Abstract: The continuous generation of plastic wastes is one of the most serious environmental problems that we are facing. Information campaigns have been used to encourage people to reduce plastic consumption. Moreover, social media has become the most prevalent and influential form of communication in this current era. This study seeks to analyze the influence of social media on consumer behavior towards plastic products. The survey includes 213 individual observations wherein four information posts that represent the overall facets of plastic usage problem were presented. These scenarios include (1) a general information post on sachet use, (2) an information post discouraging use of plastic bottles in celebration of zero waste month, (3) an information post on the adverse health effects of plastic food storage and (4) an information post on the harmful effects of plastic use to marine life and its indirect effect to human health. Results show that, prior to any information, most participants consume products in plastic packaging except for the usage of single-use plastic containers for storing food. For the first three scenarios, it has been found that social media intensifies the probability of avoiding plastic consumption when the likelihood on the involvement of self-interest on the topic, as well as the ability to read the link attached to the post, increases. However, for the scenario that shows harmful effects of plastic use to marine life, the probability of avoiding the use of plastic packaged products after seeing the post is only affected by the likelihood that the respondent will recommend the link to friends or network. This study establishes that social media can effectively influence consumer behavior towards plastic consumption if the information presented are from confirmed studies that can easily translate to results based on their own action and has a direct impact on their health. The contrasting findings based on the different scenarios can be used as palettes in constructing modulated social media posts that can effectively influence consumer behavior towards reducing plastic pollution.

Keywords: social media; plastic pollution; plastic consumption; consumer behavior; social media influence; online identity

1. Introduction

UN Environment [1] identifies municipal solid waste as the largest source of plastic waste. In 2018, global plastic production amounted to 454.3 million tonnes which generated 342.6 million tonnes of plastic waste. Forty-six percent of the plastic waste generated is attributed to packaging [2]. The broad reach of social media can be harnessed to reduce the incidence of plastic waste to achieve the United Nations Sustainable Development Goals (SDGs) responsible consumption and production (SDG 12) which extends to climate action (SDG 13), life under water (SDG 14) and good health and well-being (SDG 3).

With more than 55% of the global population having access to various social media platforms [3], social media has become a popular tool for information dissemination, news consumption and advertising placements. Traditional media have altered their strategies in reaching various demographics as social media use grew prominently over the years [4]. Environmental non-government organizations (eNGOs) have used social media
as a platform to spread awareness and information on threats to the environment. Barrios-O’Neill [5] analyzed the Twitter content of leading eNGOs and found that plastic pollution is among the most prevalent issues which has been constantly generated engagements from social media users. Aside from eNGOs, informal groups can also be created within social networking sites to allow people who share common interests to connect with each other and share knowledge [6]. Facebook groups have been used for psychosocial support for diabetes patients [7], self-management support for patients with chronic obstructive pulmonary disease [8] and online distance education [9]. Studies have shown the influence of social media towards dietary consumption [10], alcohol consumption [11] and shopping behavior [12]; however, to date, no study has been done to assess the influence of social media towards reducing plastic pollution. This study aims to show how the type of social media information affects behavior towards consuming products that contribute to plastic pollution.

The rest of this paper is organized as follows: Section 2 presents the literature review. The theoretical foundations are discussed in Section 3. Section 4 contains the discussion on the econometric model employed. Section 5 presents the Philippine case study to evaluate social media influence on plastic consumption behavior. Section 6 provides the conclusions and area for future research.

2. Literature Review

Social networking sites (SNS) have been used for communicating one’s opinions and sharing information. Borg et al. [13] conducted a study on the use of social media to disseminate policy in relation to banning the use of plastic bags in Australian supermarkets. Their study found that there were shifting reactions towards single-use plastic bag ban from the announcement stage, which was initially positively received, to the implementation stage, which yielded disapproval and reduced engagements. Through social media, stores were able to draw out consumer sentiments on new policies and recalibrate these. On the other hand, SNS can also serve as a platform to gather information on the motivations of consumption decisions. Sharifi and Shokouhyar [14] used social media analytics to identify the determinants of consumer decision towards purchasing refurbished mobile phones. While regulatory action can change production decisions, it is ultimately consumer demand that dictates how producers manufacture and distribute goods. Despite campaigns promoting the use of environmentally friendly packaging materials, the proliferation of sachets and plastic packaging continues to grow as it offers an affordable and convenient way to package products. In 2019, the market value of the global sachet market amounted to USD 8 billion and is expected to grow at a rate of 6 percent annually [15]. Unless there is a change in consumer behavior, there is no incentive for producers to avoid the use of sachets to reduce plastic waste.

Information campaigns are instrumental in promoting pro-environment choices. Heidbreder et al. [16] conducted an experiment where participants were invited to join a plastic free campaign to reduce single-use plastic consumption. They found that the impact of the information is more pronounced for participants with low pro-environmental identity. Information disseminated through professional bloggers prove to have a broader reach and elicit more engagements [17]. However, this strategy has yet to show that reach and engagements can translate to actions. Although most studies have shown strong social media engagement in environmental issues, based on Delphi survey results, social media will not cause changes in consumer behavior that will translate to environmental benefits [18].

Behavioral changes can be due to different factors. Nisa et al. [19] conducted a meta-analysis of behavioral interventions that promote household action on energy, transportation, water consumption, food waste generation, meat consumption and recycling which included 83 studies published between 1976 and 2017. They were able to show that behavioral interventions have low effectiveness in the different fronts, except for recycling. Although interventions that use social comparison and nudges are the most effective, information sharing was the most behavioral intervention used. In Sweden, information
on others’ recycling efforts and the positive externalities of recycling are important factors in a household’s decision to recycle [20]. Dhokhikah et al. [21] found that the main reason for households in Surabaya, Indonesia, to adapt municipal waste reduction measures are self-awareness and command from community leader. While knowledge and information on the adverse effects of plastic to the environment can cause reduction in plastic waste, legislation may be the key to translating intention to action. Aruta [22] noted that gender plays a key role in one’s intention to reduce plastic use. He was able to observe that levels of descriptive norms have a significant effect on male intention to reduce plastic use, while females present their intention to reduce plastic waste regardless of the level of descriptive norms.

Lau et al. [23] proposed alternative scenarios that include different types of interventions such as reducing plastic quantity in the system, substituting plastics with alternative materials, increasing collection capacity, scaling up sorting and mechanical recycling capacity, reducing environmental leakages, among others. They found that consistent adaptation of the collection and disposal practices, recycling, and reduce and substitute practices can avoid potential growth of plastic pollution in the next 20 years. However, pursuing system changes such as increased level of recycling, drastic reduction in disposal and significant reduction in mismanaged municipal solid waste can even lead to decreased levels of plastic pollution in the next 20 years.

Numerous studies have been conducted to illustrate the impact of introducing a tax for the use of plastic bags. The introduction of a tax aims to reduce the use of plastic bags which will reduce the amount of plastic waste. In Portugal, the EUR 0.10 plastic bag tax imposed on February 2015 has proven to be effective in reducing 74% of the plastic bag consumption [24]. In Turkey, a plastic bag charge of no less than 25 kurus or EUR 0.024 for each plastic bag was implemented in 2019 was also a success with more consumers bringing their own bag and not paying for the plastic bags [25]. In Australia, a ban on a specific type of plastic bag was imposed but it continued to allow the use of other types such as single-use biodegradable bags, household garbage bags and barrier bags, among others, which led to a negligible impact on the overall consumption of plastic bags [26]. In South Africa, the levy charged on each plastic bag is too low such that people were willing to pay for the bags and caused a reversed effect of increasing the plastic bag consumption [27]. Socio-economic factors play an important role in determining household use of alternative bag choices [28]. Participation in social organizations also reduces the probability of plastic bag use [28]. Educational attainment as a key factor in reducing disposable plastic bag consumption [28]. However, this is not the case in several towns in the northern Philippines, wherein almost all socio-economic factors and even education do not affect plastic bag consumption [29].

There is a need to increase public awareness and understanding towards plastic pollution [30]. Most studies focused on the impact of policies to reduce the use of plastic bags; however, no study has been conducted to assess the influence of information shared through social media to individual consumption behavior. Thus, this study aims to show how the type of social media information can influence consumer plastic use.

3. Theoretical Framework

The Theory of Planned Behavior has been widely used to assess changes in consumer behavior due to factors such as attitudes, moral norms, perceived behavior and subjective norms [31–33]. These studies considered subjective norms in relation to the social environment that one belongs to. Subjective norm has been proven to be a significant determinant of pro-environmental behavior. In the context of a developing country, attitude towards recycling, perceived behavioral control and moral norms do not significantly contribute to a consumer’s decision to participate in recycling activity. Moreover, developing countries are more prone to environmental hazards and climate change [34]. Awareness of the consequences have proven to be a contributing factor but convenience in engaging in recycling activities is the best motivation [33]. Jiang et al. [35] incorporated identity to further
extend the theory of planned behavior. Behaviors are driven by multiple identities [36]. These identities motivate how individuals think and behave accordingly. Having multiple identities may not always exhibit consistency in action due to changes in environment and variety of contexts [36]. In most cases, identities related to environmental behavior may not always be salient [36,37]. Pro-environmental behaviors may be reinforced by making moral identity more salient in a specific context [34]. This exploratory study primarily focuses on understanding how moral identity could shape an individual’s efforts and decision making to reduce plastic consumption, mediated by SNS.

Moral identity is defined as representation of one’s character as governed by the moral behavior [38]. There are two factors through which moral identity is revealed. First, through internalization when moral traits are reflected towards the self. This theory is consistent with self-identity theory which states that individuals will consistently act morally based on self-perception [34,35,37]. Individuals are more obliged to act in a more environmentally friendly manner [34,39]. Secondly, symbolization states that actions reveal moral traits externally [38]. Individuals would engage pro-environmental behavior by when moral actions are conveyed publicly [34]. Symbolization emphasizes that is important that other people recognize one’s moral behavior [37]. Bhatti et al. [40] applied these aspects of moral identity to prosocial behavior in the online context.

Membership in an SNS allows a person to assume a dual identity: online and offline identity [41]. One’s representation online may be different from one’s offline identity. Combining the moral identity with actions done online and offline is crucial to ensure a cohesive personality. Self-consistency theory states that individual actions will be aligned with the individual’s moral identity [42]. Thus, these two distinct involvement in SNS, internalization and symbolization online, should translate to offline pro-environment behaviors as well.

Based on the discussions, the following hypothesis were proposed:

**Hypothesis 1.** Personal and self-reflective consumption of informative posts through SNS elicits environmental self-identity and reinforces positive actions towards reducing plastic pollution.

**Hypothesis 2.** Re-distribution of informative posts through SNS in a social manner elicits environmental self-identity and reinforces positive actions towards reducing plastic pollution.

Figure 1 summarizes the theoretical framework to show how the theories support the connection of online and offline identity.

The first hypothesis was grounded from the concept of internalization. On the other hand, the second was established from the concept of symbolization. Internalization and symbolization questions are designed to gauge the consistency of their online and offline setting.
Figure 1. Schematic diagram of the theoretical framework.

4. Econometric Specification

The objective of this study is to estimate the probability of avoiding plastic use when presented with different information posts from SNS. The respondents were asked to rate the likelihood of avoiding plastics using an ordered categorical scale (1 = highly unlikely to 5 = highly likely). The ordered probit model is a frequently used method to study how predictive the independent variables are to the probability of observing specific categorical outcome. Equation (1) represents each observable categorical responses of the respondents [43]. Note that each categorical outcome holds a certain threshold.

\[
y_i = \begin{cases} 
0 & \text{if } \mu_{i-1} < y^*_i \leq \mu_0 \\
1 & \text{if } \mu_0 < y^*_i \leq \mu_1 \\
2 & \text{if } \mu_1 < y^*_i \leq \mu_2 \\
\vdots & \\
J & \text{if } \mu_{J-1} < y^*_i \leq \mu_J 
\end{cases}
\]  

(1)

Equation (2) represents the ordered probit model where \( y^* \) is a linear combination of independent variables \( X^T \), the vector regression of coefficients \( \beta \) and an error term \( \epsilon \) that follows a standard normal distribution.

\[
y^* = X^T \beta + \epsilon
\]  

(2)

In this model, \( y \) the observable responses will be used to estimate the parameter vector \( \beta \) considering \( y^* \) is a latent variable.

5. Case Study Analysis

5.1. Survey Implementation

This exploratory study only included respondents with active social network accounts. Due to the time-varying frequency use of SNS, only active users during the survey period were invited to partake in this study. This conventional method of posting the survey link on various websites and recruiting online respondents is known as river sampling. It is commonly used due to the undetermined demographic distribution and regularity of active users in various social networking sites [44].
The survey (see Supplementary) was conducted in April 2021 through Google Forms and disseminated through social media posts in zero-waste groups and direct messages to potential respondents on Facebook and Instagram. The data for this study were gathered from 213 participants from different backgrounds and ages within and outside the National Capital Region (NCR) of the Philippines.

Active SNS were presented four informative posts with photos and text to gather reactions from the respondents. Informative posts with photos and text elicit more engagement such as likes, emoji responses, comments and shares from the audience [45]. Appendix ?? contains the figures that were shown to each respondent. Questions relating to one’s moral identity through internalization and symbolization were asked upon presentation of the SNS posts. Table 1 presents the internalization questions referring to the SNS responses that pertain to the self.

Table 1. List of internalization questions.

| Construct       | Question Number | Actual Question [46]                                      |
|-----------------|-----------------|-----------------------------------------------------------|
| Internalization | Question 1      | How likely would you find this message interesting?       |
|                 | Question 2      | How likely would you open the link attached?              |
|                 | Question 3      | How likely would you share the link in social media?      |

Table 2 presents the symbolization questions, asked upon presentation of the SNS post, which seek to show the respondent’s actions towards their online social network.

Table 2. List of symbolization questions.

| Construct       | Question Number | Actual Question [46]                                      |
|-----------------|-----------------|-----------------------------------------------------------|
| Symbolization   | Question 1      | How likely would you seek similar content online in the future? |
|                 | Question 2      | How likely would you recommend the linked website to your friends? |
|                 | Question 3      | How likely would your friends in social media be interested in the linked website? |

Responses to the set of symbolization questions show the identity that the respondent projects through sharing the information posts to the newsfeed or specifically targeted towards their online social network.

5.2. Descriptive Statistics

Table 3 presents the demographic variables used in the study. It shows that out of the 213 respondents, 41% are from the NCR, while 67% are from outside NCR. The survey conducted was able to include participants aged 18–65 years old, with 59% being female and 35% are male. Most of them identified to be of single status, occupying 86%, and the survey was able to capture only 12% identifying as married respondents. Most of these people earn USD 219.14 to USD 429.79 as their monthly household income, while the rest range from USD 429.80 to USD 876.55. The highest educational attainment for most of the participants is a Bachelor’s Degree at 36%, followed by High School Graduates at 32%. A portion of 3% of those with Professional License also participated in the survey. A portion of 3% of those with Professional License also participated in the survey. Half of the respondents identified as students while 31% are full-time employees. The survey also shows that 75% or 161 individuals engage in social media frequently each day.
Table 3. List and Descriptive Statistics of the Independent Variables.

| Variables                  | Classification          | Count | Percentage |
|----------------------------|-------------------------|-------|------------|
| Location                   | Metro Manila            | 81    | 38%        |
|                            | Outside Metro Manila    | 132   | 62%        |
| Monthly Household Income   | USD 4382.80 and above   | 27    | 13%        |
|                            | USD 2629.66 to USD 4382.79 | 16    | 8%         |
|                            | USD 1533.38 to USD 2629.65 | 35    | 16%        |
|                            | USD 876.56 to USD 1533.37 | 39    | 18%        |
|                            | USD 429.80 to USD 876.55 | 40    | 19%        |
|                            | USD 219.14 to USD 429.79 | 56    | 26%        |
| Highest Educational Attainment | Doctoral Degree       | 10    | 5%         |
|                            | Professional License    | 7     | 3%         |
|                            | Master’s Degree         | 19    | 9%         |
|                            | Bachelor’s Degree       | 76    | 36%        |
|                            | Some College, No Degree | 12    | 6%         |
|                            | High School Graduate    | 69    | 32%        |
|                            | Less Than High School Graduate | 20 | 9%     |
| Employment Status          | Full-time               | 66    | 31%        |
|                            | Part-time               | 22    | 10%        |
|                            | Student                 | 110   | 52%        |
|                            | Unemployed              | 15    | 7%         |
| Marital Status             | Single                  | 183   | 86%        |
|                            | Married                 | 25    | 12%        |
|                            | Others                  | 5     | 2%         |
| Gender                     | Male                    | 75    | 35%        |
|                            | Female                  | 127   | 60%        |
|                            | Others                  | 11    | 5%         |
| Social Media Use           | Frequently each day     | 161   | 76%        |
|                            | At least once per day   | 37    | 17%        |
|                            | A couple of times a week| 0     | 0%         |
|                            | Less than weekly        | 15    | 7%         |

1 USD 1 = PHP 50.

Table 4 presents the respondents’ initial behavior towards plastic consumption prior to seeing the information posts on SNS. It is also important to note that the respondents who indicated that they do not consume plastic products concerning the SMP were not included in the study. Social Media Post 1 (SMP1) contains information on the use and disposal of sachets. Seventy-nine percent of the respondents answered ‘Yes’ as a response to its consumption. For SMP2, which discusses the effect of the use of disposable plastic bottles, 68% responded ‘Yes’ to using plastic bottles. Social Media Post 3 (SMP3) contains information on chemical leaching into food through plastic food storage, and 69% answered ‘No’ to the act of heating food stored in plastic containers inside a microwave. Social Media Post 4 (SMP4) is an information post on the harmful effects of plastics to marine life and its indirect effect to human health, and 93% or 198 individuals admitted the use of plastic packaged products, while only 7% or 15 individuals responded ‘No’ on the consumption of such.

With the categorical nature of dependent variable, Table 5 shows that, out of 169 respondents who had seen that SMP1, 33% are neutral on the idea of avoiding the use of products sold in sachets, and 30% are likely to avoid such. As for those who had seen SMP2, 37% or 54 individuals out of 145 respondents are likely to avoid consuming plastic-bottled water, 20% are highly likely to do so, while 9% are unlikely to avoid the use of it. The survey also revealed that 38% or 25 individuals out of 66 respondents are likely to be discouraged from heating food in microwavable plastic packaging after seeing SMP3; 19% are unlikely to be discouraged while only 3% or 2 individuals are highly unlikely to avoid such. On the other hand, of the 198 participants who answered the question on the likelihood of
avoiding the consumption of plastic packaged products after seeing SMP4, 66 respondents reported that they are likely to disengage in the said action, while 65 respondents are neutral about it; 19% answered highly likely while 13% are unlikely to disengage from such action.

**Table 4. Respondents’ Initial Behavior towards Plastic Consumption.**

| Scenario                                | Response | Count | Percentage |
|-----------------------------------------|----------|-------|------------|
| Social Media Post 1 (SMP1):             | Yes      | 169   | 79%        |
| General information on sachet use       | No       | 44    | 21%        |
| Social Media Post 2 (SMP2):             | Yes      | 145   | 68%        |
| Discourage the use of plastic bottles   | No       | 68    | 32%        |
| Social Media Post 3 (SMP3):             | Yes      | 66    | 31%        |
| Adverse health effects of plastic food storage | No   | 147   | 69%        |
| Social Media Post 4 (SMP4):             | Yes      | 198   | 93%        |
| Harmful effects of plastic use to marine life | No   | 15    | 7%         |

**Table 5. Descriptive Statistics of Dependent Variables.**

| Categorical Variables | SMP1 Count | %  | SMP2 Count | %  | SMP3 Count | %  | SMP4 Count | %  |
|-----------------------|------------|----|------------|----|------------|----|------------|----|
| Highly Likely         | 29         | 17%| 29         | 20%| 9          | 14%| 37         | 19%|
| Likely                | 50         | 30%| 54         | 37%| 25         | 38%| 66         | 33%|
| Neutral               | 56         | 33%| 43         | 30%| 17         | 26%| 65         | 33%|
| Unlikely              | 26         | 15%| 13         | 9% | 13         | 19%| 25         | 12%|
| Highly Unlikely       | 8          | 5% | 6          | 4% | 2          | 3% | 5          | 3% |
| Total Number of Respondents | 169 |      | 145 |     | 66 |      | 198 |     |

5.3. Results and Discussion

5.3.1. Results of Ordered Probit Regression

Table 6 shows the results of the ordered probit regression for a particular social media post. The variables with asterisks represent the significant variables that contribute to likelihood of avoiding plastic consumption. The numbers of asterisks indicate the level of significance. Any significant in shift in the predictor variables can result to changes in the spectrum of the ordinal categories. The internalization and symbolization questions are listed in Tables 1 and 2, respectively.

For SMP1, emoji sentiment and interest in the social media post are the only remarkable predictors of avoiding the use of sachets. In 2016, Facebook introduced other emoji responses aside from the Like button [47]. This allows people to share their sentiments on posts made on the platform. This study adapts the Emoji Sentiments Ranking [48] to attach sentiment scores to the emoji responses to the posts that were shown in the survey. Moreover, respondents who showed negative sentiments were highly discouraged.

To discourage the use of disposable plastic bottles as indicated in SMP2, showing enthusiasm to replacements and increasing monthly income appeared to be significant drivers to shift behaviors. This implies that with higher income allowing with advocacy-type information, respondents are more motivated to make the efforts to find more substitutes.

Changes in socio-demographic variables such as education level and employment status are indicative that respondents are more convinced that using plastic containers for heating food has a direct and a long-term effect on health, as shown in SMP3. The immediate effect on health has a strong impact to reduce the use of plastics.

Information sharing about the effect of plastic pollution to marine life and its possible effects to human health has a significant effect on the behavior of an individual. Promoting environmental awareness through SNS helps individuals to be more attentive and can influence the decision to avoid the use of plastic packaged products.
Table 6. Ordered Probit Regression Results.

| Variables                      | SMP1   | SMP2   | SMP3   | SMP4   |
|--------------------------------|--------|--------|--------|--------|
| Location                       | 0.0981 | 0.0018 | 0.1101 | −0.0577|
| Age                            | −0.0112| 0.0310 | 0.0035 | −0.0064|
| Gender                         | 0.1385 | 0.0126 | 1.1901 | 0.2278 |
| Monthly Income                 | −0.0762| 0.1464 | −0.0274| 0.0104 |
| Education                      | 0.0591 | 0.1190 | −0.3266| 0.0230 |
| Marital Status                 | 0.3905 | −0.1225| −0.4866| 0.1113 |
| Employment                     | 0.0555 | 0.0063 | 0.7179 | 0.1228 |
| Social Media Use               | 0.0958 | 0.0056 | 0.2624 | −0.1533|
| Emoji Sentiment                | −0.7483*| 0.6705 | 0.7061 | 0.3014 |
| Internalization Question 1     | −0.0061| 0.4772***| −0.2117| 0.2178 |
| Internalization Question 2     | 0.1945**| −0.1225| 0.6025*| −0.0825|
| Internalization Question 3     | −0.0317| 0.1155 | 0.1546 | 0.1399 |
| Symbolization Question 1       | 0.1399 | 0.0614 | 0.0143 | −0.0842|
| Symbolization Question 2       | −0.0843| −0.0598| 0.1058 | 0.5077***|
| Symbolization Question 3       | 0.0785 | 0.0197 | −0.2838| −0.2048|
| Cut1                           | −0.7798| 2.1166**| −0.2103| −0.0234|
| Cut2                           | 0.0918 | 2.8018***| 1.2454 | 0.9187 |
| Cut3                           | 1.0871 | 3.8510***| 2.1474*| 2.0276***|
| Cut4                           | 2.0223*| 4.9950***| 3.6023***| 3.1580***|

* Statistically significant at the ten percent level. ** Statistically significant at the five percent level. *** Statistically significant at the one percent level.

5.3.2. Marginal Effects Analysis

Tables 7–10 show the results of the marginal effects for each social media post. It estimates the marginal contribution of each independent variable to the probability of each ordinal category. Five ordinal categories were assigned, ranging from highly unlikely (1) to highly likely (5), to measure the probability of avoiding plastic consumption.

For SMP1, a positive change in emoji sentiment would lead to a higher probability of avoiding sachet use. On the contrary, a negative change in emoji sentiment is associated with being less likely to avoid the use of sachets, as shown in columns 4 and 5. In addition, respondents who found the post interesting will change their behavior and avoid sachet use.

Table 7. Marginal Effects for SMP1.

| Variables                      | Highly Unlikely | Unlikely | Neutral | Likely | Highly Likely |
|--------------------------------|-----------------|----------|---------|--------|---------------|
| Location                       | −0.0083         | −0.0180  | −0.0126 | 0.0161 | 0.0228        |
| Age                            | 0.0009          | 0.0020   | 0.0015  | −0.0018| −0.0026       |
| Gender                         | −0.0113         | −0.0252  | −0.0185 | 0.0223 | 0.0328        |
| Monthly Income                 | 0.0062          | 0.0139   | 0.0102  | −0.0123| −0.0181       |
| Education                      | −0.0048         | −0.0108  | −0.0079 | 0.0095 | 0.0140        |
| Marital Status                 | −0.0319         | −0.0711  | −0.0521 | 0.0627 | 0.0924        |
| Employment                     | −0.0045         | −0.0101  | −0.0074 | 0.0089 | 0.0131        |
| Social Media Use               | −0.0078         | −0.0175  | −0.0128 | 0.0154 | 0.0227        |
| Emoji Sentiment                | 0.0612          | 0.1363*  | 0.0999  | −0.1203*| −0.1772*      |
| Internalization Question 1     | 0.0005          | 0.0011   | 0.0008  | −0.0010| −0.0015       |
| Internalization Question 2     | −0.0159*        | −0.0354* | −0.0260*| 0.0313 | 0.0461**      |
| Internalization Question 3     | 0.0026          | 0.0058   | 0.0042  | −0.0051| −0.0075       |
| Symbolization Question 1       | −0.0114         | −0.0255  | −0.0187 | 0.0225 | 0.0331        |
| Symbolization Question 2       | 0.0069          | 0.0154   | 0.0113  | −0.0136| −0.0200       |
| Symbolization Question 3       | −0.0064         | −0.0143  | −0.0105 | 0.0126 | 0.0186        |

* Statistically significant at the ten percent level. ** Statistically significant at the five percent level.
Table 8. Marginal Effects for SMP2.

| Variables              | Highly Unlikely | Unlikely | Neutral | Likely | Highly Likely |
|------------------------|-----------------|----------|---------|--------|---------------|
| Location               | −0.0001         | −0.0002  | −0.0004 | 0.0002 | 0.0005        |
| Age                    | −0.0019         | −0.0037  | −0.0065 | 0.0042 | 0.0080        |
| Gender                 | −0.0008         | −0.0015  | −0.0026 | 0.0017 | 0.0032        |
| Monthly Income         | −0.0089 *       | −0.0177 ** | −0.0307 ** | 0.0197 | 0.0376 **    |
| Education              | −0.0072         | −0.0144  | −0.0250 | 0.0160 | 0.0305        |
| Marital Status         | 0.0075          | 0.0148   | 0.0257  | −0.0165 | −0.0315      |
| Employment             | −0.0004         | −0.0008  | −0.0013 | 0.0009 | 0.0016        |
| Social Media Use       | −0.0003         | −0.0007  | −0.0012 | 0.0008 | 0.0014        |
| Emoji Sentiment        | −0.0408         | −0.0810  | −0.1406 | 0.0726 | 0.1721        |
| Internalization Question 1 | −0.0290 **     | −0.0577 ** | −0.1001 ** | 0.0643 ** | 0.1225 **   |
| Internalization Question 2 | 0.0075    | 0.0148   | 0.0257  | −0.0165 | −0.0315      |
| Internalization Question 3 | −0.0070      | −0.0140  | −0.0242 | 0.0156 | 0.0296        |
| Symbolization Question 1 | 0.0036        | 0.0072   | 0.0125  | −0.0081 | 0.0158        |
| Symbolization Question 2 | −0.0012       | −0.0024  | −0.0041 | 0.0027 | 0.0051        |

* Statistically significant at the ten percent level. ** Statistically significant at the five percent level.

For SMP 2, monthly income and compelling information that discourages individuals to use plastic bottles appeared to be significant in changing behavior. Any decrease in monthly income weighs down the probability of switching to other plastic bottle alternatives. Respondents who did not show any interest in encouraging the use of plastic bottles barely changed their behavior.

Table 9. Marginal Effects for SMP3.

| Variables              | Highly Unlikely | Unlikely | Neutral | Likely | Highly Likely |
|------------------------|-----------------|----------|---------|--------|---------------|
| Location               | −0.0024         | −0.0255  | −0.0159 | 0.0275 | 0.0163        |
| Age                    | −0.0001         | −0.0008  | −0.0005 | 0.0009 | 0.0005        |
| Gender                 | −0.0264         | −0.2766  | −0.1712 | 0.2984 ** | 0.1759 **     |
| Monthly Income         | 0.0006 *        | 0.0064   | 0.0039  | −0.0069 | −0.0040       |
| Education              | 0.0073          | 0.0759   | 0.0470 * | −0.0819 ** | −0.0483      |
| Marital Status         | 0.0108          | 0.1131   | 0.0700  | −0.1220 | −0.0719       |
| Employment             | −0.0160         | −0.1669  | −0.1033 ** | 0.1800 *** | 0.1061 **    |
| Social Media Use       | −0.0058         | −0.0610  | −0.0378 | 0.0658 | 0.0388        |
| Emoji Sentiment        | −0.0157         | −0.1641  | −0.1016 | 0.1771 | 0.1044        |
| Internalization Question 1 | 0.0047        | 0.0492   | 0.0305  | −0.0531 | −0.0313       |
| Internalization Question 2 | −0.0134      | −0.1400 * | −0.0867 | 0.1511 * | 0.0890 *      |
| Internalization Question 3 | −0.0034       | −0.0359  | −0.0222 | 0.0388 | 0.0228        |
| Symbolization Question 1 | −0.0003       | −0.0033  | −0.0021 | 0.0036 | 0.0021        |
| Symbolization Question 2 | −0.0024       | −0.0246  | −0.0152 | 0.0265 | 0.0156        |
| Symbolization Question 3 | 0.0063        | 0.0660   | 0.0408  | −0.0712 | −0.0419       |

* Statistically significant at the ten percent level. ** Statistically significant at the five percent level. *** Statistically significant at the one percent level.

For SMP 3, any changes in employment status and education level suggested that it can discourage the use of plastics when heating in a microwave and food storage. Any improvement in employment status level implies that individuals are more likely to make a conscious effort to avoid using plastics. The consumers’ gender can also contribute to the increased probability of avoiding microwave use for heating food. Female respondents who answered that they were likely or highly likely will have a higher probability of changing their behavior compared to their male counterparts.

For SMP 4, disseminating information regarding consequences of plastic use to marine life and its indirect effect to human health can change one’s own behavior. McNicholas and Cotton [49] identify that the absence of collective responsibility causes ocean plastic pollution. Deliberate efforts to share information can increase awareness of their actions and encourage activism in the social network.
Table 10. Marginal Effects for SMP4.

| Variables            | Highly Unlikely | Unlikely | Neutral | Likely | Highly Likely |
|----------------------|-----------------|----------|---------|--------|---------------|
| Location             | 0.0023          | 0.0088   | 0.0118  | −0.0094| −0.0135       |
| Age                  | 0.0003          | 0.0010   | 0.0013  | −0.0011| −0.0015       |
| Gender               | −0.0092         | −0.0351  | −0.0463 | 0.0375 | 0.0530        |
| Monthly Income       | −0.0004         | −0.0016  | −0.0021 | 0.0017 | 0.0024        |
| Education            | −0.0009         | −0.0035  | −0.0047 | 0.0038 | 0.0053        |
| Marital Status       | −0.0045         | −0.0171  | −0.0226 | 0.0183 | 0.0259        |
| Employment           | −0.0049         | −0.0189  | −0.0249 | 0.0202 | 0.0286        |
| Social Media Use     | 0.0062          | 0.0236   | 0.0312  | −0.0253| −0.0357       |
| Emoji Sentiment      | −0.0121         | −0.0464  | −0.0612 | 0.0497 | 0.0701        |
| Internalization Q1   | −0.0088         | −0.0335  | −0.0442 | 0.0359 | 0.0506        |
| Internalization Q2   | 0.0033          | 0.0127   | 0.0168  | −0.0136| −0.0192       |
| Internalization Q3   | −0.0056         | −0.0215  | −0.0284 | 0.0230 | 0.0325        |
| Symbolization Q1     | 0.0034          | 0.0130   | 0.0171  | −0.0139| −0.0196       |
| Symbolization Q2     | −0.0204 *       | −0.0781 ***| −0.1032 **| 0.0836 **| 0.1181 ***     |
| Symbolization Q3     | 0.0082          | 0.0315   | 0.0416  | −0.0337| −0.0476       |

* Statistically significant at the ten percent level. ** Statistically significant at the five percent level. *** Statistically significant at the one percent level.

Our findings are coherent with Winterich et al. [50], such that when internalization responses are significant, symbolization responses are not significant, and when symbolization responses are significant, internalization responses are not significant.

6. Conclusions and Recommendations

6.1. Conclusions

Social media platforms capitalize on algorithms to target audiences based on their interests and their network’s interests. This study was able to show how social media can influence the consumption behavior of individuals towards plastic pollution.

When the social media posts present information that can yield results through their own action, then internalization factors play a significant role in a consumer’s decision to avoid modes of plastic consumption. For social media posts that present information that seems to require a broader response, such as the harmful effects of plastic consumption to marine life, a person’s decision to recommend the link to their friends becomes a significant factor in their decision to avoid plastic packaged products. Thus, advocacy within their own network, both online and offline, translates to pro-environmental action. Socio-economic factors do not play a significant role in a consumer’s change in behavior except in the scenario that concerns plastic bottles and food storage. This shows that social media can influence consumer behavior towards plastic consumption if the information presented are confirmed results of studies, can easily translate to results based on their own action, and has a direct impact on their health.

6.2. Practical Implications

Social media has become the main platform for information dissemination, gathering and discourse. This study provides insights to maximize the effectiveness of social media in addressing plastic pollution towards more sustainable consumption. Binding regulations and commitment to reduce plastic pollution will require cooperation among all stakeholders. Different countries have implemented varying levels of regulation for single-use plastic and microbeads, ranging from banning the use of single-use plastic to charging consumer fees and shift towards reusable and recoverable plastics and biodegradable alternatives [51]. This study confirms that there is a lack of awareness on the indirect impacts of plastic consumption on human health [52], as seen in responses to SMP4. Communicating these kinds of information to the general public through social media posts can contribute to changes in their consumption choices. Policymakers, government agencies and advocacy groups
should capitalize on social media in disseminating information and formulate posts based on the findings of this study in order to enhance the effectiveness of sustainability policies.

6.3. Limitations and Areas for Future Research

The emergence of virtual communities that promote plastic pollution reduction and zero-waste lifestyle provides another method of information dissemination that has not been explored. Future work can focus on how information presented to a targeted audience can translate to changes in behavior compared to a general information post. The survey was implemented in the Philippine setting and implemented through a river sampling technique; thus, results and findings are not generalizable. Future research can implement a more diversified respondent base to include other countries which may yield differences in results. This will lead to different approaches that each government should take to reduce plastic waste. Furthermore, government initiatives can be included in the social media posts to gauge the public’s awareness and effectiveness of the sustainability initiatives.

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Appendix A

This section presents the social media posts in the scenarios.

“Sachets are widely used in the country because they can contain small portions of products from shampoo to snacks and are thus preferred by many customers who want bargains. Almost all these sachets are then disposed of after a single use and customers often buy them in bulk...Because of such wasteful consumer habits, the country generates 2.7 million tons of plastic waste annually and a fifth of all that waste ends up in the island nation’s seas. It does not help that waste collection and recycling initiatives remain sporadic and underfunded across much of the country.”

#SustainableLiving
#EndPlasticPollution
#EarthDayEveryday

Figure A1. Information post on sachet use.
In 2019, the United Nations released a report calling for a plan of action for e-waste. The report emphasized the annual e-waste production of $62.5 billion. Under a business-as-usual (BAU) scenario, the UN University (UNU) foresees the increase of e-waste to 120 million tonnes by 2050!

Since Zero Waste is about an individual’s lifestyle and choices, we can evaluate the number of electronic devices we really need and try to make these devices last longer. When throwing old devices out, make sure to dispose them properly. (CHECK: https://www.preview.ph/.../where-and-how-to-dispose-of...)

We hope it’s not yet too late to add mindful purchases and consumption, and #UseLess to your New Year’s resolution! 😊

See you next week! 🤗

#ZeroWasteFridays

**Figure A1.** Information post on sachet use.

**Figure A2.** Information post on avoiding plastic bottles.
Studies have found that certain chemicals in plastic can leach out of the plastic and into food and beverages we eat. Some of these chemicals have been linked to health problems such as metabolic disorders (including obesity) and reduced fertility. This leaching can occur even faster and to a greater degree when plastic is exposed to heat. This means you might be getting an even higher dose of potentially harmful chemicals simply by microwaving your leftovers in a plastic container.

"Even though single exposures to a specific chemical are small, if they occur repeatedly over long periods of time, their effects may add up, leading to a variety of adverse health outcomes down the road," says Dr. Hauser. Furthermore, and most importantly, we are exposed to many chemicals simultaneously (i.e. chemical mixtures) that may have additive adverse effects.
All over the world, researchers are staring through microscopes at tiny pieces of plastic - fibers, fragments, or microbeads - that have made their way into marine and freshwater species, both wild caught and farmed. Scientists have found microplastics in 114 aquatic species, and more than half of those end up on our dinner plates.

Scientists remain concerned about the human-health impacts of marine plastics because, again, they are ubiquitous and they eventually will degra...

See more

Figure A4. Information post on the harmful effects of plastic to marine life.

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