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Mindful Choices: Unveiling the Driving Factors behind Consumers' Intention to Reduce Single-Use Plastic Utensils

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Abstract: As consumers increasingly access takeaway food from restaurants, the importance of reducing the use of single-use plastic has emerged. To investigate this complex process, the current study applies the Theory of Planned Behavior (TPB) and the Norm Activation Model (NAM) to discover how this theory and model leads to discovering customers' behavioral intentions. Data were collected from 436 respondents and reflect people aged 18 years or older who accessed an online food ordering platform within the three months prior to the study data collection. Results present that customers' attitudes, subjective norms, perceived behavioral control, awareness of consequences, and personal norms regarding reducing single-use plastic utensils influence consumers' behavioral intentions. These findings are meaningful to academia in providing insights into the link between consumers' behavior and reducing the use of single-use plastic utensils in the restaurant context. In addition, this study provides marketing strategies and implications for improving consumers' awareness of the use of single-use plastic utensils in retail food services.

Keywords: consumer behavioral intention; single-use plastic utensils; takeaway food from a restaurant; theory of planned behavior; norm activation model

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1. Introduction

The utilization of single-use plastic (used once and thrown away) presents a global predicament in contemporary society. Despite consumers' awareness, the interest of corporations, and regulations aimed at reduction, single-use plastic waste increased from 133 million tons in 2019 to 139 million tons in 2021 [1], or 6 million tons globally, during that period. Moreover, a serious problem exists for the widespread use of single-use plastics, which do not decompose when discarded in nature without proper disposal. According to the US Environmental Protection Agency, only about 9% of plastic is actually recycled [2]. Simultaneously, the adoption of single-use plastic has enjoyed a notable upsurge, particularly within the medical and restaurant industries, thereby contributing to its escalating usage overall [3,4]. Furthermore, the COVID-19 pandemic has further fueled concerns surrounding hygiene in public, medical, and service domains, consequently fostering an upswing in the adoption of single-use plastic as a precautionary hygienic measure. Single-use plastic has experienced a pronounced escalation particularly within the restaurant industry since the pandemic due to surging delivery and takeout ordering, which have more than doubled and grown by 8% [5].

In light of growing environmental consciousness, governments, including the US government, have begun to acknowledge and address the issue of single-use plastic. Several states and municipalities have offered solutions: More than five states (e.g., Iowa, Ohio, and Texas) are attempting to reduce the usage of plastic bags, straws, and takeout clamshells, and a hundred municipalities and cities prohibit using Styrofoam food containers [6]. Additionally, according to a survey of 34 countries, on average, 70% of consumers believe

that governments need to act to create global rules to deal with plastic pollution. Such proposals include banning plastics that cannot be easily recycled and reducing plastic packaging from manufacturers and retailers [7].

An awareness of social impact and environmental problems has emerged again since COVID-19, and many relating studies have been conducted. Various fields of research are studying environmental-related issues, including the use of single-use plastic, its associated problems, and their solutions [8–10]. Fischbach and Yauney [8] applied social cognitive theory to investigate the interrelationships of three variables: green consumer values, bans and incentive programs, and consumer decision-making associated with single-use plastic waste. As a result, states with bans or reward/rebate programs showed higher green consumer values; bans could result in consumers indicating a reduced usage of single-use plastic items [8]. Additionally, again from the study of Fischbach and Yauney [8], the level of education among consumers apparently has a substantial impact on both consumers' plastic waste use and green values. Khan et al. [9] examined a model that could help transform consumers' behavior toward greener choices, resulting in knowledge and attitudes having a significant and positive impact on the desired actions. In addition, Walker et al. [10] investigated consumers' willingness to pay premiums for sustainable food packaging alternatives and explored consumers' motivations for reducing single-use plastic waste. Walker et al. [10] found that Canadian consumers showed strong motivation to use less single-use plastic food packaging, but were less inclined to spend money on sustainable alternatives. In the hospitality field, Fischbach et al. [11] investigated consumers' willingness to pay for plastic alternatives related to environmental concerns, environmental identity, and demographics through a restaurant dining or takeout scenario. Moreover, Weber et al. [12] investigated sustainability, recycling, the existing knowledge of the effects of plastic materials, and the impact of plastic residues on the environment. Their research indicated that although the majority of consumers possess knowledge and exhibit favorable responses to recycling, they encounter challenges when transitioning toward adopting sustainable consumption habits. Even though previous researchers identified environmental issues, consumer intentions, and consumers' knowledge of recycling and sustainability, earlier research has not examined the use of single-use plastic utensils in the online food ordering space.

Previous studies focused on changes in consumer knowledge, attitudes, and behaviors regarding awareness of the environment and its importance. According to the results of these studies [11,13], consumers did consider the importance of, and their attitudes toward, environmental preservation. In particular, Fischbach et al. [11] examined consumers' behavioral intentions and environmental awareness regarding single-use plastics used for food delivery or takeout. Nevertheless, this study centered on plastic alternatives, and a distinction appeared between dine-in and takeout scenarios. In addition, Jeong et al. [13] conducted a study on consumers' perceptions and attitudes toward green practices, but according to the results, the effectiveness of ecological matters was limited to eco-friendly consumers only. Unfortunately, articles confirming that consumers reduce their use of single-use plastics for online food ordering and articles confirming consumers' intentions to reduce plastic utensils use are lacking. Therefore, the current study examines consumers' intentions to reduce their use of 'single-use plastic utensils,' specifically for online food ordering platforms. Identifying and understanding consumers' attitudes, perceptions, and adherence to social norms in this plastic waste context is crucial since such identification clarifies consumers' beliefs and the influential factors that drive reductions in single-use plastic, which are, apparently, environmentally advantageous. Despite restaurants or food ordering platforms undertaking independent initiatives to reduce single-use plastic, the efficacy of these efforts hinges directly on consumer participation. Therefore, the current study considers consumers' intentions to reduce single-use plastic as the dependent variable, given its rational manifestation based on individual intentions.

The main goal of this study is to pinpoint the key influences for consumers' intentions to reduce their use of single-use plastic, with the aim of providing suggestions for

government policymakers and restaurant owners regarding strategies that can effectively promote this behavior. The Theory of Planned Behavior and Norm Activation Model are two theories that this study uses to accomplish this goal. Specifically, the focus is on attitude, subjective norms, perceived behavioral control, awareness of consequences, and personal norms for consumers' behavioral intentions to reduce using single-use plastic when placing orders through food ordering platforms. By comprehending these influential constructs, this study endeavors to contribute valuable insights for developing interventions and initiatives aimed at fostering sustainable practices within the restaurant industry.

2. Literature Review

2.1. Behavioral Intention

Behavioral intention refers to a plan to perform according to a particular, predetermined set of actions. Behavioral intention is a confirmed, and perhaps the most important, factor for directly forecasting how humans will act [14]. In general, behavioral intention is specifically a substitute marker for actual behavior in marketing [15]. The formation of behavioral intention (BI) is a pivotal antecedent of behavior, representing three cognitive dimensions: attitude (AT), subjective norms (SNs), and perceived behavioral control (PB). The importance of each of these cognitions, as predictors, aligns with the critical degree to which an individual perceives attitude, subjective norms, or perceived behavioral control to be in relation to the behavior at hand [16]. A heightened intention to adopt a behavior generally increases the likelihood of its translation into actual performance [14]. Therefore, Ajzen and Fishbein [17] suggested that assessing behavioral intention (BI) carries anticipated potential regarding upcoming actions. The current research's focus is on consumers' behavioral intention (BI) toward reducing single-use plastic when patronizing a restaurant's takeaway food service.

Previous studies have investigated relevant topics by using the Theory of Planned Behavior (TPB) [18–20] and the Norm Activation Model (NAM) [18,21,22], driven by apprehensions regarding environmental issues.

Ajzen's [14] Theory of Planned Behavior (TPB) stated that attitude, subjective norms, and perceived behavioral control influence behavioral intention. In previous research, the Theory of Planned Behavior (TPB) model assessed behavioral intention (BI) related to sustainability behavior. Wang and Li [20] conducted a study in which shoppers brought reusable bags to effectively reduce plastic waste. Wang and Li [20] defined behavioral intention (BI) as bringing a reusable bag for shopping, and found that attitude (AT), subjective norms (SNs), and perceived behavioral control (PB) had considerable influences on consumers' intentions to use reusable bags. Examining the tourism context, Adam [18] identified behavioral intention (BI) as being pro-environmental, namely the intent to use reusable substitutes. In the foodservice context, Kim and Yun [19] explored consumers' decision-making processes for choosing environmentally responsible commodities in terms of eco-friendly cafés. Their results indicated that attitudes (ATs) toward environmental behavior, perceived value, and perceived marketplace influence had significant influences on customers' pro-environmental behavior.

Schwartz [23] developed the Norm Activation Model (NAM), which incorporates components such as the ascription of responsibility, awareness of consequences, and personal norms to elucidate pro-social behavioral intention. Adam [18] found that the use of reusable alternatives was positively influenced by personal norms (PNs). In the tourism context, Li and Wu [22] applied the Norm Activation Model (NAM) to interpret the environmentally friendly intentions of non-local tourists and defined behavioral intention (BI) specifically as visitors' pro-environmental intentions. Examining the foodservice context, Kim and Hwang [21] examined the formation of eco-friendly behavioral intention (BI) regarding food service delivery via drone. Their results presented that personal norms (PNs) helped to increase behavioral intention (BI).

The present study is able to utilize behavioral intention (BI) as a construct that is impacted by behavioral control perception, attitude, subjective norms, knowledge of consequences, and personal norms.

2.2. Attitude toward Behavior and Behavioral Intention

Attitude (AT) refers to "the extent to which a person holds a positive or negative evaluation or appraisal of a particular behavior" [14]. In simpler terms, a person's mindset reflects their overall positive or negative perception of engaging in a specific behavior. Ajzen [14] explained that an individual's inclination toward a favorable or unfavorable attitude has direct and intertwined links to the potency of their cognitive disposition regarding an action's foreseen consequences, as rooted in the expectancy–value model. The current study defines attitude (AT) as the beliefs related to consumers reducing single-use plastic when purchasing takeaway food from a restaurant.

Numerous empirical studies have sought to provide evidence supporting the influence of attitude (AT) on behavioral intentions (BIs) related to sustainability [19,21,24]. Ertz et al. [24] categorized attitudes (ATs) toward pro-environmental behavior based on importance, duration, and cost, investigating their impact on both public and private pro-environmental behaviors. The findings of Ertz et al. [24] emphasized the significance of consumers' attitudes toward the importance and cost of pro-environmental behavior in shaping actual pro-environmental actions. In the hospitality and foodservice context, Kim and Hwang [21] conducted research that integrated the Norm Activation Model (NAM) and the Theory of Planned Behavior (TPB) to describe environmentally friendly behavioral intention (BI) in the context of drone food delivery services. Their results underscored the substantial influence of a positive attitude (AT) for shaping behavioral intention (BI). Kim and Yun [19] employed the Value–Attitude–Belief (VAB) model and the Theory of Planned Behavior (TPB) to elucidate how consumers determine environmentally responsible items in eco-friendly coffee shops. Kim and Yun [19] delved into the influence of attitude (AT) toward environmental behavior on environmentally friendly behavior, categorizing the latter into word-of-mouth behavior, sacrifice behavior, and willing-to-pay behavior. Their findings demonstrated that individuals' attitudes (ATs) toward environmental behavior significantly affected environmentally friendly behavioral intention (BI). Therefore, the current study argues that attitude (AT) appears to serve as a key determinant for the behavioral intention (BI) of minimizing the single-use plastic that accompanies takeaway food from a restaurant. Consequently, this study's first hypothesis is:

H1. *Consumers' attitudes toward reducing single-use plastic utensils have a positive influence on behavioral intentions to reduce single-use plastic when purchasing takeaway food from restaurants.*

2.3. Subjective Norms and Behavioral Intention

Social influence, a prominent topic within the field of social psychology, refers to the ways in which the actions and opinions of others impact individuals [25]. Subjective norms (SNs), or, interchangeably, normative social influence, represents the pressure to conform to the positive expectations of others, as well as the drive to align one's actions with the perceived expectations of oneself, another person, or a group [26]. In accord, Ajzen [14] defined subjective norms (SNs) as "the perceived social pressure to perform or not to perform the behavior". In other words, subjective norms (SNs) entail noticeable viewpoints of others that have significance in an individual's life and decision-making processes. These influential "others" influence an individual's choices for engaging in or abstaining from certain actions. Normative beliefs within subjective norms (SNs) encompass the societal pressures exerted by important reference individuals or groups who express approval or disapproval of an individual's actions or behaviors. These beliefs serve as motivators to align with the social pressures [14,27].

The concept of subjective norms (SNs) has been a topic of discussion within the realm of behavior, particularly in relation to sustainable behaviors. The current research defines

SNs as the consumer's awareness of social pressure from people who are important, and who advocate for a reduction in the use of single-use plastics. Their influence motivates individuals to follow these influential people's views regarding takeaway food purchased from a restaurant.

Previous studies have conducted research related to the subjective norm (SN) and its influence on behavioral intentions in the context of sustainable behavior [28–30]. Hameed and Khan [31] identified consumers' intentions to return and recycle plastic waste by applying the Theory of Planned Behavior (TPB). Their findings revealed a positive association between subjective norms (SNs) and behavioral intention (BI) related to returning and recycling plastic waste. In the tourism context, Hu et al. [29] identified the effect of subjective norms (SNs) on the behavioral intention (BI) of tourists in mountainous tourism areas regarding the disposal of self-generated litter. Their findings indicated a significant impact of subjective norms (SNs) on behavioral intention (BI) in this context. In the context of hospitality and foodservice, Asmuni et al. [28] explored the link between subjective norms (SNs) and people's behavioral intention (BI) to use reusable drinking straws. For Asmuni et al. [28], subjective norms (SNs) refer to the motivation to align with the awareness of others regarding reducing single-use plastics, and this research found a positive impact from subjective norms (SNs) for intentionally reusing drinking straws.

Correspondingly, the current research employs the subjective norm (SN) as a pivotal construct that influences a consumer's behavioral intention (BI) to decrease single-use plastic usage when obtaining takeaway food from a restaurant. The result suggests the following hypothesis:

H2. *Consumers' subjective norms toward reducing single-use plastic utensils have a positive influence on their behavioral intention to reduce the single-use plastic that accompanies takeaway food from a restaurant.*

Attitude (AT) serves as a mediator between the subjective norm (SN) and consumers' behavioral intention (BI). The mediating effects demonstrate how consumers' subjective norms (SNs) influence behavioral intention (BI) by affecting their attitude (AT) toward behavior [32]. Therefore, the third hypothesis is:

H3. *Consumers' subjective norms toward reducing single-use plastic utensils have a positive influence on their attitude, while attitude is a mediator between the subjective norm and consumers' behavioral intentions to reduce single-use plastic accompanying restaurant takeaway food.*

2.4. Perceived Behavioral Control and Behavioral Intention

Perceived behavioral control (PB) can be explained as "the perceived ease or difficulty of performing the behavior" [14]. The Theory of Planned Behavior (TPB) primarily emphasizes perceived behavioral control (PB) since it is difficult to define and measure the tangible resources and opportunities involved in carrying out a specific action. Perceived behavioral control (PB) is determined by the whole set of achievable control beliefs, as commonly recognized. These beliefs pertain to an individual's perception of the presence of resources and chances necessary to carry out a certain action, as well as an assessment of the significance of these resources and opportunities for achieving desired results [33]. Perceived behavioral control (PB), as defined in the present study, refers to a customer's assessment of the level of ease in minimizing the amount of single-use plastic that comes with takeout foods from a restaurant.

Within the realm of sustainable behavior, several studies have explored the correlation between perceived behavioral control (PB) and behavioral intention (BI) [21,29,34]. So et al. [34] identified the link between Hong Kong citizens' perceived behavioral control (PB) for plastic waste management and their behavioral intentions (BIs) related to plastic waste management. Their definitions of perceived behavioral control ranged through easy, difficult, willing, confidence, and convenience. So et al. [34] revealed a positive relationship

between perceived behavioral control (PB) and behavioral intention (BI) on plastic waste management. In the context of the tourism industry, Hu et al. [29] found a connection between perceived behavioral control (PB) and the behavioral intention (BI) of returning with one's self-generated litter after a mountain excursion. Measures of perceived behavioral control (PB) included willingness, physical strength, and convenience, resulting as the influential element in their study. In essence, perceived behavioral control (PB) affected this behavioral intention (BI) to reduce self-generated litter in mountainous areas significantly and positively. Within the realms of hospitality and foodservice, Kim and Hwang [21] explored perceived behavioral control (PB) and environmentally friendly behavioral intention (BI) for food delivery services using drones. The authors examined perceived behavioral control (PB) by applying measurements of willingness, confidence, resources, time, and opportunity in the context of ordering food using delivery services via drone. This study confirmed a positive connection between perceived behavioral control (PB) and behavioral intention (BI).

Although prior studies have identified the influence of perceived behavioral control (PB) on the development of behavioral intention (BI), limited exploration exists for the connection between perceived behavioral control (PB) and behavioral intention (BI) to reduce single-use plastic. Notably, however, perceived behavioral control (PB) significantly contributes to behavior formation. Consequently, the current study suggests a link between perceived behavioral control (PB) and consumers' behavioral intention (BI) to decrease the use of single-use plastics, particularly in the context of ordering takeaway food from a restaurant. These hypotheses are:

H4. *Consumers' perceived behavioral control toward reducing the use of single-use plastic utensils has a positive influence on their behavioral intention to reduce single-use plastic when ordering takeaway food from a restaurant.*

H5. *Consumers' perceived behavioral control toward reducing the use of single-use plastic utensils has a positive influence on their attitude toward reducing the use of single-use plastic utensils when ordering takeaway food from a restaurant.*

2.5. Awareness of Consequences and Personal Norms

Awareness of consequences (AC) is a crucial factor that activates personal norms (PNs) and serves as a key variable in the Norm Activation Model (NAM) [23,35]. Individuals' awareness of predictable adverse consequences associated with their actions triggers the formation of personal norms (PNs), influencing their adoption of specific actions to prevent harmful outcomes. For instance, individuals who recognize negative environmental consequences are more likely to take responsibility for their actions, perhaps engendering a heightened sense of moral obligation toward the environment, and ultimately fostering pro-environmental behavior [35,36].

Awareness of consequences (AC) represents an individual's perception of the potential outcomes that may arise from engaging in, or not engaging in, a particular social or pro-environmental behavior [37,38]. In the context of this study, awareness of consequences (AC) links to consumers' realization that reducing the use of single-use plastic is an effective way to address environmental problems. Consumers who possess knowledge of the potential consequences of reducing single-use plastic are more likely to develop positive attitudes and a strong sense of personal obligation toward adopting such behavior.

Empirical studies have highlighted the pivotal role of awareness of consequences (AC) in shaping individuals' personal norms (PNs) and sense of moral obligation [35]. For instance, Lv et al. [39] demonstrated the significant impact of residents' awareness of the environmental consequences resulting from improperly discarded medicine on their personal norms (PNs), leading to a positive influence for proper disposal behavior. Similarly, in the tourism sector, Esfandiar et al. [40] investigated visitors' pro-environmental behavior, specifically the use of designated disposal and recycle bins in national parks.

Esfandiar et al. [40] found that awareness of consequences (AC) emerged as the most influential factor in activating personal norms (PNs), ultimately determining pro-environmental binning behavior. Exploring pro-environmental travel behavior after COVID-19, O'Connor and Assaker [41] developed a comprehensive model examining the relationships among perception of COVID-19 risks, environmental awareness, environmental responsibility, environmental moral obligation, and travelers' pro-environmental behavior. The O'Connor and Assaker [41] study confirmed the direct and positive influence of environmental awareness and responsibility on environmental moral obligation, subsequently influencing travelers' engagement in pro-environmental behavior. In the context of restaurants, Shin et al. [42] sought to understand the mechanisms driving consumers' preference for eco-friendly products, such as organic menu items. Shin et al. [42] revealed that consumers' awareness of consequences (AC) directly influenced their personal norms (PNs), consequently affecting their intention to visit restaurants offering organic menu items. In other words, individuals who demonstrated a heightened awareness of the environmental impact of the restaurant industry felt a stronger moral obligation to choose organic menu options when dining out.

Consumers are increasingly conscious of the severe environmental pollution caused by the excessive usage of single-use plastic. The higher the levels of awareness individuals possess regarding the need to protect the public environment, the greater the feeling of a sense of responsibility toward environmental conservation. Consequently, individuals are more inclined to engage in responsible behavior, such as reducing their reliance on single-use plastic when ordering takeaway food. The current study considers individuals' awareness of the consequences as a crucial factor influencing their personal norms (PNs) concerning specific pro-environmental behaviors, including the responsible use of single-use plastic. Therefore, the hypothesis is:

H6. *Consumers' awareness of the consequences of reducing single-use plastic utensil use has a positive influence on consumers' personal norms, which act as a mediator between consumers' awareness of consequences and their behavioral intentions to reduce single-use plastic when ordering takeaway food from a restaurant.*

2.6. Personal Norms and Behavioral Intention

Personal norms (PNs) hold significant importance in understanding altruistic behaviors, including pro-environmental behavior [38,43]. The Norm Activation Model (NAM) emphasizes the significance of pro-social motives, such as moral obligation, as the primary driver of consumer behavior concerning the environment [37,40]. Personal norms (PNs) apply an individual's moral obligation to engage in specific altruistic behaviors [23,43]. Pro-environmental consumption activities, such as reducing single-use plastic, are in the category of altruistic behaviors driven by a concern for the environment [44]. Such behaviors may require individuals to make short-term sacrifices for the greater benefit of communities and the environment [45].

Previous research has consistently highlighted the critical role of personal norms (PNs) in forecasting individuals' environmentally friendly intentions [43,45,46]. Park and Ha [46] conducted research to understand consumer recycling behavior and incorporated two constructs from the Norm Activation Model (NAM), namely awareness of consequences (AC) and personal norms (PNs), into a comprehensive model. Park and Ha [46] found that personal norms (PNs), activated through problem awareness, directly influenced recycling intentions. In the tourism context, Han et al. [43] investigated the pro-environmental intentions of young vacationers while they travel to international tourist destinations. Han et al. [43] revealed that personal norms (PNs) emerged as the most important factor in shaping young vacationers' waste reduction and recycling intentions. Their study implied that activating personal norms (PNs) among young vacationers are essential for endorsing waste reduction and recycling intentions through effective messaging that emphasizes travelers' moral obligation. Examining the foodservice context, Hwang et al. [45] explored

consumers' behavior toward electric-powered drone food delivery services, which are considered more environmentally friendly than traditional food delivery methods. The researchers found that the sense of obligation to take pro-environmental actions played a pivotal role in forming intentions to use food delivery services via drone. In other words, consumers with higher levels of environmentally motivated personal norms (PNs) were more inclined to use, pay increased fees, and recommend environmentally friendly food delivery services using drones. Based on these findings, the next hypothesis is:

H7. *Consumers' personal norms have a positive influence on their behavioral intention to reduce single-use plastic when ordering takeaway food from a restaurant.*

The proposed research model is presented in Figure 1.

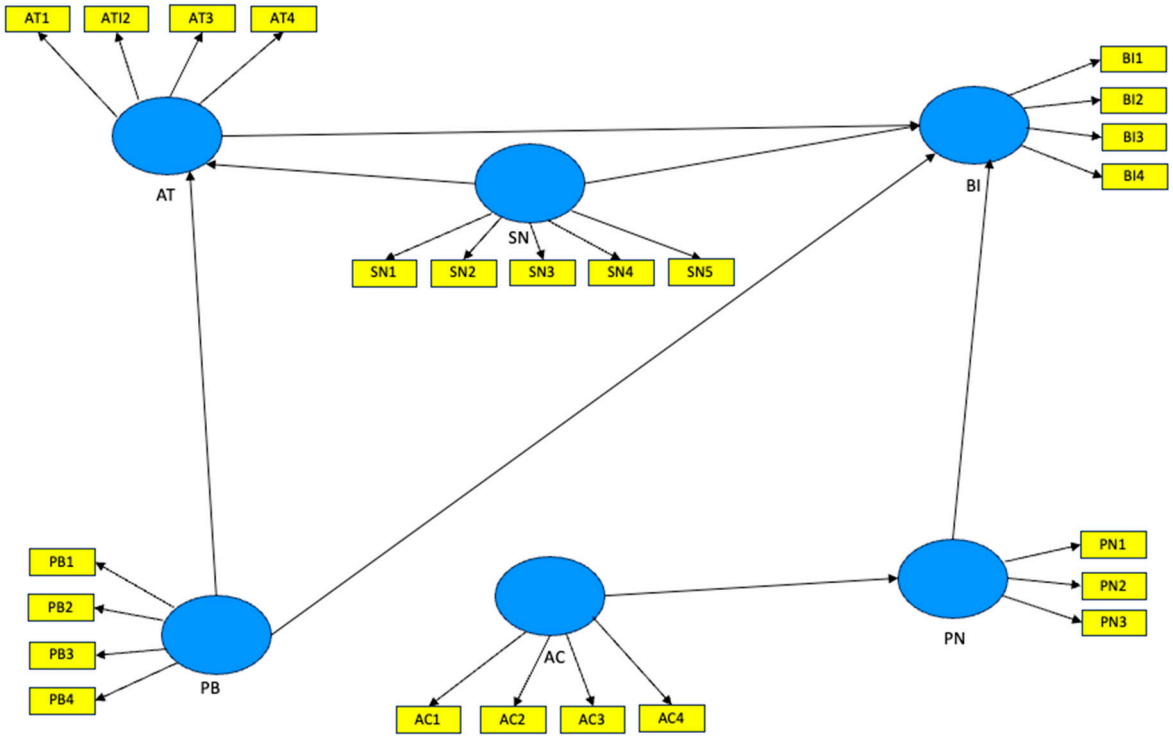

Figure 1. The proposed research model and hypotheses.

3. Method

3.1. Data Collection and Sampling

The current study conducted a cross-sectional empirical survey through Amazon Mechanical Turk within the United States. The survey incorporated a link hosted on QuestionPro. The data, collected between 12 and 14 June 2023, recruited participants through MTurk, by applying a random sampling method. The HIT approval rate needed to be higher than 80%. The survey targeted US residents, over 18 years old, who had used an online food ordering platform over a period of three months. The questionnaire included attention-check questions to guarantee the data quality and to filter out careless responses. Four hundred and thirty-six collected surveys remained after screening prior to further analysis. The Institutional Review Board of a university in the United States authorized this study.

3.2. Research Instruments

The questionnaire consists of two components: the main survey and demographic information. The first component of the survey sought participants' responses regarding: intentions to reduce the use of single-use plastic utensils when ordering takeout food from

restaurants, the existence of social pressure, and the attitude toward reducing the use of single-use plastics. Five subjective norms (SNs) relating to reducing the use of single-use plastic utensils were modifications from researchers Ajzen [14] and Kim et al. [32], including, "Most people who are important to me think that I should reduce a single-use plastic when it comes to getting takeaway food from a restaurant". Four items relating to attitude toward reducing the use of single-use plastic utensils (AT) were adopted from Ajzen [14], including, "When it comes to getting takeaway food from a restaurant, in general, reducing use of single-use plastic is intelligent". Four items relating to perceived behavioral control (PB) were modifications from researchers Ajzen [14] and Kim et al. [32], including, "If I want to, I can reduce use of single-use plastic utensils when it comes to getting takeaway food from a restaurant". Four items assessing behavioral intention (BI) were modifications from the research of Ajzen [14] and Kim et al. [32], for example, "I am willing to reduce a single-use plastic when it comes to getting takeaway food from a restaurant". Four items adapted from Schwartz [23] examined awareness of consequences (AC), including "Reducing a single-use plastic is way to conserve vital natural resources". Three items adopted from Jang and Kim [47] measured personal norms (PNs), including "I feel a personal obligation for reducing a single-use plastic when it comes to getting takeaway from a restaurant".

This study applied a 7-point Likert scale to measure all the items in the survey (1 = strongly disagree to 7 = strongly agree; only the constructs of personal norms (PNs) and behavioral intention (BI) used 1 = extremely unlikely to 7 = extremely likely for measurement). The questionnaire appears in Appendix A. The second component of the survey encompasses demographic information, including the frequency of respondents' use of the food delivery app, their gender, employment status, income, education level, marital status, ethnicity, and their age.

3.3. Data Analysis

Hypothesis testing used the Statistical Package for Social Science (IBM SPSS 29.0 for Mac software) and the partial least squares structural equation modeling (PLS-SEM) hypotheses. PLS-SEM is suitable for assessing complex predictive models in smaller sample sizes and non-normality conditions [48]. The proposed mediation analysis aligns effectively with PLS-SEM for the current research. The software SmartPLS (Version 4.0) provides development for models and assessment of models' validity.

4. Results

4.1. Sample Profile

Of 436 respondents, 61.9% identified as male, while 37.8% identified as female, and 0.2% chose "Prefer not to say". This distribution highlights a gender imbalance, particularly with a higher proportion of male respondents. Additionally, there was a significant concentration of respondents in the 25–34 age group, indicating a limitation in generalizability. In terms of age distribution, the majority (56.4%) fell within the 25–34 age range, followed by 35–44 (23.2%), 45–55 (11.7%), 18–24 (6.2%), and above 55 (2.5%). Among the respondents, 79.6% were Caucasian or White, followed by Asian (7.3%), and Hispanic or Latino (6.9%). Most respondents' household incomes ranged between USD 75,000 and above, as reported by 34.9%, followed by 33.3% for households earning between USD 50,000 and USD 74,999, and 31.8% of the respondents reported annual household incomes of less than USD 50,000 before taxes. Overall, 73.9% of respondents had bachelor's degrees, compared to 17.9% who had associate's degrees or less, and 8.0% who had postgraduate degrees. Moreover, 32.8% of the people in the sample were not married, while 26.1% preferred not to say. Full-time employment represented 92.7% of respondents (Table 1). Table 2 shows the 'Frequency of eating outside the home and using online food ordering platforms.' Participants were able to select more than one 'Types of food delivery apps used by participants', and the majority of respondents used UberEats, followed by DoorDash, Grubhub, and others. In the case of the 'Number of times participants eat out per month', the majority had eaten out 2–5 times per month (41.7%), followed by 6–10 times (40.6%), 11–15 times (10.6%),

more than 15 times (3.9%), and once per month (3.2%). Among the respondents, most respondents used delivery apps 6–10 times per month (42.7%), followed by 2–5 times (37.6%), more than 15 times (11.2%), 0 times during the last three months (4.6%), and those who used the delivery apps only once (3.9%).

Table 1. Demographic profile.

Variable	Frequency	Percent	Variable	Frequency	Percent
Gender			Bachelor's degree	322	73.9
Male	270	61.9	Post-graduate degree	35	8.0
Female	165	37.8	Marital status		
Prefer not to say	1	0.2	Not married	143	32.8
Employment status			Widowed	19	4.4
Full-time employment	404	92.7	Divorced	19	4.4
Part-time employment	7	1.6	Separated	77	17.7
Unemployed	3	0.7	Never married	64	14.7
Self-employed	15	3.4	Prefer not to say	114	26.1
Home-maker	2	0.5	Race		
Student	1	0.2	Hispanic or Latino	30	6.9
Retired	3	0.7	American Indian or Alaska Native	7	1.6
Prefer not to say	1	0.2	Asian	32	7.3
Income status			Black or African American	16	3.7
Less than USD 15,000	12	2.8	Caucasian or White	347	79.6
USD 15,000–24,999	46	10.6	Multiracial	3	0.7
USD 25,000–34,999	38	8.7	Native Hawaiian or other Pacific Islander	1	0.2
USD 35,000–49,999	43	9.9	Age		
USD 50,000–74,999	145	33.3	18–24	27	6.2
USD 75,000–99,999	115	26.4	25–34	246	56.4
USD 100,000–149,999	35	8.0	35–44	101	23.2
USD 150,000 and above	2	0.5	45–55	51	11.7
Education level					
12th grade or less	1	0.2	Above 55	11	2.5
Graduate high school or equivalent	49	11.2			
Some college, no degree	12	2.8			
Associate degree	17	3.9			

Table 2. Frequency of eating outside the home and using online food ordering platforms.

Types of Food Delivery Apps Used by Participants			
	N	**Percent**	**Percent of Cases**
UberEats	269	45.4	61.7
DoorDash	230	38.8	52.8
Grubhub	86	14.5	19.7
Other	8	1.3	1.8
Total	593	100.0	136.0
Number of times participants eat out per month			
	N		Percent
once	154		3.2
2–5 times	182		41.7
6–10 times	177		40.6
11–15 times	46		10.6
more than 15 times	17		3.9

Table 2. *Cont.*

Types of Food Delivery Apps Used by Participants			
	N	**Percent**	**Percent of Cases**
Number of times participants use delivery apps per month			
once	17		3.9
2–5 times	164		37.6
6–10 times	186		42.7
more than 15 times	49		11.2
0 times	20		4.6

4.2. Assessment of Measurement Model

The estimates of the PLS-SEM model's parameters and diagnostics offered evidence for the reliability and validity of all of the constructs in this study and appear in Tables 3 and 4. The outer loadings of all of the items on their constructs were significant ($p < 0.01$) and ranged from 0.69 to 0.84. Sometimes, lower values were acceptable in previous studies due to the magnitude of the coefficient, depending on the number of factors of which the construct consists [49]. The CR, as a criterion to establish internally consistent reliability, of the six constructs ranged from 0.81 to 0.90, above the recommended threshold of 0.70 [50].

Table 3. Measures and reliability.

Variables [a]	**Outer Loading** [b]	**Cronbach's α**	**CR**	**AVE**
AC: Awareness of consequences (4 items)		0.79	0.86	0.61
AC01	0.79			
AC02	0.75			
AC03	0.80			
AC04	0.79			
AT: Attitude toward reducing single-use plastic (4 items)		0.79	0.85	0.58
AT01	0.81			
AT02	0.76			
AT03	0.69			
AT04	0.78			
BI: Behavioral intention (4 items)		0.82	0.88	0.64
BI01	0.79			
BI02	0.78			
BI03	0.81			
BI04	0.83			
PB: Perceived behavioral control (4 items)		0.77	0.85	0.59
PB01	0.79			
PB02	0.76			
PB03	0.79			
PB04	0.74			
PN: Personal norm (3 items)		0.65	0.81	0.59
PN01	0.84			
PN02	0.77			
PN03	0.70			
SN: Subjective norm (5 items)		0.86	0.90	0.64
SN01	0.80			
SN02	0.77			
SN03	0.81			
SN04	0.80			
SN05	0.83			

Note: [a] All items were measured on a 7-point Likert scale; [b] loading = standardized regression weights: all were significant at levels of 0.001; α = Cronbach's alpha; AVE = average variance extracted; CR = composite reliability.

Table 4. Fornell–Larcker discriminant validity criteria.

	AC	AT	BI	PB	PN	SN
AC	0.78					
AT	0.68	0.74				
BI	0.73	0.76	0.80			
PB	0.77	0.67	0.74	0.77		
PN	0.57	0.64	0.70	0.56	0.77	
SN	0.59	0.77	0.65	0.55	0.62	0.80

Assessing Fornell–Larcker criteria ensures an adequate discriminant validity of the measurement model by stating that the square root of each construct's AVE must be greater than its correlation with the other constructs [51]. All AVE values of the constructs exceeded the 0.50 cutoff (0.58 to 0.64). Table 4 illustrates that the square root of each AVE is greater than the corresponding inter-construct correlations in the construct correlation matrix (except AT-BI and AT-SN) due to the slightly lower AVE of AT, showing that almost-reflective constructs have appropriate discriminant validity.

4.3. Assessment of the Structural Model

Smart PLS software examines structured equation models using 5000 bootstraps. If the sample size is greater than 100, the SRMR values are ideally lower than 0.08. However, some researchers [52] prefer a softer threshold of less than 0.10. Thus, the current research found a model fit for this study (0.090). Analysis finds that a 58% variance occurs for attitude toward reducing single-use plastic utensils, 59% variance occurs for personal norms, and 64% variance occurs for behavioral intention (BI). Hence, the result of this study reaches a level of significance.

4.4. Structural Equation Modeling

This study's analysis examined the proposed model's validity using PLS-SEM. Hypotheses testing occurred by analyzing the t values and p values with the path coefficients. Hypothesis 1, regarding the link between attitude (AT) and behavioral intention (BI), remained statistically supported (t = 4.90; $p < 0.001$). Hypothesis 2, which examines the effect of subjective norms (SNs) and behavioral intention (BI), did not gain support (t = 0.66; $p > 0.05$). Hypothesis 3, concerning the result of subjective norms (SNs) and attitude (AT), is supported (t = 10.32; $p < 0.001$). The data support Hypothesis 4 by showing that perceived behavioral control (PB) is controlled by behavioral intention (BI) (t = 5.61; $p < 0.001$). The result of analyzing perceived behavioral control (PB) and attitudes (ATs) toward reducing single-use plastic utensils, Hypothesis 5, gained support (t = 5.84; $p < 0.001$). These results show the importance of consumer behavior for reducing single-use plastic utensils. Hypothesis 6, on the link between awareness of consequences (AC) and personal norms (PNs), gains support (t = 11.80; $p < 0.001$). Lastly, personal norms (PNs) significantly affect behavioral intention (BI) (t = 4.50; $p < 0.001$), supporting Hypothesis 7. These results show the degree of importance of consumers' attitudes, perceived behavioral control, and awareness for reducing the use of single-use plastic utensils and affecting behavioral intention. Table 5 provides a summary of the findings, and Figure 2 shows the estimated model.

The last research step, examined for model assessment, is the multiple mediation effect (indirect effect) assessment. A third variable influencing a direct causal link between an independent variable and a dependent variable represents a mediation effect [53]. The current research analyzed the mediation effect using a nonparametric bootstrapping approach, by testing the indirect effect as proposed by Preacher and Hayes [54]. The results show that the mediations are significant: PB → AT → BI (p values = 0.001 ***) and AC → PN → BI, SN → AT → BI (p values = 0.000 ***); thus, these are accepted (Table 5).

Table 5. Hypothesis testing.

	Hypothesis	Sample Mean	t-Value	*p* Value	Decision
H1	Attitude toward reducing single-use plastic utensils → Behavioral Intention	0.30	4.90	0.000 ***	Supported
H2	Subjective Norm → Behavioral Intention	0.05	0.66	0.51	Not Supported
H3	Subjective Norm → Attitude toward reducing single-use plastic utensils	0.58	10.32	0.000 ***	Supported
H4	Perceived Behavioral Control → Behavioral Intention	0.36	5.61	0.000 ***	Supported
H5	Perceived Behavioral Control → Attitude toward reducing single-use plastic utensils	0.34	5.84	0.000 ***	Supported
H6	Awareness of Consequences → Personal Norm	0.57	11.80	0.000 ***	Supported
H7	Personal Norm → Behavioral Intention	0.29	4.50	0.000 ***	Supported
	Indirect effect assessment				
	PB → AT → BI	0.10	3.39	0.001 ***	
	AC → PN → BI	0.16	4.25	0.000 ***	
	SN → AT → BI	0.17	4.64	0.000 ***	

Note: *** $p < 0.001$; SRMR: 0.090; NFI: 0.746.

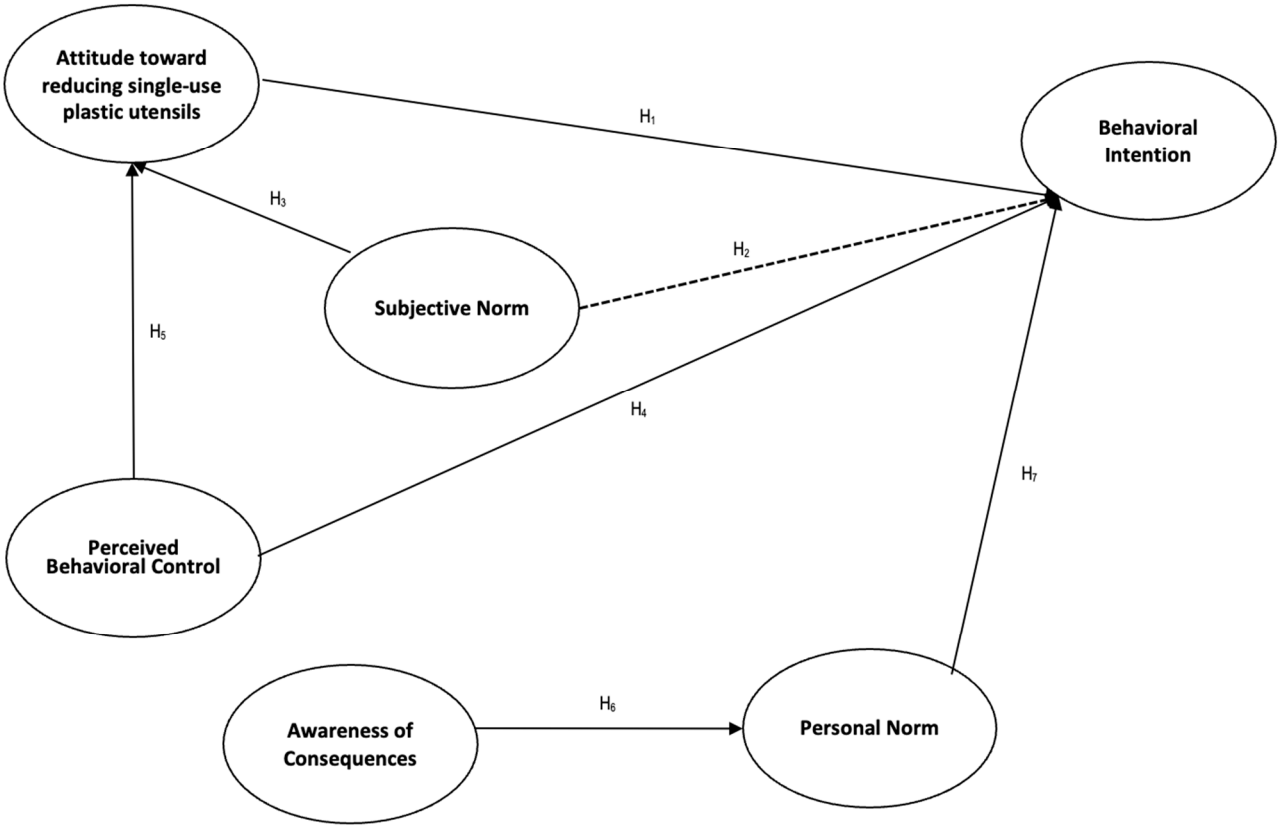

Figure 2. Structural model with path coefficients and R^2.

5. Discussion

The purpose of this study is to identify changes in consumers' behavior with respect to reducing single-use plastic utensils when ordering takeaway food from restaurants, providing empirical support for the applicability of the Theory of Planned Behavior (TPB) and Norm Activation Model (NAM) in understanding consumers' behavior aimed at reducing single-use plastic utensils. Given the inherent complexities in directly gauging actual consumers' behavior, this study employs an indirect approach by assessing consumers' behavioral intentions. In other words, the goal is to enhance consumers' behavior intentions by validating the factors associated with each of this research's variables (i.e., attitude toward reducing the use of single-use plastic utensils, perceived behavioral intentions, subjective norms, personal norms, and awareness of consequences). According to previous studies [18,20,55,56], the Theory of Planned Behavior (TPB) and Norm Activation Model (NAM) are effective in changing consumers' intentions. The findings of this study underscore the significance of all mediating roles, with particular emphasis on the mediating functions of attitudes and personal norms within the specified context. The discernment of consumer attitudes and personal norms that contribute to reducing the usage of single-use plastic utensils is crucial for delineating changes in consumer behavior.

6. Conclusions

This study contributes novel theoretical perspectives regarding the determinants of consumers' intention to minimize the usage of single-use plastic utensils, particularly in the context of purchasing takeaway food from restaurants.

6.1. Theoretical Implications

First, this study represents the inaugural exploration of a reduction in single-use plastic utensils within the context of obtaining takeaway food from restaurants. Previous studies have considered the motivational aspect of this, mainly in association with the broad concept of environmentally friendly behavior in the context of the hospitality industry or other contexts of plastic use (e.g., [5,7,10]) or single-use plastic use in various contexts (e.g., [11]). However, in the face of rising plastic consumption resulting from the surge in online ordering for off-site delivery, no research has yet measured consumers' intentions to reduce single-use plastic. Hence, the current study represents an innovative theoretical analysis of the factors driving sustainable behavior in this specific context.

Second, the current study empirically validates the merging of the Theory of Planned Behavior (TPB) and the Norm Activation Model (NAM) and establishes a causal relationship between the variables related to consumers' intentions to reduce single-use plastic utensils by employing the Theory of Planned Behavior (TPB) and the Norm Activation Model (NAM) as the foundational framework for empirical investigation. In other words, the findings here establish a solid theoretical foundation for examining the reduction in single-use plastic utensils within the context of online food ordering. Previous research has predominantly utilized the Theory of Planned Behavior (TPB) [14,32], the Norm Activation Model (NAM) [18,21], or a combination of the Theory of Planned Behavior (TPB) and the Norm Activation Model (NAM) [57,58] in various contexts. Consequently, this study represents a significant theoretical contribution by delineating and predicting the reduction in consumers' use of single-use plastic utensils when ordering takeaway food from a restaurant. The demonstrated adaptability and flexibility of the Theory of Planned Behavior (TPB) and the Norm Activation Model (NAM) suggest their potential as a valuable and shared foundation for future investigations into consumer behavior, providing novel insights for the restaurant industry.

Third, this study concluded that attitude and personal norms played significant mediating roles for generating behavioral intentions to lower the use of single-use plastic utensils. Attitude is a full mediator between subjective norms and behavioral intentions and a partial

mediator between perceived behavioral control and behavioral intentions. This finding aligns with previous research [32,57], indicating that the opinions of individuals significant to the consumer play a role in shaping their attitudes toward reducing the use of single-use plastic utensils, ultimately influencing the formation of consumers' behavior. Furthermore, personal norms act as a mediator between consumers' awareness of consequences and behavioral intention. This finding is consistent with previous studies [36,37,46] and implies that an individual's belief in the rightness or wrongness of reducing the use of single-use plastic utensils impacts their personal norms, which, in turn, influences the formation of their behavior. Hence, the current study, along with these analogous constructs, elucidates the significance of investigating attitudes and personal norms as mediators, thereby shedding light on their directions and values.

6.2. Practical Implications

In addition to its academic importance, the current research offers distinctive offerings to professionals within the restaurant industry. First, restaurant operators should recognize the considerable influence of customers' attitudes on their behavioral intentions concerning reducing the use of single-use plastic utensils. The findings of this study show that consumers' perceptions include intelligence, interest engagement, desirability, and beneficial choices for reducing single-use plastic when ordering takeout food from restaurants. This underscores the pivotal role of consumers' beliefs within the framework of reducing the use of single-use plastics. Therefore, an imperative for restaurant operators, online delivery application developers, and marketers is proactive encouragement and innovative strategies aimed at cultivating consumers' interests and awareness of benefits in order to influence their attitudes toward reducing single-use plastic in the context of takeaway food from a restaurant. As an illustration, highlighting and endorsing the initiatives undertaken by major corporations like McDonald's to diminish consumption of single-use plastic can serve as a means to directly or indirectly educate consumers and raise awareness regarding the desirability and benefits of reducing single-use plastic [59]. Additionally, when consumers become aware of the collaborative efforts between businesses, individuals, and government entities, there exists the potential to substantially influence consumers' attitudes. For example, if a prominent city like New York City in the United States was to announce its initiatives to reduce single-use plastic, such a declaration could have a profound impact on customer attitudes [60].

Second, to inspire consumers to reduce their dependence on single-use plastic utensils, foodservice practitioners should underscore the environmental consequences associated with such usage while also cultivating consumers' personal norms. This study's findings substantiate this approach, by indicating that consumers with strong personal norms exhibit a resolute behavioral intention to avoid single-use plastic utensils when obtaining takeaway food from restaurants. Furthermore, personal norms are malleable, at times being shaped by a heightened awareness of the resulting consequences. For instance, global single-use plastic waste has seen a significant increase, rising by 6 million tons from 133 million tons in 2019 to 139 million tons in 2021 [1]. Yet, alarmingly, only about 9% of plastic is currently being recycled [2]. In addition, frequent use of single-use plastics is able to lead to increased disclosure of potentially detrimental chemicals, posing health risks to consumers [61]. On an annual basis, microplastics are what humans ingest the most [62], and our second largest intake is food and beverages [63]. Foodservice practitioners and policymakers can effectively raise consumer awareness by highlighting these critical environmental and health consequences.

Third, advisedly, foodservice practitioners should streamline the process of excluding single-use plastic utensils from delivery applications, ensuring minimal consumer effort. This approach provides multiple avenues for reducing single-use plastic utensils when engaging with restaurants or food ordering platforms. This aligns with the present study's findings, which highlight the considerable influence of perceived behavioral control on

shaping consumers' attitudes and behavioral intentions pertaining to reducing single-use plastic utensils within the framework of restaurants' takeout orders. Efforts to reduce single-use plastics can be effective if consumers encounter no frustration when excluding such items from food orders or if the process of reducing single-use plastic use occurs during the ordering process. For instance, foodservice operators can employ the 'nudge' effect by offering simplified choices that reduce decision-making time when it comes to single-use plastics. The 'nudge' effect, rooted in the concept of choice architecture, suggests that environmental design can influence an individual's preference for one option over another [64].

6.3. Limitations and Future Research

In light of the theoretical and practical implications, crucial consideration accrues to several limitations when interpreting the findings of this study. While this study represents an initial and essential advancement in understanding consumers' behavioral intentions regarding reducing the use of single-use plastic utensils within the framework of takeaway food from restaurants, its research represents a first step for investigation; future research should aim to provide a more comprehensive perspective. A first imperative should be to adapt and incorporate the subjective norm as a pivotal variable in the context of behavior for sustainability, building upon its significance within the framework of the current study. Second, since this study's research employs a cross-sectional survey, future studies could incorporate an experimental design to investigate the efficacy of specific stimuli, such as the presence of visual cues, in reducing consumers' utilization of single-use plastic from food ordering platforms. Such research would offer practical insights for developers of food ordering platforms and restaurant operators. Implementing these findings could facilitate swift adoption within the restaurant industry, leading to an immediate reduction in customers' use of single-use plastic utensils. Lastly, the results of this study may be difficult to generalize because the sample's demographic characteristics limit application. Therefore, future studies should obtain data from a more various population, which may apply consumers' behavioral intentions more broadly across various demographics and among different countries.

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Appendix A. Questionnaire

This study applied a 7-point Likert scale to measure all the items in the survey (1 = strongly disagree to 7 = strongly agree).

Social Norms
Most people who are important to me think that I should reduce single-use plastics when it comes to getting takeaway food from a restaurant.
Most people who are important to me tell me the importance of reducing single-use plastics when it comes to getting takeaway food from a restaurant.
Those people who are important to me consider reducing single-use plastics when it comes to getting takeaway food from a restaurant to be a good idea.
The people in my life whose opinion I value reduce their use of single-use plastics when it comes to getting takeaway food from a restaurant, and would prefer me to reduce single-use plastic utensils rather than use them.
Most people who are important to me reduce their use of single-use plastics when it comes to getting takeaway food from a restaurant.
Attitude
When it comes to getting takeaway food from a restaurant, in general, reducing single-use plastic is intelligent.
When it comes to getting takeaway food from a restaurant, reducing single-use plastic is interesting.
When it comes to getting takeaway food from a restaurant, reducing single-use plastic is desirable.
When it comes to getting takeaway food from a restaurant, reducing single-use plastic is beneficial.
Perceived Behavioral Control
If I want to, I can reduce single-use plastic when it comes to getting takeaway food from a restaurant.
If I want, I could easily reduce single-use plastic when it comes to getting takeaway food from a restaurant.
I have the time and opportunity to reduce single-use plastic when it comes to getting takeaway food from a restaurant.
I am confident that I can reduce single-use plastic when it comes to getting takeaway food from a restaurant.
Awareness of Consequences
Reducing single-use plastic is a way to conserve vital natural resources.
Reducing single-use plastic is a way to reduce litter.
Reducing single-use plastic is a way to conserve energy.
Reducing single-use plastic is a way to reduce the wasteful use of land for dumps.
Personal Norms
I feel a personal obligation to reduce single-use plastic when it comes to getting takeaway food from a restaurant.
Regardless of what other people do, because of my own principles, I feel that I should reduce single-use plastic.
I would feel guilty if I did not reduce single-use plastic when it comes to getting takeaway food from a restaurant.
Behavioral Intention
I am willing to reduce single-use plastics when it comes to getting takeaway food from a restaurant.
I will make an effort to reduce single-use plastics when it comes to getting takeaway food from a restaurant.
I plan to reduce single-use plastics when it comes to getting takeaway food from a restaurant.
I want to reduce single-use plastics when it comes to getting takeaway food from a restaurant.

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