

A Market Research on LUHANTU's GEcoWrap – A Biodegradable, Reusable Soy Wax Wrap – in District VI, Quezon City

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ABSTRACT

Filipinos consume about 41 Titanics of plastics annually (World Wide Fund, 2021). The Philippines is the world's third-ranking contributor to plastic pollution (UN Environment Program, 2016). Plastic pollution has been linked to major health risks, including respiratory diseases, reproductive disorders, and cancer (Greenpeace, 2020). These exacerbating shreds of evidence give life to the purpose of LUHANTU's research: to provide QCitizens with relevant nature-oriented and market information on environmental sustainability.

A structured survey from focus group discussions and a rigorous review of related literature was used to gather data from 385 Cochran-proposed respondents. Data was collected through quota sampling and analyzed using frequency, percentages, and hypothesis testing. The results show that most participants always utilize single-use plastics. But, the majority of them are totally aware of reuse. Hence, the extreme willingness to purchase GecoWrap. Moreover, there is a significant difference between the respondents' occupation or barangay and both the frequency of consuming single-use plastics and the awareness of reuse. Additionally, there is no significant difference between gender and single-use plastics consumption and reuse awareness. Furthermore, there is a significant difference between the awareness of reuse and the willingness to purchase GecoWrap.

In conclusion, QCitizens are ready to go on the greener side through sustainable practices. GecoWrap will be an influential product and symbol of Quezon City in supporting the 17 Sustainable Development Goals (United Nations, 2015) and reducing the prevalence of single-use plastics in the metropolis with regard to the respondents' background.

Keywords: plastic pollution, reuse, biodegradable, wax wrap, market research

INTRODUCTION

A. Single-use Plastic Consumption

In the Philippines, the usage of plastics for packaging food and other products, such as furniture, clothing, and appliances, is quite widespread, with the country's market estimated at 1283.71 million US\$ in 2016 (Guevarra, 2022). This number is predicted to grow at a compounded annual growth rate of 6.11% until 2023 (UN SEA, 2020).

Moreover, plastic usage for packaging accounts for around 48% of total plastic consumption (Reuters, 2022). Reports from GAIA (The Global Alliance for Incinerator Alternatives) in 2019 showed that the country produces 48 million pieces of plastic shopping bags and 45.2 million pieces of plastic labo bags on a daily basis (OCEANA, 2022). Unfortunately, most of these plastics end up in landfills, oceans, and even the air we breathe.

B. Plastic Pollution

The Philippines is at the epicenter of the world's battle against plastic pollution in oceans. Research shows that this nation is one of the five countries that produce half of the planet's plastic waste (OCEANA, 2022). Additionally, packing waste is a major source of marine debris and plastic contamination (UN SEA, 2020). Oxford University's Our World in Data states that almost 80% of the plastic that ends up in the oceans comes from Asian rivers, and the Philippines contributes a third of this total (Ritchie, 2021). It is estimated that 2.7 million tons of plastic are produced in the Philippines each year, and 20% of this ends up in the ocean (World Bank Group, 2021). A study in February 2015 revealed that this country was the 3rd leading source of plastic contamination in the sea (Ranada, 2015). The Philippine National Solid Waste Management Commission and the World Bank stated that 74% of plastic leakage is due to mismanaged waste that has been collected (WWF Philippines, 2018). With no corrective action, mismanaged plastic waste is expected to reach 9 million tons in 2040 and 11 million tons in 2060 (Schachter & Karasik, 2022).

C. Effects of Plastic Pollution

It has been established that plastics can seriously impact wildlife (Envilience ASIA, 2022). Both external and internal injuries and blockages of airways and digestive tracts have been linked to plastics, which can lead to the death of animals (da Costa, et. al., 2016; Khalid, et. al., 2021; Lusher, 2015). Furthermore, plastics are known to absorb and adsorb contaminants, such as persistent organic pollutants and heavy metals, from the surrounding environment, thus providing a means for toxic substances to be ingested by organisms (Khare, 2019). As most of the plastics used are buoyant, they can be distributed far and wide by wind and surface currents, exposing wildlife in otherwise remote areas, such as Antarctica, to the dangers of these pollutants (Obbard, 2018). Additionally, plastic waste in water bodies can reduce fish yields, making it more difficult for fishermen to make a living (Alegado, 2020). Additionally, plastic waste can worsen flooding in urban areas, such as Metro Manila, by blocking the passage of water (UN SEA, 2020). Finally, plastic waste on beaches can negatively affect the tourism industry, as it detracts from the scenery (The Borgen Project, 2022).

D. Sustainability

Sustainability is the practice of meeting our current needs without compromising the ability of future generations to do the same (University of Alberta, 2013). This concept acknowledges the interconnectedness of environmental and societal issues and requires a holistic approach to address the complexity of the situation (UCLA, 2023). According to the United Nations Sustainable Development 2020 Report, the Philippines ranked 99th with a score of 65.5 (Priority, 2021). The Philippines fared poorly in the 2022 Environmental Performance Index, ranking 158th out of 180 countries in terms of progress toward better environmental health, preserving

ecosystems, and mitigating climate change (Aboitiz, 2023). This dismal score of 28.9 points out of a possible 100 was the lowest among select East and Southeast Asian countries (Business World, 2022).

E. Reuse

Reusing products or components allows them to remain in circulation for their intended purpose or another while retaining the same structure (Eurostat, 2019; Safeopedia, 2015). Reuse implies taking things that would then be discarded and using them again in their current form, or with few upkeeps or modifications (Sherman, 2019). This practice is essential in order to get the most out of the materials that one encounter (Ohio Valley Waste Service, 2017). According to Castillo & Otoma (2013), 95% of the solid waste produced by households can be reused or recycled (43%).

F. Wax Wrap

A wax wrap is a sustainable, food-grade material typically made of cotton, organic oil, and carbon-based resin (Wax Wrap, 2021). It has a lifespan of up to a year, and possibly longer with proper care (Pearce, 2022). It can be 'refreshed' by remelting the wax through the use of an oven or a flat iron with parchment paper (Sarah, 2021). Its waterproof, breathable nature keeps food fresh longer, and it is easily shaped around food or a bowl by heating the wrap with your hands (Thakkar, 2018). It is also a sustainable alternative to plastic wrap or cling wrap (Little Earth Nest, 2019). The prevalence of wax wraps in the United States of America inspired the proponents of this research to take part in its innovation.

G. Soy Wax Wrap

Soy wax, an all-natural and vegan solution, is often seen as a great substitute to beeswax (Andrea, 2020). It has the potential to be reused and renewed if needed, meaning it can last longer than foil or cling film while also causing less damage to the environment (Bergfelde, 2020). Additionally, soy wax is more affordable than beeswax, without any compromises (McLeod, 2019). Since the most common wax wraps are sold at a high price in the Philippines, soy wax wraps become a better alternative for Filipinos due to their affordability. This is a great step to promote sustainability and reuse in the country, particularly in District VI, Quezon City.

H. LUHANTU

The name LUHANTU is a portmanteau of four Filipino words - "LUPA" (earth), "HANGIN" (air), "APOY" (fire), and "TUBIG" (water) - that collectively refer to the vital elements of the environment. According to the business name registration search (BNSR) of the Department of Trade & Industry (DTI), the name is original.



LUHANTU's logo resembles the shape of a diamond. This gem is precious, and so is the environment. Its mission is to produce innovative, eco-friendly products that are mindful of our planet, its resources, and the people who use them. It strives to offer its customers the highest quality, sustainable, and reliable products backed by credible scientific research, while always striving to respect and honor the needs of our customers and our planet. On the other hand, LUHANTU's vision is to become a global leader in eco-friendly product and technology development by providing innovative, sustainable solutions that meet customer needs while promoting

environmental stewardship. It aspires to be a trusted partner in the journey toward a more sustainable and equitable future.



LUHANTU's culture is built on four elemental core values: Innovation (Air), Respect (Earth), Sustainability (Water), and Passion (Fire). The tagline "Go on The Greener Side." is an inspiring reminder of the positive outlook Filipinos should have on life and their commitment to taking care of the planet. It succinctly communicates the company's commitment to sustainability and the environment, while also providing an aspirational call to action. LUHANTU operates as a limited partnership business organization. Nestled in the heart of the city is 537, Mindanao Avenue, Novaliches, Quezon City, the home to a factory office and head office for the company.

I. GEcoWrap

At LUHANTU, we work passionately to produce our innovative wrap named GEcoWrap - a portmanteau of the words green, eco-friendly, and wrap - for the local food industry, urban farmers, SMEs, and households of District VI, Quezon City. The global brand database (GBD), run by the Intellectual Property Office of the Philippines (IPOP), corroborates the originality of the brand name.



GEcoWrap (pronounced as gecko-wrap) is inspired by the gecko's remarkable trait and symbolism: flexibility and fortune. It symbolizes adaptability to the changing needs of the environment and good fortune for nature through sustainability.



GEcoWrap is made from 100% organic materials found in nature such as cotton and soy wax. Through this product, we will eliminate the prevalence of single-use plastics in communities and businesses, while promoting sustainable, green-living methods in the form of reuse to not only the citizens of Quezon City but also the youth of tomorrow.

J. Objectives of the Study

Through focus group discussions (FGD) with certified and professional Industrial Engineers, the goals of this academic pursuit were identified. This study entitled *A Market Research on LUHANTU's GEcoWrap - A Biodegradable, Reusable Soy Wax Wrap - in District VI, Quezon City* aims to:

1. To know the demographic profile of the respondents in District VI, Quezon City in terms of age, gender, occupation, and barangay
2. To determine the participants' level of frequency in terms of single-use plastic consumption, the level of respondents' awareness of the reuse concept, and the respondents' level of willingness to purchase GEcoWrap - a biodegradable, reusable soy wax wrap
3. To recognize the existence of any significant difference between the demographics and both the frequency of single-use plastic consumption and awareness of reuse
4. To acknowledge the presence of any significant difference between the level of awareness of reuse and the level of willingness to purchase GEcoWrap

Firstly, this market research will help the researchers in identifying the appropriate promotional strategies for LUHANTU with respect to the company's dedication to teaching the current generation about the detrimental effects of single-use plastics, plastic pollution, the concept of sustainability, and reuse. The distribution plans encompass online (e-commerce), offline (trade shows, exhibits), customer acquisition (social media), and customer retention (loyalty programs and customer service). Secondly, this will allow LUHANTU to effectively target people based on changing market behaviors. They can focus on barangays where a large interest in GEcoWrap is present, in order to save marketing expenses while making the product more visible. Finally, this will help the partners of LUHANTU to understand if significant relationships exist between the demographic profile of a population and the variable of GEcoWrap's market acceptability. Knowledge of this aspect will aid the top management in creating future business decisions for LUHANTU.

K. Scope and Limitation

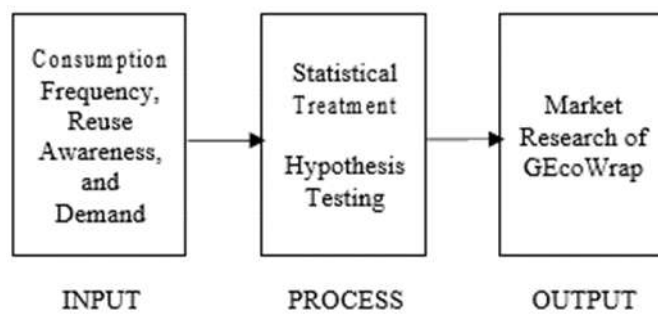
This study entitled *A Market Research on LUHANTU's GEcoWrap - A Biodegradable, Reusable Soy Wax Wrap - in District VI, Quezon City* has been tapered down by certified Industrial Engineers via FGD and compared with related pieces of literature, as supported by the following statements:

1. This academic pursuit will not include other parts of its feasibility study entitled *GEcoWrap; The Flagship Creation of LUHANTU*. This literature will be limited to company and marketing feasibility. Management, production, financial, and socio-economic feasibility will all be excluded.
2. This research will not employ random sampling for its data gathering. Due to time constraints and resource availability, the proponents of this market research can only conduct quota sampling instead.
3. The demographic profile of District VI, Quezon City will only consider the age, gender identity, barangay, and occupation of respondents.
4. This market research will only include the frequency of single-use plastic consumption, the awareness level of reuse, and the demand for GEcoWrap.

5. The hypothesis testing will only cover the demographics vs. frequency of single-use plastic consumption, demographics vs. the awareness level of reuse, and reuse awareness vs. the demand for GEcoWrap.
6. Reliability testing is excluded from this market research since there is only one question per category.
7. This market research will not include any type of laboratory testing such as a comparison of the durability of GEcoWrap to other existing wax wraps, all due to time constraints.

METHODOLOGY

A. Conceptual Framework



The figure above shows the input-process-output (IPO) diagram of this market research. The input will contain the demographic profile of the respondents (i.e., age, gender identity, barangay, occupation), their frequency of single-use plastic consumption, the participants' awareness level of reuse, and their demand for GEcoWrap. The process of this market research will employ statistical analysis and hypothesis testing. Both the input and process illustrated will be vital for the actualization of the output – the market research on LUHANTU's GEcoWrap - a biodegradable, reusable soy wax wrap - in District VI, Quezon City.

B. Data Collection

A structured questionnaire is a document with a predetermined set of questions and a predetermined order, used to collect data from respondents (Cheung, 2014). Depending on the respondent type, the content of the questionnaire, and the budget, it can be administered face-to-face, in self-completion, or over the telephone (Eticha, 2019). To formulate the survey, the proponents first held a focused group discussion (FGD) with a certified Industrial engineer and a professional engineer (Kansas University, 2023). FGD is used to learn about opinions on a given topic and to guide future action. Additionally, the proponents reviewed relevant literature on market research (Ilieva, 2016; Brace, 2018), awareness surveys (Claudy et al., 2010; Brown et al., 2011), and willingness measurements (Barber, 2019; Zielke & Dobbstein, 2013).

The data gathering through the structured questionnaire will be conducted face-to-face, implying that emissaries will be sent to each barangay of District VI. In the name of efficiency, smartphones will be utilized as devices for participants in obtaining responses for the survey.

C. Sample Size Calculation

The Cochran formula allows you to calculate an ideal sample size given a desired level of precision, desired confidence level, and the estimated proportion of the attribute present in the population (GMO Research, 2022). Cochran's formula is

considered especially appropriate in situations with large populations (Al-Hemyari, 2018). Calculation of the sample size can be done through this formula:

$$n = \frac{\lambda^2 p(1-p)}{d^2 [1 + \lambda^2 p(1-p)]}$$

where n = sample size
 λ = value based on the confidence level
 p = sample proportion
 d = margin of

error
 Performing the calculations,

$$n = \frac{1.96^2(0.5)(1-0.5)}{0.05^2[1 + [1.96^2(0.5)(1-0.5)]]}$$

$$n = 384.16 \approx 385$$

Ergo, 385 respondents are needed for the data gathering.

D. Sampling Method

Quota sampling is a sample that has been designed to reflect the features of a market (BBC, 2023). The researcher will pick the characteristics they desire the participants to have. It is cost-effective as fewer respondents are necessary, yet it is difficult to remove bias in the selection process. Quota sampling ensures a representative age demographic, yet it isn't a random sample since the sampling frame is unknown (Boston University, 2016). For this research, we utilized classifying per barangay, in which each of the 11 has a proportion of 9.1%, or 35 quotas to reach $n = 385$.

E. Statistical Treatment

The first step is to construct a frequency distribution (f) of the scores, counting how many people obtained each of the choices that were possible to obtain (Statistics Canada, 2021). To compare frequency distributions based on different totals, the statistician must convert the raw frequency into a relative frequency (i.e., as percentages of the total) by dividing the raw frequency by the total number of cases and then multiplying by 100 (University of Sussex, 2000).

Hypothesis testing is a type of statistical analysis that seeks to assess the validity of assumptions about a population parameter (Pennsylvania State University, 2023). To do this, the null hypothesis must be rejected if its probability falls below a predetermined significance level; in such a case, the hypothesis being tested is said to have that level of significance (Khan Academy, 2023). For this market research, here are the null and alternative hypotheses for the third objective:

H_0 : There is no significant difference between demographics and the frequency of single-use plastic consumption and reuse awareness.

H_A : There is a significant difference between demographics and the frequency of single-use plastic consumption and reuse awareness.

On the other hand, here are the null and alternative hypotheses for the fourth objective:

H0: There is no significant difference between reuse awareness and the willingness to purchase GEcoWrap.

HA: There is a significant difference between reuse awareness and the willingness to purchase GEcoWrap.

The statistical treatment of the data for this market research was professionally done by a statistician, denoting credibility for the results of the literature.

RESULTS AND DISCUSSION

A. Age

The table below shows that the majority of the respondents are 21-30 years old, accounting for 246 frequencies or 63.9% of the total respondents. This is followed by 31-40 years old (70 frequencies or 18.2% of the total participants), 20 years old and below (50 frequencies or 13.0% of the total responses), 41-50 years old (13 frequencies or 3.4% of the total respondents), and 51-60 years old (5 frequencies or 1.3% of the total participants). To finish, 61 years old and above has only 1 frequency or 0.3% of the total responses.

AGE	f	%
20 years old and below	50	13.0
21-30 years old	246	63.9
31-40 years old	70	18.2
41-50 years old	13	3.4
51-60 years old	5	1.3
61 years old and above	1	0.3
Total	385	100.0

B. Gender Identity

The table below displays that most respondents are female, represented by 208 frequencies or 54.0% of the total respondents. This is followed by males (149 frequencies or 38.7% of the total participants) and LGBTQIA+ (18 frequencies or 4.7% of the total responses), Lastly, 10 frequencies, or 0.3% of the total responses prefer not to disclose their gender identities.

GENDER IDENTITY	f	%
Female	208	54.0
LGBTQIA+	18	4.7
Male	149	38.7
Prefer not to say	10	2.6
Total	385	100.0

C. Occupation

The table below exhibits that the majority of the respondents are university students, denoted by 97 frequencies or 25.2% of the total respondents. This is followed by unemployed (51 frequencies or 13.2% of the total responses), government and private employees (49 frequencies or 12.7% of the total participants), graduate students (46 frequencies or 11.9% of the total responses), high school students (30 frequencies or 7.8% of the total respondents), business owners (28 frequencies or 7.3% of the total participants), freelance (18 frequencies or 4.7% of

the total participants), and house person (15 frequencies or 3.9% of the total participants). Finally, artists have only 2 frequencies or 0.5% of the total responses.

OCCUPATION	f	%
Artist	2	0.5
Business Owner	28	7.3
Freelancer	18	4.7
Government Employee	49	12.7
Graduate Student	46	11.9
High School Student	30	7.8
House Person	15	3.9
Private Employee	49	12.7
Unemployed	51	13.2
University Student	97	25.2
Total	385	100.0

D. Barangay

By virtue of quota sampling, each barangay of District VI has 35 frequencies or 9.10% of the total respondents. They were equally divided for the non-random sampling conducted.

BARANGAY	f	%
Apolonio Samson	35	9.1
Baesa	35	9.1
Balon-Bato	35	9.1
Culiat	35	9.1
New Era	35	9.1
Pasong Tamo	35	9.1
Sangandaan	35	9.1
Sauyo	35	9.1
Talipapa	35	9.1
Tandang Sor	35	9.1
Unang Sigaw	35	9.1
Total	385	100

E. Frequency of Single-use Plastic Consumption

The table below indicates that most participants always consume single-use plastics, implied by 237 frequencies or 61.6% of the total responses. This is followed by often (103 frequencies or 26.8% of the total participants) and sometimes (39 frequencies or 10.1% of the total respondents). Finally, only 6 frequencies, or 1.6% of the total responses denote rare consumption of single-use plastics.

FREQUENCY OF SINGLE-USE PLASTIC CONSUMPTION	f	%
Always	237	61.6
Often	103	26.8
Rarely	6	1.6
Sometimes	39	10.1
Total	385	100.0

F. Awareness of Reuse

The table below signifies that most respondents are totally aware of reuse, suggested by 208 frequencies or 54.0% of the total responses. This is followed by aware (134 frequencies or 34.8% of the total participants) and neutral (40 frequencies or 10.4% of the total respondents). To finish, only 3 frequencies or 0.8% of the total responses indicate an unawareness of reuse.

AWARENESS OF REUSE	f	%
Aware	134	34.8
Neutral	40	10.4
Totally Aware	208	54.0
Unaware	3	0.8
Total	385	100.0

G. Willingness to Purchase GEcoWrap

The table below illustrates that the majority of participants are extremely willing to purchase GEcoWrap, meant by 216 frequencies or 56.1% of the total responses. This is followed by willing (136 frequencies or 35.3% of the total participants), neutral (22 frequencies or 5.7% of the total respondents), and unwilling (10 frequencies or 2.6% of the total respondents). Lastly, only 1 frequency, or 0.3% of the total responses suggests an extreme unwillingness to purchase GEcoWrap.

WILLINGNESS TO PURCHASE GEcoWrap	f	%
Extremely Unwilling	1	0.3
Extremely Willing	216	56.1
Neutral	22	5.7
Unwilling	10	2.6
Willing	136	35.3
Total	385	100.0

H. Demographics vs. Consumption Frequency

The table below shows the testing of a significant difference between demographics and frequency of single-use plastic consumption. Therefore, the two variables are significantly different if the p-value is less than or equal to the α -level (0.05). However, the means are not significantly different if the p-value is larger than the α -level (0.05).

Since the p-values of age (0.300) and gender (0.870) are more than the 0.05 level of significance, thus, the researchers' decision failed to reject the null hypothesis with respect to the frequency of single-use plastic consumption. On the other hand, since the p-values of occupation (0.011) and barangay (0.000) are less than the 0.05 level of significance, thus, the researchers' decision is to reject the null hypothesis with respect to the frequency of single-use plastic consumption.

FREQUENCY OF SINGLE-USE PLASTIC CONSUMPTION VS.	P- VALUE	DECISION
Age	0.300	Fail to Reject Ho
Gender	0.870	Fail to Reject Ho
Occupation	0.011	Reject Ho
Barangay	0.000	Reject Ho

I. Demographics vs. Reuse Awareness

The table below shows the testing of a significant difference between demographics and awareness of reuse. Therefore, the two variables are significantly different if the p-value is less than or equal to the α -level (0.05). However, the means are not significantly different if the p-value is larger than the α -level (0.05).

Since the p-value of gender (0.262) is more than the 0.05 level of significance, thus, the researchers' decision failed to reject the null hypothesis with respect to the awareness of reuse. On the other hand, since the p-values of age (0.000), occupation (0.014), and barangay (0.000) are less than the 0.05 level of significance, thus, the researchers' decision is to reject the null hypothesis with respect to the awareness of reuse.

AWARENESS OF REUSE VS.	P-VALUE	DECISION
Age	0.000	Reject Ho
Gender	0.262	Fail to Reject Ho
Occupation	0.014	Reject Ho
Barangay	0.000	Reject Ho

J. Reuse Awareness vs. Willingness to Purchase

The table below shows the testing of a significant difference between awareness of reuse and willingness to purchase GEcoWrap. Therefore, the two variables are significantly different if the p-value is less than or equal to the α -level (0.05). However, the means are not significantly different if the p-value is larger than the α -level (0.05).

Since the p-value of willingness to purchase GEcoWrap (0.000) is less than the 0.05 level of significance, thus, the researchers' decision is to reject the null hypothesis with respect to the awareness of reuse.

AWARENESS OF REUSE VS.	P-VALUE	DECISION
WILLINGNESS TO PURCHASE GEcoWrap	0.000	Reject Ho

CONCLUSION

In conclusion, the results show that most participants always utilize single-use plastics. But, the majority of them are totally aware of reuse. Hence, the extreme willingness to purchase GEcoWrap. Moreover, no significant difference exists between the age of the participants and the level of frequency in terms of single-use plastic consumption. But on the contrary, a significant difference exists between the age of the participants and the level of awareness of the concept of reuse. Furthermore, there is a significant difference between the respondents' occupation and barangay and the frequency of consuming single-use plastics. Additionally, there is a significant difference exists between the occupation and barangay of the participants and the level of awareness of the concept of reuse. Contrarily, there is no significant difference between the gender identities and both single-use plastics consumption and reuse awareness. To end, there is a significant difference between the level of awareness of reuse and the level of willingness to purchase GEcoWrap.

In conclusion, QCitizens of District VI are ready to go on the greener side through sustainable practices. GEcoWrap will be an influential product and symbol of Quezon

City in supporting the 17 Sustainable Development Goals (United Nations, 2015) and reducing the prevalence of single-use plastics in the metropolis with regard to the respondents' background.

RECOMMENDATIONS

It is highly recommended by the researchers to collaborate with other investigators in terms of conducting durability tests or other laboratory examinations with DOST. This endeavor can lead to technical studies about the significant difference between existing wax wraps and that of LUHANTU.

Moreover, we encourage students to take part in finding more economical ways to eradicate the prevalence of single-use plastics in Filipino households by innovating and inventing products that can perform the same functions as single-use plastic.

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