LET'S EAT THE PROBLEM: CONSUMER ACCEPTANCE ON THE POTENTIALITY OF EDIBLE STRAWS AS ALTERNATIVE TO SINGLE-USE PLASTIC STRAWS IN COLEGIO DE SAN JUAN DE LETRAN BATAAN

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ABSTRACT

This study assessed the potential of edible straws as an environmentally sustainable alternative to single-use plastic straws in Colegio de San Juan de Letran Bataan. Specifically, it examined consumers' acceptance of edible straws in terms of taste, texture, and usability, as well as their perceptions of the product's environmental impact regarding production, disposal, decomposition, and sustainability. A quantitative descriptive research design utilizing pre- and post-surveys was employed. Data were collected from 213 respondents composed of elementary, junior high school, senior high school, college students, and employees of the institution. Descriptive statistics were used to analyze the gathered data. The findings revealed that respondents generally had a positive perception of edible straws, with usability receiving the highest rating among the consumer acceptance variables. Respondents also strongly agreed that edible straws have a positive environmental impact, particularly in reducing plastic waste through their biodegradable and eco-friendly characteristics. Although taste received the lowest mean among the evaluated attributes, it was still positively rated, suggesting that improvements in flavor may further increase consumer acceptance. Overall, the study concludes that edible straws are a viable and sustainable alternative to single-use plastic straws and have strong potential for wider adoption within educational institutions. The researchers recommend improving the product's taste and affordability while promoting its use through institutional sustainability initiatives.

INTRODUCTION

Plastic has become a serious hazard to the ecosystem. According to Roy and Morya (2022), the daily use of plastic products causes substantial environmental damage, such as air pollution caused by plastic incineration, pollution of the marine environment, and microplastics damaging internal organs of animals and indirectly harming humans by consuming seafood, meat, and other products contaminated with microplastics. As stated by Kumar et al. (2021), the existing practices of manufacture, design, consumption, and disposal of plastics have demonstrated crucial negative impacts on the planet on ecological imbalance, biodiversity, human health, climate change, sustainable livelihoods, cultural variety, and human rights. Research on plastic pollution reveals that the Philippines is the world's largest contributor to ocean plastic pollution, with an annual average of 3.30 kg per person (Corrales, 2023). The majority of the plastic waste found in the oceans includes plastic bags, plastic straws, food packaging, and single-use cutlery.

Furthermore, according to Sousa and Bastos (2021), during the COVID-19 pandemic, the public was advised to use drinking straws as a means of reducing virus transmission by avoiding contact with liquid-containing cups or containers. Thus, COVID-19 demanded and resulted in an unprecedented surge in the world's manufacture of all forms of single-use plastics, including drinking straws. As stated by Mulhern (2020), plastic straws are among the top ten most prevalent items found during global coastal litter clean-ups. According to the Annual International Coastal Clean-up Reports 1988-2017, plastic straws have continuously been rated high in terms of item count during clean-up events. In the United States alone, 500 million plastic straws are consumed every day, enough to load more than 127 school buses per day, or more than 46,400 annually. Therefore, it appears that single-use plastic straws contribute significantly to plastic pollution. And that various initiatives and alternatives must be implemented to reduce its consumption and contribute to the reduction of plastic pollution, especially in the Philippines.

In recent years, the world has become more aware of the environmental consequences of single-use plastics. As stated by H (2024), plastic straws, in particular, have drawn a lot of concern due to their widespread use and the devastation they bring to marine life. As a result, numerous alternatives have been proposed to the market, with edible straws emerging as one of the most innovative and environmentally friendly options. Edible straws are straws that you can consume after drinking your favorite beverage. These straws are created with natural ingredients such as rice, tapioca starch, wheat, and seaweed. Unlike plastic straws, which take hundreds of years to decompose, edible straws break down naturally or can be ingested, leaving no trace behind. Edible straws are considerably better than other alternatives, as paper straws are also harmful to the environment, considering that their production could lead to deforestation.

However, even though edible straw is already on the market, it is only available in certain places throughout the world and is not as widely utilized as it should be. There are still people who are unaware of edible straws, indicating that it should be introduced to more

consumers to be fully adopted as an alternative to plastic straws. This study assessed the potential of edible straws as an environmentally beneficial alternative to plastic straws. Despite the existing research studies indicating that developing an alternative to single-use plastic is viable and potentially significant, there is still a need to evaluate consumer perceptions of the potential of the edible straw. Therefore, this study looked into how potential consumers perceive the taste, texture, and usability of these edible straws in comparison to traditional plastic straws. And compare the environmental footprint of creating and disposing of edible straws to single-use plastic straws.

Furthermore, to provide the respondents a deliberate perspective on the quality of the edible straw, the researchers used edible rice straw for them to try. This edible straw is made from rice flour and tapioca starch, which offer various health benefits. Rice flour is a fantastic heart-healthy choice because it is low in fat and cholesterol. It's a great option for active lifestyles because it's also a great source of energy from carbohydrates. Tapioca starch, on the other hand, is easy to digest because it contains little FODMAPs (fermentable oligosaccharides, disaccharides, monosaccharides, and polyols), a type of carbohydrate that your gut has difficulty processing. It's also good for your heart because it's low in saturated fat. It has been discovered that cutting back on saturated fat can reduce your risk of heart disease.

Additionally, this kind of edible straw is preferable to other edible straws and is readily available on the market, particularly online. Unlike sugarcane straws, which are not edible, rice straws are completely edible and do not alter the flavor of the drink, unlike coffee bean straws. Furthermore, rice is widely cultivated worldwide, including in the Philippines. Rice straw is an abundant byproduct of rice cultivation that is produced in significant amounts every day. Compared to certain other kinds of edible straws that could come from fewer sources or more resource-intensive crops, this makes it an easily available and renewable resource. As a result of these aspects and other properties of rice straw, it is preferable to use it in this study to examine potential consumer perceptions of edible straws, as well as to be extensively used in the community.

Rationale

Plastic has become a prevalent issue to the ecosystem, causing major negative effects that take a heavy toll on the earth and its inhabitants. In response to the numerous environmental concerns associated with single-use plastics, this study examined the development of edible straws as an alternative for increased sustainability, efficiently tackling crucial ecological issues such as marine environment pollution, microplastic consumption, general ecological imbalance, etc., consequently evaluating consumer attitudes and perception regarding the product's taste, texture, functionality, and acceptability compared to the traditional plastic straws.

With the growing awareness of the toxicity and non-biodegradable nature of disposable plastic, consequently linking to health risks, consumers are actively looking for sustainable alternatives. This study explored edible straws that are convenient, feasible, and healthy for consumers and the environment as a whole. The study focused on consumer perception and acceptance regarding the concept of edible straws to ensure that it meets its expectations for functionality, taste, and overall satisfaction, subsequently creating a product that offers a healthy experience and an alternative option that is supported by the community

To thoroughly understand the differences and comparison between single-use plastic straws and the study's edible straws, the study further expounds the comparison by studying the differences in the environmental footprint of the production and disposal of both products. Understanding these differences will help define and identify the benefits and flaws of the product, further helping with alterations that refine the output.

The creation and widespread utilization of edible cutlery could lead to a reduction in the pollution caused by plastics. Numerous literatures indicate that developing an alternative to single-use plastic is feasible and may be highly beneficial. Edible cutlery is already on the market, however, it is only available in a few nations worldwide. Therefore, there is still a need to evaluate consumer perceptions of the potential of edible straws.

The primary objectives of this study consist of: (a) assessing the viability of edible straws as a sustainable solution, (b) evaluating consumer attitudes, and (c) contributing to the broader conversation on reducing plastic waste in the food and beverage industry. Ultimately, the study aims to help reduce plastic pollution by creating edible straws that have thoroughly understood customer preferences.
The specific objectives of the study include: (a) understanding how potential consumers perceive the taste, texture, and practicality of edible straws compared to traditional plastic straws while also (b) identifying the environmental footprint of producing and disposing of edible straws compared to single-use plastic straws. In conclusion, the study seeks to thoroughly study and understand consumer perceptions regarding the concept, practicality, and usability of edible straws as an alternative to plastic straws.

Review of Related Literature

Plastics are synthetic organic polymers of hydrocarbons that are modified to suit our purposes and performance via a variety of additives, plasticizers, colors, etc. These make them more robust, less biodegradable, and all the more toxic for human health. According to Pilapitiya and Ratnayake (2024), with the discovery of plastic, it was referred to as “the material with 1000 uses” due to it having versatile properties. Despite the advantages, the use of plastic has led to drastic environmental and human health issues. Degraded plastics can be as small as particles which can easily spread into the atmosphere, bodies of water, and the ground, which in turn negatively affect ecosystems and human health. In a study of Meijer et al. (2021), plastic accumulates largely in bodies of water, mainly from rivers. A large quantity of rivers are stem distributors of plastic waste to the ocean, leading to rivers having 80% of the plastic waste.

Moreover, according to a study of Chowdhury et al. (2021), although the popularity of metal cutlery is non-diminishing, their use and maintenance is resource demanding. Their inexpensive counterparts, i.e., plastic cutlery, are relatively undemanding and easy to use, but they end up fouling the environment as solid wastes. Plastic wastes in the environment are detrimental to the biota and end up in living organisms, oftentimes having harmful toxic effects. The detrimental effects of plastic pollution are evident worldwide via the quantum of disposables, containers, and packages that find their way into landfills that often spill over into the water bodies, damaging aquatic life and creating hazardous effects by integrating into the food chain. To avoid such harmful effects of plastics on the environment and provide a sustainable alternative to cutlery, ‘Edible Cutlery’ is a creative and futuristic approach to manufacturing food deliverables and storage.

Narvekar's study (2022) states that these plastic containers and cutlery, usually non-biodegradable, accumulate in the environment. To put the amount of waste in perspective, it is estimated that Indians use about 120 billion pieces of plastic cutlery per year. This number is about 40 billion in the United States. In the case of plastic cutlery, people usually avoid recycling as they are considered to be too small, too lightweight, and too contaminated.

To counter this, there are already campaigns like encouraging people to say no to plastic cutlery when taking food delivery. Also, many governments are banning the use of single-use plastic. Along with these initiatives, if we shift to edible containers and cutlery, the production of plastic waste will be reduced. Also, in the case of edible cutlery made up of flours, flours can be chosen such that they are made up of cereals which are very healthy but are not consumed normally. For example, the edible spoons sold by Bakely contain Jowar as an ingredient along with Rice and Wheat flour. According to the creator of this spoon, Narayan Peesapaty, he decided to include Jowar as it's a nutritious grain with multiple health benefits.

According to the study of Roy and Morya (2022), there is a need for plastic alternatives or better solutions for individuals. Plastic is the most serious threat to humanity and the natural world, causing cancer, soil erosion, ocean toxicity, and air pollution. Edible cutlery is a more sustainable alternative to single-use plastic cutlery such as straws, spoons, forks, and coffee stirrers. Additionally, it can be more economical when raw material production rises, assisting in the final product's ability to satisfy the financial requirements of the consumer. Edible cutlery offers biodegradability, eco-friendliness, edibility, and health benefits to address the problem. Edible cutlery contributes to achieving sustainable development goals. The product's traits and advantages can be improved and manufactured using the same method.

Subsequently, most people in the modern world are employed in this fast-paced era. They therefore find it extremely difficult to cook or clean the utensils they use regularly. Disposable plastic containers have become increasingly popular, however, their toxic and non-biodegradable nature has been linked to health risks. The majority of people in Pakistan use non-biodegradable cutlery, which takes hundreds of years to break down in the environment and contaminate landfills and waterways. In the study of Raza et al. (2022), edible cutlery made entirely of natural substances has been designed to prevent the use of non-biodegradable materials such as wheat flour, rice flour, and sorghum flour. This study's cutlery is delicious, healthful, and environmentally friendly. It reduces the usage of plastic, which releases chemically hazardous substances into the environment during disintegration. This indicates that producing edible cutlery is possible. This is an alternative to single-use plastic cutlery, such as spoons, forks, and bowls. In this way, single-use plastic cutlery is used.

Also in the Philippines, some concerned individuals have already come up with the idea of making alternatives to plastic. A group of aspiring engineers from the Technological Institute of the Philippines (T.I.P.) Quezon City came up with the idea of making cutlery "edible", to offer a viable solution against plastic pollution. These students developed a research paper about turning flour into edible utensils that may potentially replace single-use plastic cutlery.

As reported by Malipot (2024), the team leader, fourth-year civil engineering student Stanley del Rosario, stated that after learning about plastic waste's disastrous effects on the environment, the group decided to try to "reduce plastic waste." He pointed out that pollution is connected to many illnesses, human fatalities, and marine biodiversity. "With a simple product like 'edible cutleries,' we believe it can be a sustainable solution to lessen our need for single-use plastics," del Rosario said. "It won't cause a problem to the community, especially for marine animals, because even if they ingest it, it is safe," he added. Increasing public awareness of the detrimental effects of plastic pollution is one of their objectives in researching the subject. After two months of work, the team submitted the proposal to compete for the 2023 Swiss Innovation Prize in September. In the "Sustainability" category of the 2023 Swiss Innovation Prize, the project came in third. After reviewing 150 entries from professionals and students across the country, a team of six judges ranked it in the top three for the "Sustainability" category.

One article from ABS-CBN News (2024) highlighted a company that wants to gradually lessen the amount of single-use plastic used in the Philippines. Adrian Mendoza started PH Sustainable, which has been in talks with local government agencies, the Department of Environment and Natural Resources (DENR), and business owners to provide edible straws, so Filipinos can progressively stop using single-use plastic products. The straws are produced from rice flour and tapioca starch, can tolerate hot and cold conditions, and have a two-year shelf life. They also come in various sizes and colors to go with drinks like smoothies and milk teas. If PH Sustainable is successful in bringing edible straws to various parts of the country, the company aims to expand its offerings to include cutlery, plates, and containers.

Additionally, as reported by Deña (2021), EhKape, a café managed by ekolife OFW Marketing Cooperative, has been using biodegradable straws since 2017. The straw, which is made of 70% rice and 30% tapioca, has no unique taste and hence does not affect the flavors of the drinks. In an interview, customers of the said café expressed their amazement at the edible straw, stating that it does not affect the overall taste of the beverage and can even stand for a long time on the drink. This is not the first time that eateries in Laguna province have used natural biodegradable materials. Last year, a pizza restaurant in Pila municipality went viral after employing handcrafted pizza boxes made of pandan leaves woven by craftsmen in nearby Cavinti.

In the study of Ongthongkam (2021), it is stated that the growing popularity of the "going green" idea has led to long-term effects on people's attitudes and perceptions. There are many factors and perceptions of the thinking of the customers to know whether they are willing to change or adapt their behavior toward the environmental issue or not. The willingness to change or agree to use a new product is extremely difficult to do and takes time because people tend to get used to the old attitude. Therefore, they need enough information about the benefits of change. Moreover, the cost of an organic and biodegradable product is more expensive than a plastic product since the ingredients are more expensive and the manufacturing procedure. The customers need to understand and be willing to pay more to buy this type of product.

These existing studies indicate that developing an alternative to single-use plastic is feasible and may be highly beneficial. Edible cutlery is already on the market, however, it is only available in a few nations worldwide. The creation and widespread utilization of edible cutlery could lead to a reduction in the pollution caused by plastics. The researchers utilized edible straw that is made from rice flour and tapioca starch. These ingredients do not affect the flavor of the beverage, making it an ideal alternative to plastic straws.

Overall, the objective of this research is to develop a viable alternative to single-use plastic straws to contribute to the reduction of plastic pollution. However, with the existing possible options for sustainable eco-friendly alternatives to plastic straws, people still tend to opt for plastic straws or sip lids. This causes a dilemma for the production of these alternatives, as it has not been fully widespread and adapted.

Statement of the Problem

The widespread use of single-use plastic straws contributes significantly to environmental pollution and poses a threat to marine life. This study explored the potential of edible straws as an eco-friendly alternative to plastic straws. Therefore, the researchers seek to answer the following questions:

1. Consumer Acceptance: How do potential consumers perceive the taste, texture, and usability of these edible straws compared to traditional plastic straws?

2. Environmental Impact: What is the environmental footprint of producing, disposing, decomposing, and the sustainability of edible straws?

3. What would be the possible interventions that could be implemented to help increase the usage of edible straws as alternatives to single-use plastic straws?

General Objectives

The researchers' main objective is to assess the viability of edible straws as a sustainable solution, evaluate consumer attitudes, and contribute to the broader conversation on reducing plastic waste in the food and beverage industry, particularly in Colegio de San Juan de Letran Bataan.

Specific Objectives

The researchers seek to identify how potential consumers perceive the taste, texture, and usability of these edible straws compared to traditional plastic straws. Additionally, this study aims to determine the environmental footprint of producing and disposing of edible straws versus single-use plastic straws.

Hypothesis

In this study, the researchers aimed to assess the viability of edible straws as a sustainable solution, evaluate consumer attitudes, and contribute to the broader conversation on reducing plastic waste in the food and beverage industry. With this, the researchers observed the following:

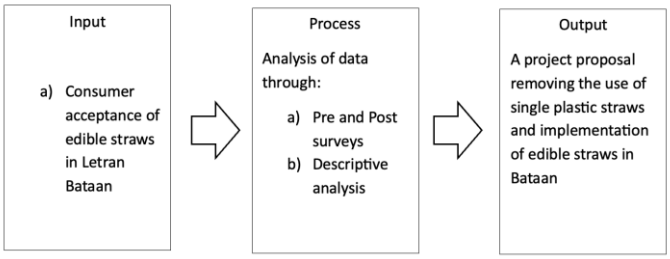
H0: There is no relationship between the quality of edible straw, such as taste, texture, and usability, and the standards and acceptance of potential consumers
Ha: There is a relationship between the quality of edible straw, such as taste, texture, and usability, and the standards and acceptance of potential consumers

Scope and Limitations

This study focused specifically on exploring the perceptions of potential consumers regarding the use of edible straws as a sustainable alternative to traditional plastic straws. It participates in the wider conversation about strategies for reducing plastic waste in the food and beverage industry. The research is confined to the Colegio de San Juan de Letran Bataan community, examining their acceptance and willingness to adopt edible straws instead of conventional plastic options.

By evaluating consumer perceptions, the study aims to contribute valuable insights into the acceptance of environmentally friendly spractices within this specific demographic. This study only evaluated the perception of potential consumers on edible straws as a sustainable alternative. And engage in the broader discourse on mitigating plastic waste within the food and beverage sector. This study only covers the acceptance of the Colegio de San Juan de Letran Bataan community by using edible straws instead of plastic straws.

Conceptual Framework



The study will utilize the Input-Process-Output (IPO) model as its conceptual framework. The IPO model represents all the factors that make up a process. According to Canonizado (2021), the IPO diagram includes all the materials and information required in the process, the specific details of the process itself, and the descriptions of all products and by-products anchored on the process that took place. One of the variables of the study is the consumer acceptance of edible straws in Letran Bataan. For the population of Letran Bataan's students and employees, find out if edible straws are accepted in this institution; all the information will be gathered by conducting pre- and post-surveys and examinations through descriptive analysis. The researchers constructed the model depicted above by replacing the variables from this study with the IPO model.

Theoretical Framework

The theories that are utilized in this study are the Theory of Planned Behavior, the LOHAS Theory, and the Health Belief model. As stated by Denish et al. (2024), the Theory of Planned Behavior suggests that human behavior is determined by behavioral intentions, which are influenced by attitudes, subjective norms, and perceived behavioral control. This theory proposes that individual behavior is driven by behavioral intentions. In the context of edible straws, the views that consumers have towards health and sustainability can have a significant impact on whether or not they intend to purchase these items. According to research, customers who place a high priority on environmental friendliness are more inclined to accept edible straws, particularly if they consider edible straws as a realistic alternative to standard plastic straws.

Additionally, The LOHAS (Lifestyles of Health and Sustainability) Theory, according to Denish et al. (2024), identifies the segment of customers that is essential in the acceptance of edible straws. Studies indicate that social awareness and subjective standards considerably affect the purchasing decisions of these consumers. They often exhibit an increased willingness to adopt products when they see them as

authentic and aligned with their values. This demographic is motivated by individual beliefs about health and sustainability, as well as the influence of their social networks. This significantly pertains to consumers' perceptions of edible straws, since they are more inclined to favor ecologically concerned items like edible straws.

Lastly, according to Priya and Alur (2024), with the Health Belief Model, researchers can explore how health-conscious consumers use nutritional information panel labels to purchase food products, with a particular emphasis on the ethical evaluation dimension. It seeks to study how ethical factors influence the decision-making process of health-conscious consumers. Concerning edible straws, customers may be more likely to embrace them if they perceive that the use of such items helps favorably to both their health. If customers are aware of the health advantages that are linked with the components that make up edible straws, they may be more inclined to choose these straws over conventional alternatives. Because of the increased knowledge of the problems involved with plastic trash, customers may be more likely to seek out alternatives that are healthier and more sustainable, which would be the edible straw.

Research Design

In this study, the researchers utilized the evaluative method as the research design. As stated by Maze (2023), evaluative research is a research method that involves evaluating a product or concept and gathering data to help enhance your solution. It provides numerous advantages, including determining if a product works as planned and identifying opportunities for improvement. In an evaluative method, it usually entails gathering data before and after an intervention and using statistical analysis to determine whether changes observed may be attributed to the intervention. With this, the researchers were able to measure the potential consumer's perspective to evaluate the effectiveness or areas for improvement of the proposed edible straw as an alternative to single-use plastic straws. Using the evaluative method, it enabled
this study to have a deeper and comprehensive understanding regarding the acceptance of the Letran-Bataan community on the edible straw.

Population and Sample

This study primarily focused on the Letran-Bataan community. The research respondents for this study included the students and employees of Colegio de San Juan de Letran-Bataan, regardless of age and gender. This population was considered the potential consumers of the proposed edible straw, as it might have been adopted by the said community. By this, the researchers utilized stratified sampling to select the respondents. According to an article written by Thomas (2020), stratified sampling is a probability sampling technique that splits a population into uniform subpopulations known as strata, allowing researchers to estimate statistical metrics for each subpopulation. Every member of the population being researched was expected to belong to just one stratum. When a population's features are diverse, researchers use stratified sampling to guarantee that each trait is correctly represented in the sample.

Stratified sampling improved the study's generalizability and validity, while also preventing research biases. The Colegio has a total population of 1,015, including students and employees. The researchers were tasked with conducting a survey that required responses from 279 individuals, the sample size was determined using RaoSoft, a tool often used to calculate appropriate sample sizes based on population parameters, desired confidence levels, and margins of error. To enhance the precision of the sample, the researchers aimed to survey individuals from five predefined strata within the Colegio. Each stratum represented a distinct subgroup, and an equal number of 56 respondents was selected from each to provide balanced representation across all groups. This allowed the researchers to effectively collect sufficient and valid data that represented the preferences of the students and employees in the Colegio de San Juan de Letran-Bataan institution regarding the edible straw as an alternative to plastic straws.

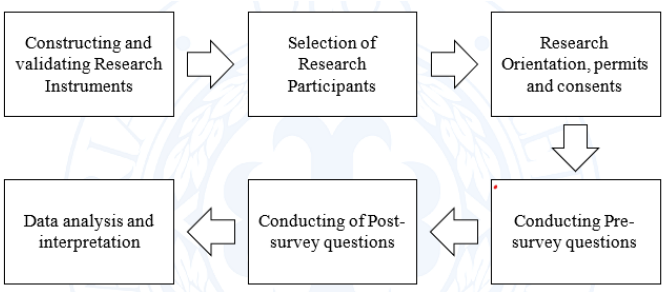
Research Instrument

The researchers gathered data through surveying to understand the consumers' preferences. The questions that were included in the survey discussed the environmental impact of edible straws and the consumers' acceptance of the said product. As stated by Mazhar et al. (2021), this instrument is efficient for getting information from many people. Surveys were also appropriate for getting information from people who are spread over a wide area and who are not easy to contact face-to-face. As with all data collection methods, the survey in this study adhered to ethical and moral codes of conduct.

Furthermore, the researchers utilized a Likert scale in the survey to assess the preferences and opinions of the respondents. The respondents assessed their level of agreement or disagreement with a statement on a scale. Following the evaluative method, the researchers conducted a pre- and post-survey. By conducting pre-surveys before the implementation of edible straws, the researchers gained valuable insights regarding the respondents' preference for edible straws as an alternative to plastic straws. On the other hand, in the post-survey phase, the researchers handed out edible straws to the respondents to enhance their perception of the product, allowing them to experience its qualities such as its taste, texture, and usability, this provided essential context for evaluating the effectiveness of the straw. By comparing the post-intervention outcomes to the data collected during the pre-survey, the researchers discovered whether the intervention had produced changes.

In addition, the researcher used a validated self-made survey questionnaire, which was first carried out on a pilot test to make sure that it would successfully bring out the findings that the study needed from the respondents.

Data Gathering Procedure



The illustration above is the data-gathering procedure that was followed by the researchers for this study. Firstly, the creation and validation of research instruments, which included the development of

surveys. Once the instruments were set and validated, the researchers selected respective respondents from Letran Bataan's employees and students who are currently working and studying inside the institution. The research orientation, permits, and consent were given to the respondents in advance to ensure they were willing to be surveyed and that their responses would be indicated in the study, while all respondents remained anonymous.

The next step involved conducting pre-research surveys before the respondents tested the cutlery, and post-research surveys after they tried it. Following the data collection, descriptive statistics were used in data analysis and interpretation regarding the use of edible straws in replace of single-use plastic straws.

Data Analysis

The researchers utilized descriptive statistics for analyzing data in this study. According to Hayes (2024), descriptive analysis is a brief representation of data that describes and explains the highlights of a given data set measured into three categories: measures of central tendency, measures of variability, and frequency distribution. In this study, this is used to observe trends or patterns that are identified in analyzing data based on the data of the pre- and post-survey. The use of pre- and post-surveys helped us test the respondents' thoughts on edible straws before and after examining the product. Moreover, descriptive analysis helps summarize the data to highlight meaningful information for easier interpretation. Thus, this enables the researchers to analyze important data regarding the potential consumer's perception of the edible straw as an alternative to plastic straws.

Ethical Consideration

The study was reviewed and approved by the Office of Research and Publication at Colegio de San Juan de Letran Bataan to ensure compliance with institutional ethical standards.

Informed Consent:

- Respondents were informed of the study's aims, methods, potential benefits, and risks.
- Informed consent was obtained in writing before participation, with both the participant and researcher signing and dating the form.
- Respondents received a copy of the consent form.

Privacy and Confidentiality:

- Personal data were anonymized using code numbers.
- A separate, password-protected file linked study codes to respondents' identities, accessible only to researchers.
- All data were stored securely, and sensitive information was encoded in a password-protected Excel file. Physical data forms were kept in a locked cabinet.

Data Protection:

- Researchers complied with the Data Privacy Act of 2012.
- Data is stored on encrypted, secure cloud servers and is accessible only to the researchers.
- Data will be retained for five years for potential follow-up studies, after which it will be securely deleted. If shared for collaboration, it will be anonymized to protect participant identities.

Risk Assessment:

- This is a minimal-risk study, with no direct benefits for respondents but potential indirect benefits through the publication of study results in LINANG Publications, which may contribute to future research on the topic.

RESULTS AND DISCUSSION

A total of 213 respondents were surveyed by the researchers for this study. Although this is less than the supposedly desired number of responses, the researchers had to take ethical considerations into account, as some respondents declined to participate for personal reasons. Accordingly, the researchers used a 90% confidence interval to determine this total population. This achieves a balance between practicality and statistical rigor, enabling the researchers to work efficiently with the practically feasible sample size. Applying a 90% confidence level enables the strategy to be optimized to meet real-world limitations without sacrificing the study's validity. Furthermore, this study's respondents were 17 employees, 31 college students, 55 elementary students, 55 junior high school students, and 55 senior high school students.

Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Employee	17	8.0	8.0	8.0
	Student (College)	31	14.6	14.6	22.5
	Student (Elementary)	55	25.8	25.8	48.4
	Student (Junior High School)	55	25.8	25.8	74.2
	Student (Senior High School)	55	25.8	25.8	100.0
	Total	213	100.0	100.0	

SOP 1. Consumer Acceptance

As shown in Table 1 below, the acceptance of the consumer on the edible straw's taste, texture, and usability is calculated. The edible straw had an overall positive perception, with the highest rating having a mean of 4.0864. Usability scored the highest among the three variables, suggesting respondents rated it the most positively. While Taste Acceptance scored the lowest but still above neutral, suggesting a generally favorable perception. Variability is moderate for all variables, with standard deviations below 1, indicating that most respondents' responses clustered around the mean.

Table 1

Report

	Taste	Texture	Usability	Over_all_Percetion
Mean	3.5906	3.6329	3.8291	4.0864
N	213	213	213	213
Std. Deviation	.81421	.90086	.87227	.82716

These statistical results highlighted that respondents generally perceived the edible straws favorably in terms of Taste, Texture, and Usability, with Usability being the standout attribute. According to Ha (2023), rice straws, which are also used in this study, are gaining acceptance among like-minded individuals and producers as the best new single-use plastic alternative due to its excellent quality and usability. These edible straws decompose quickly and have a wide range of applications, working well in both hot and cold drinks. Because of its versatile design, these plasticless straws can be used for any of your favorite drinks, including juice, smoothies, coffee, and homemade cocktails. It can also last up to 2 hours for cold drinks and 1 hour for hot drinks, giving consumers enough time to enjoy their drink. This makes

the straw highly functional and useful for drinking beverages. The edible straw's usability is one feature that influences consumer perceptions positively.

Furthermore, rice straws are edible and safe to consume. Rice straws are created from two major ingredients: rice flour and tapioca starch, making them completely natural and safe for human consumption. This is associated with the Health Belief Model, which, according to Priya and Alur (2024), allows researchers to investigate how health-conscious consumers use nutritional information labels to purchase food products, with a focus on the ethical evaluation dimension. It looks into how customers who are concerned about their health make decisions based on ethical considerations. Customers are more likely to adopt edible straws if they believe they benefit or would not harm their health. Customers who are aware of the health benefits associated with the ingredients that make up edible straws may be more likely to prefer these straws over traditional ones. Furthermore, as individuals become more aware of the difficulties associated with plastic waste, they may be more willing to seek out healthier and more sustainable alternatives, such as edible straws. Also, among all the attributes, the edible straw's usability has the highest average, as it encompasses functionality, edibility, and health benefits—key factors influencing the perceptions of potential consumers.

SOP 2. Environmental Impact

As illustrated in Table 2 below, the perspective of the potential consumers about the edible straw's environmental impact is calculated. The high means across all variables indicate that respondents perceive the edible straw as environmentally friendly, with particularly strong ratings for production, disposal, and overall environmental impact. While sustainability was still rated positively, it had the lowest mean (4.1491) among the variables. The relatively low standard deviations suggested a high degree of agreement among respondents, particularly regarding the overall environmental impact. Overall, the respondents strongly agree that the environmental impact of edible straws is positive, which likely supports the environmental benefits of switching from plastic to edible straws. This is particularly due to its significant environmental impact, particularly in lowering plastic pollution.

Table 2

Report

	Production	Disposal	Decomposition	Sustainability	Environmental_Impact
Mean	4.2031	4.2019	4.1995	4.1491	4.2934
N	213	213	213	213	213
Std. Deviation	.89424	.83006	.83488	.85666	.81129

As stated by Emily (20224), the greatest significant advantage of edible straws is their zero-waste nature. Unlike plastic straws, which take hundreds of years to degrade, edible straws decompose naturally or can be consumed without leaving any trace. This makes them an excellent alternative for ecologically aware people and businesses. The product's natural ingredients allow for plasticless production and decomposition, which helps to reduce the usage of plastics significantly. Furthermore, edible straws are completely compostable for individuals who don't want to consume them. They break down swiftly in composting conditions, restoring important nutrients to the soil while leaving no toxic residue. Edible straw may not harm not only land animals but also aquatic life.
According to an ABS-CBN News (2021) report, a company known as Ph Sustainable is working to reduce the usage of single-use plastic in the Philippines one step at a time by introducing edible straws. The company's founder has been in talks with business owners, the Department of Environment and Natural Resources (DENR), and local government units about producing edible straws so that Filipinos can progressively transition toward eliminating single-use plastic products. The founder noted that the existing problem is already massive and that if we continue to manufacture non-sustainable packaging, our waste problem will only worsen and resources will be wasted, causing further imbalance in the ecosystem and reducing human productivity. This demonstrates the need for alternatives to single-use plastic straws. That is why they have started bringing edible straws to the market, which is regarded as the most sustainable alternative to plastic straws due to its natural composition.

As a result, customers are more likely to support and utilize edible straws due to their environmental benefits. This reflects the LOHAS (Lifestyles of Health and Sustainability) Theory, which, according to Denish et al. (2024), defines the customer segment that is critical to edible straw acceptance. According to the study, social awareness and subjective standards have a significant influence on consumers' purchase decisions. They are more likely to adopt things that they believe are authentic and linked with their values. These types of consumers are influenced by personal health and sustainability values, as well as the influence of their social networks. This has a huge impact on consumers' opinions of edible straws, as they are more likely to prefer environmentally friendly products such as edible straws. Given that edible straws can help reduce plastic pollution and are an effective alternative, consumers, particularly those concerned about the environment, are likely to support and purchase this intervention. The respondents may therefore consider buying this product since they believe that edible straws are environmentally friendly and sustainable. Furthermore, given that edible straw is functional and efficient, it would be highly effective for customers to reap its environmental benefits.

CONCLUSION

The main goal of the study was to draw well-founded findings and offer thorough responses to the research questions based on the thorough examination of the data gathered. The focal point of the study was to delve into the perceptions of Colegio de San Juan de Letran's community regarding edible straws, concerning the edible straw's quality (Taste, Texture, Usability), and environmental impact (Production, Disposal, Decomposing, Sustainability). The findings showed overwhelmingly positive responses for every component, highlighting edible straws' potential as a sustainable plastic substitute. These conclusions and statistics were derived from the valuable insights shared by the (213) respondents who were involved with the study and its surveys. Based on these insights, the product will be improved, and its acceptance will depend on the community.

The findings of the survey determined that, when it came to Taste Acceptance, respondents provided an average rating of 3.5906, indicating a slightly positive reaction towards the provided edible straw's taste. According to these measurements, the flavor of the provided edible straws is acceptable and tolerable, but it may still be improved to further improve the straws' utility and enjoyment. The variable bears a standard deviation of 0.81421 which suggests responses are fairly consistent, with most respondents sharing similar views on this attribute. Having the lowest score among all variables indicates that improving the flavor profile of edible straws is a major aspect if it's going to be adopted by the community.

In terms of the straw's Texture, the variable received an average rating of 3.6329, wherein it attained a slightly higher score than the variable Taste Acceptance. This suggests that the study's respondents thought its texture was acceptable, or perhaps favorable. Furthermore, the variable has a standard deviation of 0.90086, indicating the responses were slightly more varied compared to Taste Acceptance. The statistics above indicate that while a greater number of people enjoyed the texture, there were more varying preferences.

Of the three consumer acceptance factors, edibility received the highest average rating of 3.8291. This suggests respondents viewed the straw's edibility as a standout attribute with positive perceptions. The standard deviation of 0.87227 implies a moderate spread in responses, such as that of the variable Texture. The view that the fundamental component of edibility was accomplished was supported by this positive assessment.

The high mean across all variables suggests that respondents consider edible straw to be environmentally favorable, with particularly high scores for production, disposal, and overall environmental impact. Although sustainability continues to receive favorable evaluations, it has the lowest mean (4.1491) of all the factors. A high level of agreement among respondents, especially concerning the overall environmental impact, was indicated by the comparatively low standard deviations. The respondents generally strongly agree that edible straws have a beneficial environmental impact, which probably supports the idea that using edible straws instead of plastic will have a favorable environmental impact. This is especially because it has a big impact on the environment, especially when it comes to reducing the amount of plastic waste.

In summary, the Colegio de San Juan de Letran Bataan community finds edible straws to be a highly acceptable and adaptable alternative to single-use plastic straws. Among the edible straw's taste, texture, and usability, respondents favored its usefulness, which encompasses functionality, edibility, and health benefits, all of which are important considerations in influencing potential consumers' opinions. Furthermore, potential customers believe that edible straws would be a significant environmental benefit, particularly because they are produced without the use of plastic. Edible straws may break down naturally or can be eaten without leaving any trace, in contrast to plastic straws which take hundreds of years to decompose. They are therefore a great alternative to plastic straws. The use of plastics is greatly decreased because of the product's natural constituents, which enable plasticless production and decomposition. Given that edible straw is useful and efficient, it would be highly effective for users to bring out its environmental benefits. Potential customers' perceptions of edible straws were positively impacted by its quality and environmental impact, making them a widely accepted alternative to plastic straws.

RECOMMENDATION

Based on the study's findings, the researchers suggest various recommendations. Regarding the first SOP, which addressed customer acceptance of the edible straw's taste, texture, and usability, respondents preferred its usability the highest, while they liked its taste the least. With this, the researchers suggest improving the ingredients of the edible straws. Moreover, upon the data gathering, the researchers identified suggestions from the respondents about making other flavors, making the straw a bit softer, and creating other sizes of straws applicable to other types of drinks such as milk teas with boba pearls. Considering these suggestions is very essential to ensure that the potential consumer's expectations and wants are met so that they would support and purchase it more.

Furthermore, for the second SOP, when it comes to customer perceptions of the edible straw's environmental impact in comparison to plastic straws, respondents favor its production. This is particularly significant given that edible straw is made using organic materials. Therefore, it is better to make more edible straws so that other consumers may also be aware of it. However, to see the increase in the use of edible straws and to motivate businesses to use edible straws, it is necessary to think about how to make edible straws cheaper. The researchers suggest looking for any other ingredients that could make the edible straw since it can be made from locally sourced raw materials by local producers, such that the price realized for them will be friendly for even local businesses. Food and beverage businesses would be a great help in promoting the usage of edible straws.

Furthermore, for the last SOP, determining feasible interventions that may be conducted to increase the use of edible straws, the researchers have developed a project proposal. This would primarily involve developing a plastic-strawless institution, where consumers may purchase an edible straw if they prefer to use one for their drinks. This aims to reduce the usage of single-use plastic straws while encouraging the widespread adoption of edible straws as an alternative.

For future researchers, this study recommends widening the scope of the population that would be introduced with edible straw. This is mainly to allow other individuals to know about the edible straw and its impacts on the environment. With this, the edible straw would be widely known and used as an alternative to single-use plastic. Moreover, for the government and concerned individuals, the use of edible straws can also be promoted by demonstrating the usefulness of an impact a business can have by phasing out plastic straw usage. By increasing the availability of edible straws and familiarizing the public with the benefits of the product type, they can become widely used, offering a worthwhile and protective benefit for businesses that aim to reduce the detrimental effects they produce on the world's environment.

Overall, the researchers suggest widely introducing and adapting the edible straw to effectively bring out its environmental impact and improve the edible straw's ingredients and quality.

Proposal of "Eat the Problem": An Eco-friendly Edible Straw Transition in the Colegio

This proposal outlines a project to advance Colegio de San Juan de Letran Bataan's commitment to sustainability and environmental stewardship by adapting the use of edible straws as a replacement for plastic straws. Specifically, it is grounded in the findings of a study demonstrating the Letran Bataan community's acceptance of edible straws as a sustainable alternative to single-use plastic straws. Finally, it will act as a reference point for Letran and its community regarding advances toward a much more sustainable future with the utilization of eco-friendly, reliable, and safe edible straws.

I. Purpose

"Eat the Problem" is a project that aims to incorporate edible straws into the Colegio's canteen, consequently halting the use of plastic straws. As the main source of food and refreshments for a majority of the Colegio community, implementing the project "Eat the Problem" will greatly reduce the plastic use of the school. Furthermore, with the widespread use and knowledge of edible straws in the Letran Bataan community,

the product could potentially reach larger markets and communities that all share the same mission of convenient eating and drinking without harming the environment. This project helps mitigate the issues caused by plastics in the environment and create a pro-green reputation for the Colegio.

II. Overview

The objective of this initiative is to replace plastic straws in the school canteen with edible straws. Addressing the urgent problem of plastic waste, the project is in line with the school's dedication to sustainability and environmental responsibility. In addition to encouraging eco-conscious behaviors among students and staff, we hope to lessen the school community's environmental impact by substituting edible straws for plastic ones. This initiative will promote an environmentally conscious culture by acting as an example for other organizations looking to implement sustainable practices. Knowledge about eco-friendly products, such as edible straw, can be advantageous to the community, as it gives them an upper hand in adjusting to potential environmental and economic changes in the future. Through this project, the Letran community is offered to adopt a healthier and much more sustainable option of eco-friendly edible straws. These products are produced in masses and can easily be found and bought online. These edible straws are utilized by particular restaurants and certain communities, wherein their popularity and overall use can be heightened through the school's advances in adapting the aforementioned product.

III. Nature of Participants and Geographical Location

The participants of the study are composed of the entirety of Letran Bataan's community, including students from elementary, high school, senior high school, and college, and employees from all different departments in the Colegio. Including various participants with numerous different perspectives helped the researchers effectively gather honest and diverse views from the school's community. The location wherein this project shall take place is within the Colegio's canteen, where most of the purchases of food and drinks occur. This is the place where most vendors work and reside, thus it will be more successful if as many as possible are reached. This adaptation shall be introduced to the community to efficiently adapt to the usage of edible straws or no straws at all.

IV. Project Outline

The researchers will use a structured plan for this project. Different edible straw brands and products will be precisely evaluated in the first phase, and the most cost-effective and suitable option for the community will then be identified. Moreover, the researchers will also help find reliable suppliers for the school. The second phase will prioritize the preparation of converting from plastic straws to edible straws. This phase will prominently display educational signs and posters; they will thoroughly educate students, staff, and parents about the upcoming shift to emphasize the ecological advantages of edible straws. Once ready, plastic straws will be completely phased out, and edible straws will be introduced. Following the use of edible straws, the school canteen will stop giving away free plastic straws of any sort to customers. Instead, those who prefer to use a straw will have to buy an edible straw straight from the seller. This strategy helps canteen vendors, it promotes choices that are good for the environment, and it makes sure the initiative will continue to be financially viable.

V. Monitoring and Evaluation

The researchers and the project coordinator will closely monitor the project's progress. They will ensure that informal posters and signage are put up in the canteen to properly inform customers of the benefits and the purpose of the transition from plastic to edible straws. The researchers will monitor the purchases of these straws and ask students about their experiences regarding the edible straw. Once the researchers have garnered and documented evident positivity regarding students' thoughts on the straw and the heightening of edible straw sales, the project will be considered a success.

VI. Inputs

The program will require assistance from a project coordinator, who will oversee the integration and evaluate the project's progress. Additionally, the cooperation of all vendors is vital for the project to effectively take place, wherein they will serve beverages and drinks without straws, offering the customer the option to buy an edible straw. For the material equipment, the project will require the edible straws themselves that will be provided to the vendors, consequently helping them familiarize themselves with the product without having to dispense money. Along with the edible straws should come the packaging that keeps it clean and hygienic, and a proper disposal bin to dispose of the edible straw and its packaging waste. Moreover, signage and posters can help spread awareness to the students regarding the school's change from plastic straws to edible straws, informing them of its benefits to nature and themselves.

VII. Constraints, Limitations and Hazards

There can be several difficulties that must be overcome to carry out this program. First and foremost is the cost of the edible straws, wherein these purchases may cost more than the traditional single-use plastic straws. Due to the price of edible straws, the canteen may choose to sell the edible straws rather than hand them out for every purchase, consequently inconveniencing some. Furthermore, finding a supplier who can provide edible straws for the entire school regularly might pose logistical challenges. This issue makes it difficult to begin the adaptation, solely because of the lack of resources. And of course, the sudden change in produce may negatively impact students' experience, as not everyone is familiar with the texture and taste of edible straws.

VIII. Budgetary Plan

This budget plan is just an estimate of the cost of the materials and equipment to be used for this project.

Domain/Activity	Materials	Unit	Price
Implementation of Edible Straws in the Colegio's Canteen	Edible Straws	300 pcs	Php 720
	Posters/Signages	10 pcs	Provided by theResearchers
Estimated Total:			*Php 720 (depends on the consumption)*

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