well as in supermarkets, minimarkets, and community areas where single-use plastic bag consumption is common.

Research Object

The object of this research is the behavioral intention and actual behavior of Denpasar residents in using single-use plastic bags. The study focuses on three main constructs from the Theory of Planned Behavior (TPB)—subjective norms, environmental attitudes, and perceived behavioral control—along with the mediating role of purchase intention in reducing single-use plastic bag usage.

Population and Sampling Method

The population comprises all residents of Denpasar City who have used single-use plastic bags in their daily activities. Since the total population size is unknown, the sample size was determined using Cochran's formula for an infinite population, resulting in 100 respondents at a 95% confidence level, 0.5 population proportion, and a margin of error of 9.8%.

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A purposive sampling technique was applied, with the following inclusion criteria: respondents must (1) be at least 17 years old, (2) have experience using single-use plastic bags, and (3) be willing to complete the questionnaire.

Types and Sources of Data

The study utilized primary and secondary data.

1. Primary data were obtained directly from respondents through a structured questionnaire based on the Likert scale (1 = strongly disagree to 5 = strongly agree).
2. Secondary data were sourced from government regulations, official statistics, relevant research articles, and environmental reports related to plastic waste management in Denpasar and Bali.

Data Collection Method

Data collection was conducted via a closed-ended questionnaire, distributed both in printed form and online. The questionnaire measured subjective norms (social influence on plastic usage), environmental attitudes (awareness of plastic's environmental impact), perceived behavioral control (perceived ease or difficulty in avoiding plastic), intention to reduce plastic use, and actual usage behavior of eco-friendly alternatives. Field surveys were conducted in traditional markets, modern retail outlets, and residential communities. The responses were then coded and prepared for analysis using the Partial Least Squares–Structural Equation Modeling (PLS-SEM) method with SmartPLS software.

Measurement Model (Outer Model)

The measurement model (outer model) is used to test construct validity and instrument reliability. The following is the result of the PLS model diagram tested:

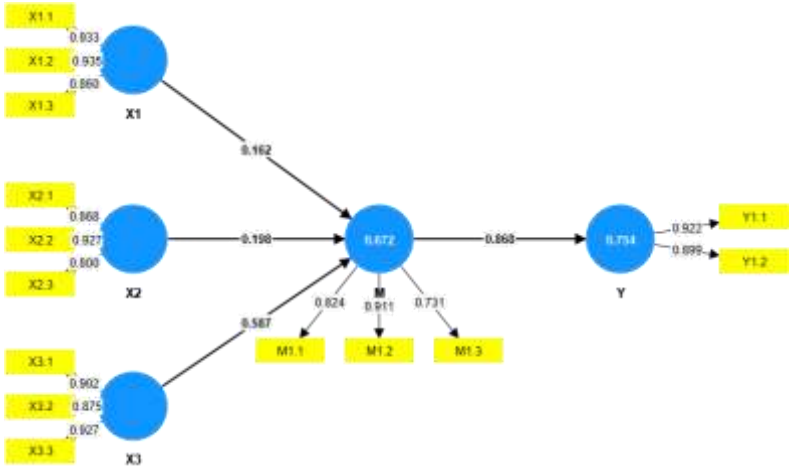

Figure 1. PLS model

Based on the figure 1, it is evident that each research variable indicator has an outer loading value greater than 0.70. Therefore, all indicators are deemed appropriate or valid for use in the study and can be further analyzed.

Discriminant Validity

The discriminant validity test was conducted using cross-loading values. An indicator is considered to meet discriminant validity if its cross-loading value on its associated variable is the highest compared to its loadings on other variables (Ghozali, 2014).

Tabel 1. Cross-loading

Indicator	Variable				
	Subjective Normsf (X1)	Attitude (X2)	*Perceived Behavioral* (X3)	Intention (M)	Usage Behavior (Y)
X1.1	**0.933**	0.396	0.429	0.471	0.434
X1.2	**0.935**	0.411	0.466	0.519	0.534
X1.3	**0.860**	0.274	0.424	0.439	0.439
X2.1	0.358	**0.868**	0.543	0.562	0.544
X2.2	0.364	**0.927**	0.607	0.623	0.579
X2.3	0.312	**0.800**	0.448	0.417	0.380
X3.1	0.409	0.541	**0.902**	0.695	0.601
X3.2	0.394	0.565	**0.875**	0.725	0.641
X3.3	0.506	0.575	**0.927**	0.711	0.620
M1.1	0.487	0.413	0.535	**0.824**	0.719
M1.2	0.471	0.554	0.656	**0.911**	0.867
M1.3	0.338	0.586	0.768	**0.731**	0.538
Y1.1	0.530	0.594	0.671	0.736	**0.922**
Y1.2	0.460	0.473	0.579	0.740	**0.899**

Based on the table 1, it can be seen that each indicator of the research variables has the highest cross-loading value on the variable it is intended to measure, compared to its cross-loading values on other variables. In addition to using cross-loading values, discriminant validity can also be assessed through another method, namely by examining the Average Variance Extracted (AVE) value for each indicator, which is required to be greater than 0.50 for a good model (ghozali, 2015)

Composite Reliability

Composite reliability is used to test the reliability values of the indicators for a given variable. A variable is considered to meet the composite reliability requirement if it has a composite reliability value greater than 0.60. The following are the composite reliability values for each variable used in this study:

Table 2. Composite Reliability

Variabel	Composite Reliability
Subjective Norms (X1)	0.935
Attitude (X2)	0.900
Perceived Behavioral (X3)	0.929
Intention (M)	0.864
Usage Behavior (Y)	0.906

Based on the Table 2, it can be seen that the composite reliability values of all research variables are greater than 0.60. This result indicates that each variable has met the composite

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reliability requirement, thus it can be concluded that all variables have a high level of reliability.

Structural Model Testing

The structural model in PLS is evaluated using the R-square value for the dependent variables and the path coefficient values for the independent variables, which are then assessed for significance based on the t-statistic value of each path. The structural model of this study can be seen in the following figure:

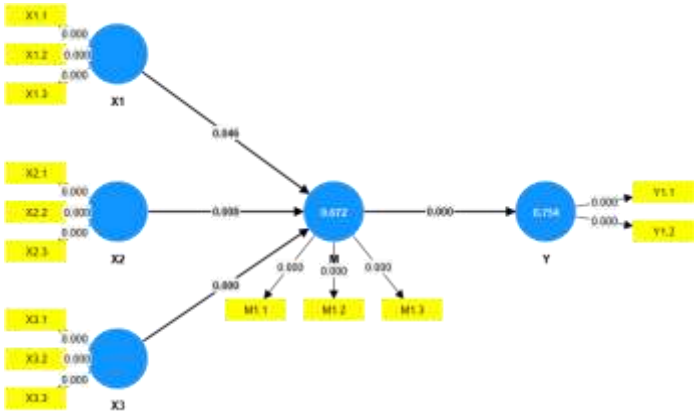

Figure 2. Structural Model in PLS

Goodness of Fit Test

Based on the data processing conducted using SmartPLS 4.0, the R-square values obtained are as follows:

Table 3. R-square

Variable	Nilai R-Square
Intention (M)	0.672
Usage Behavior (Y)	0.754

Based on the table 3, it can be seen that the R-square value for the intention variable is 0.672. This indicates that 67.2% of the variance in intention can be explained by subjective norms, attitudes, and perceived behavioral control. The R-square value for the usage behavior variable is 0.754, meaning that 75.4% of the variance in usage behavior can be explained by subjective norms, attitudes, and perceived behavioral control.

The goodness of fit is assessed using the Q-square value. The Q-square has the same interpretation as the coefficient of determination (R-square) in regression analysis, where a higher Q-square indicates that the model has better fit with the data. The Q-square value is calculated as follows:

$$\begin{aligned}\text{Q-Square} &= 1 - [(1 - R1) \times (1 - R2)] \\ &= 1 - [(1 - 0.672) \times (1 - 0.754)] \\ &= 1 - (0.328 \times 0.246) \\ &= 1 - 0.081 \\ &= 0.919\end{aligned}$$

Based on the above calculation, the Q-square value obtained is 0.919. This means that 91.9% of the variability in the research data can be explained by the proposed model, while

the remaining 8.1% is explained by factors outside the model. These results indicate that the research model has a good goodness of fit.

Effect Size

Effect size is used to evaluate the specific impact of an independent variable on the prediction of a dependent variable. This measurement is carried out by examining the f-square (f^2) value. An f^2 value is interpreted as small if it is less than 0.02, medium if it is between 0.02 and 0.15, and large if it is greater than 0.35. By calculating f^2, researchers can identify which independent variables have the greatest influence on the dependent variables in the model, thus providing deeper insights into the dynamics of relationships among latent variables.

Table 4. Results of the Effect Size Test

	X1	X2	X3	M	Y
X1				0.060	
X2				0.072	
X3				0.575	
M					3.059
Y					

Based on the table 4, the explanation is as follows:

1. Subjective Norm on Intention
   The f^2 value for this path is 0.060, indicating a medium effect. Subjective norms have a fairly significant impact in increasing an individual's intention, which in turn influences their actual behavior.
2. Attitude on Intention
   The f^2 value for this path is 0.072, indicating a medium effect. An individual's attitude has a fairly significant impact in increasing their intention, which subsequently influences their actual behavior.
3. Perceived Behavioral Control on Intention
   The f^2 value for this path is 0.575, indicating a large effect. Perceived behavioral control has a highly significant impact in increasing an individual's intention, which in turn influences their actual behavior.
4. Intention on Usage Behavior
   The f^2 value for this path is 3.059, indicating a large effect. An individual's intention has a very significant impact in realizing their actual behavior.

Hypothesis Testing

The evaluation of path coefficients is used to indicate the strength of the effect or influence of independent variables on dependent variables. The following table presents the path coefficient results obtained from the SmartPLS bootstrapping output for the direct effect test:

Table 5. SmartPLS bootstrapping output

	Original Sample Estimate	Sample Mean	Standard Deviation	T-Statistic	P-Values
X1 → M	0.162	0.168	0.081	1.996	0.000
X2 → M	0.198	0.198	0.075	2.650	0.046
X3 → M	0.587	0.582	0.081	7.237	0.008
M → Y	0.868	0.870	0.022	39.152	0.000

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Based on Table 5, the path coefficient value for the effect of subjective norms on intention is 0.162, while the path coefficient value for the effect of attitude on intention is 0.198. The path coefficient value for the effect of perceived behavioral control on intention is 0.587. The path coefficient value for the effect of intention on usage behavior is 0.868. These results indicate that all variables in this model have positive path coefficient values. The larger the path coefficient value of an independent variable on a dependent variable, the stronger the influence of that independent variable on the dependent variable.

Effect of Subjective Norms (X1) on Intention (M)

The hypothesis testing results show that subjective norms have a significant and positive effect on the intention to use single-use plastic bags, as indicated by a p-value of 0.000 and a positive t-statistic of 1.996. This means that the stronger the social pressure or influence from significant others—such as family, friends, or the surrounding community—who support or justify the use of single-use plastic bags, the greater the individual's intention to use them. This finding aligns with previous studies adopting the Theory of Planned Behavior (TPB) framework (Ajzen, 1985). Subjective norms are one of the main predictors of behavioral intention, where social pressure from significant referents can increase an individual's tendency to engage in pro-environmental behavior or, in this context, maintain practical behaviors such as using single-use plastics (Miller, 2017). Similarly, subjective norms, along with attitudes and perceived behavioral control, significantly affect the intention to use environmentally friendly packaging, suggesting that similar effects may occur for non-environmentally friendly packaging like single-use plastics when supported by social norms (Dash, 2021). Subjective norms not only influence attitudes but also voluntary customer behavior (green customer citizenship) and contribute the most to behavioral variation (Han, 2020).

A study in Indonesia found that subjective norms directly and positively impact the intention to use electric vehicles; analogously, when social norms favor plastic use, the intention to use it increases (Dorce et al., 2021). The effect of subjective norms on the intention to purchase organic food is mediated by attitudes but remains significant as a driving factor; the same may occur with single-use plastic use intention (Ghazali et al., 2019). Kamalanon et al., (2022) showed both direct and indirect effects of subjective norms on green purchase intention through corporate green image, reinforcing the role of norms in shaping product choices. (Dash, 2021)) also demonstrated that subjective norms influence green purchase intention, mediating the relationship with actual purchase behavior, and found a significant relationship between subjective norms and attitudes toward electric vehicles that has implications for adoption decisions. Furthermore, a meta-analysis by Niemiec et al., (2020) confirmed that subjective norms are an important driver of conservation behavior intentions, although their strength may vary depending on the type of norm and behavior. Overall, empirical evidence suggests that when individuals perceive social support or justification for using single-use plastic bags, their intention to use them will increase, even if the choice has negative environmental impacts.

Effect of Attitude (X2) on Intention (M)

The study results show that attitude has a positive and significant effect on the intention to use single-use plastic bags, as evidenced by a p-value of 0.046 and a t-statistic of 2.650. This means that when someone has a positive view of using plastic—such as considering it

practical, cheap, and easy to obtain—their tendency or intention to use it also increases. This aligns with the Theory of Planned Behavior, which explains that attitude is one of the main determinants of behavioral intention (Ajzen, 1985). This finding is supported by Dilkes-Hoffman et al., (2019)who found that although awareness of the negative impacts of plastic is high, positive perceptions of its convenience can still encourage its use. Pro-environmental attitudes can predict environmentally friendly behaviors, although implementation is influenced by environmental conditions and support (Han, 2020). Other studies have found that positive evaluations of a product's benefits and convenience increase consumer purchase intentions (Ghazali et al., 2019). Positive attitudes toward environmentally friendly technology can increase the willingness to adopt it ((Y. Li & Wang, 2022). Bhatti and Glowik (2020) add that cultural factors influence attitude formation, which in turn affects behavior.

From an individual development perspective, environmental attitudes begin forming in early childhood and can influence behavior into adulthood (Otto et al., 2019). Experiences and emotional connections to an issue play a role in shaping attitudes, which then influence behavior (Zhang & Dong, 2020). Character and concern for the environment are closely linked to positive environmental attitudes and conservation behaviors (Liu et al., 2020). A review by Zhang and Dong (2020)emphasizes that attitude is one of the most consistent individual factors influencing green purchasing decisions. Furthermore Liu et al.(, 2020)demonstrated that attitude serves as a bridge between a person's knowledge and their actions, including pro-environmental behaviors. In the context of single-use plastics, when practical benefits are perceived as outweighing environmental harm, positive attitudes tend to maintain or even increase the intention to keep using them.

Effect of Perceived Behavioral Control (X3) on Intention (M)

The hypothesis testing results show that perceived behavioral control (PBC) has a significant and positive effect on the intention to use single-use plastic bags, as indicated by a p-value of 0.008 and a t-statistic of 7.237. This indicates that the greater an individual's belief that using single-use plastic bags is easy, readily available, and without significant barriers, the greater their intention to use them. In the TPB framework, PBC is a direct predictor of behavioral intention—people are more likely to have strong intentions to act if they feel capable, have resources, and face no external constraints (Ajzen, 1985). In the context of single-use plastics, Nu'man and Noviati (2021)found that PBC significantly predicts pro-environmental behavioral intentions related to plastic bags and straws ($\beta = 0.47$, $p < 0.000$). This means perceived control—such as easy access to free plastics in stores or markets—can strengthen the intention to keep using them. Nathania and Purnama (2021) also stressed that the availability of free plastics in traditional markets keeps both traders and consumers dependent on plastic despite restriction policies.

A study in Turkey confirmed that PBC is a dominant factor influencing sustainable consumption intentions; when perceived barriers are low and resources are sufficient, the intention to perform a behavior—whether environmentally friendly or not—increases(Ayar & Gürbüz, 2021). In the case of single-use plastics, the perception that they are cheap and easily accessible can reinforce the desire to use them. Other studies highlight that even with restriction regulations, without strict supervision and adequate alternatives, perceived ease of using plastics remains high, making intention hard to change (Nathania & Purnama, 2020).

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Effect of Intention (M) on Usage Behavior (Y)

Based on the hypothesis test results showing a p-value of 0.000 and a positive t-statistic of 39.152, it can be concluded that intention (M) has a significant and positive effect on the behavior (Y) of using plastic bags. This means that the higher a person's intention, the more likely they are to actually use plastic bags. Sun and He, (2023) explain that in the TPB framework, attitudes, social norms, perceived behavioral control, and emotions play important roles in shaping the intention to purchase single-use plastic products, thus high intention will reinforce such behavior. In Indonesia, it was found that despite the "plastic diet" campaign, consumers still use them due to convenience and perceived practicality (Dorce et al., 2021). Batooli et al., (2022), through a TPB approach, found that subjective norms and perceived behavioral control positively correlate with the intention to use plastic or cloth bags, and high intention toward plastics is difficult to shift without external reinforcement. Li and Wang (2021) emphasized that motivation—both environmental and economic—moderates the relationship between intention and pro-environmental behavior; if intention toward plastics is high, restriction policies become less effective. Overall, evidence from these studies reinforces that intention is a strong predictor of plastic bag usage behavior, suggesting that a combination of education, social pressure, economic incentives, and restriction policies is needed to reduce such intention and consequently decrease plastic use behavior.

Results of Path Coefficient Bootstrapping Indirect Effect

Table 6. Results of Path Coefficient Bootstrapping Indirect Effect

	Original Sample Estimate	Sample Mean	Standard Deviation	T-Statistic	P-Values
X1 → M→ Y	0.141	0.146	0.070	1.995	0.046
X2 → M→ Y	0.172	0.173	0.066	2.619	0.009
X3→ M→Y	0.510	0.506	0.072	7.075	0.000

The Influence of Subjective Norms (X1) on Usage Behavior Through Intention (M)

The analysis results show that subjective norms have a significant indirect effect on usage behavior through intention, with a coefficient of 0.141, T statistic of 1.995 > 1.96, and P-value of 0.046 < 0.05. This indicates that social support or pressure does not directly cause a person to use single-use plastic bags but first generates intention, which subsequently drives actual behavior. Research indicates that normative factors, including subjective norms, can influence intentions through specific psychological mechanisms, where cultural contexts such as collectivism strengthen the relationship between personal norms and intentions (W. Zhang et al., 2022). Among younger generations, information on social media shapes perceptions and subjective norms, which then increase interest in green consumption before eventually leading to behavior (Xie & Madni, 2023). Subjective norms, along with altruistic and egoistic motivations, serve as initial factors influencing green purchase intention, which then continues to behavior (Kumar & Pandey, 2023)

Subjective norms play a significant role in intentions, and their effects often operate through mediating variables such as attitudes or intentions (Buhmann et al., 2024). Roh et al., (2022), in their study on organic food consumption, also found that subjective norms and attitudes work together in shaping purchase intentions, with those intentions serving as a bridge to actual behavior.

Another study in *Social and personal factors influencing green customer citizenship behaviours* emphasized that subjective norms, although socially strong, are more effective in influencing behavior when there is internalization of values and the formation of intention. In the context of green consumption in the retail sector, Chen et al., (2019)demonstrated that subjective norms first increase awareness and intention before behavior occurs.

The results of this study and previous empirical evidence clarify that subjective norms operate indirectly: they influence individuals' perceptions and desires, shape intentions, and from those intentions, actual behaviors—such as the use of single-use plastic bags—are formed. Intervention strategies aiming to reduce plastic use should therefore not only rely on social norms but also foster positive intentions toward environmentally friendly alternatives.

The Influence of Attitudes (X2) on Usage Behavior Through Intention (M)

The analysis results show that attitudes have a significant indirect effect on usage behavior through intention, with a coefficient of 0.172, T statistic of 2.619 > 1.96, and P-value of 0.009 < 0.05. This means that a person's positive or negative view of using plastic bags does not automatically lead them to act but first shapes intention, which then drives actual behavior. This finding aligns with Dilkes-Hoffman et al., (2019), who found that although most respondents had negative attitudes toward single-use plastics and about 80% intended to reduce their use, many had not translated these attitudes into action due to a gap between awareness and behavior. Cultural values and pro-environmental motivations can shape environmentally friendly behavior, but the process is often mediated by psychological factors such as intention (Chwialkowska et al., 2020).

Misgana & Tucho, (2022)found that although 93% of respondents were aware of the negative impacts of plastic and 80.9% supported a ban on single-use plastic bags, usage remained high due to convenience and low cost, highlighting the importance of building strong intentions to change habits. In Indonesia, the "plastic bag diet" campaign is often ignored because positive environmental attitudes alone are not strong enough to trigger action without supporting motivations and sustainable new habits (Wijaya et al., 2020).

Environmental motivation significantly influences the intention to bring reusable bags, and economic motivation can strengthen this relationship, meaning that positive attitudes must be combined with other driving factors to produce actual behavior. Research on Thai university students found that attitudes only influenced the intention to reduce single-use plastics during the contemplation phase, suggesting that without mature intention development, behavioral change is difficult to achieve (Oludoye & Supakata, 2024)).

The Influence of Perceived Behavioral Control (X3) on Usage Behavior Through Intention (M)

The analysis results show that perceived behavioral control (PBC) has a significant indirect effect on usage behavior through intention, with a coefficient of 0.510, T statistic of 7.075 > 1.96, and P-value of 0.009 < 0.05. Oludoye & Supakata, (2024)emphasize that PBC plays an important role throughout the stages of behavioral change, including when the behavior formed actually supports the use of single-use plastics; the sense of ability and ease of action becomes a factor that strengthens such intention. This finding is consistent with research in Ethiopia, where although 93% of respondents were aware of the dangers of plastic and 80.9% supported a ban, the ease of obtaining free plastic bags and convenience factors kept usage high (Misgana & Tucho, 2022). Another study demonstrated the strongest correlation between PBC and intention in the context of choosing bags (cloth vs. plastic) in

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Iran, showing that perceived ability and ease of behavior encourage consumers' preferred choices—including if that choice is plastic (Batooli et al., 2022)

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