SENSORY ACCEPTABILITY OF SQUASH (*Cucurbita maxima*) MUNCHKIN AS BISCUIT SUBSTITUTE: TECHNO-GUIDE

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ABSTRACT

This study explored the sensory acceptability of squash (*Cucurbita maxima*) munchkin as biscuit substitute, aiming to promote innovative, health-oriented, and sustainable snack options for community livelihood development. Using an experimental research design, four formulations were developed with varying amounts of squash: F0 (control, 0g), F1 (50g), F2 (100g), and F3 (150g). Each formulation combined squash with biscuit crumbs, sugar, condensed milk, and desiccated coconut. A total of 75 respondents composed of selected consumers and food professionals evaluated the munchkins using a 9-point Hedonic Scale and a 5-point Likert scale, assessing color, taste, odor, and texture. Results showed that Formulation 3 (F3), with 150g of squash, received the highest acceptability rating, described as “Acceptable” with a grand mean of 3.79. Analysis of Variance (ANOVA) revealed significant differences in sensory attributes, particularly in flavor and texture. Food experts demonstrated a more critical perception across all attributes, while consumers showed preference trends aligned with the enhanced flavor and moistness contributed by increased squash content. The findings support F3 as the most favorable formulation for product development. As a result, the study recommends F3 for community-based production and inclusion in a Techno Guide, promoting the use of underutilized vegetables like squash in creating nutritious and appealing snack alternatives.

Keywords: Squash Munchkin, Sensory Evaluation, Biscuit Substitute, Consumer Preference, Techno Guide

APPROVAL SHEET

This research paper entitled "**SENSORY ACCEPTABILITY OF SQUASH (*Cucurbita maxima*) MUNCHKIN AS BISCUIT SUBSTITUTE: TECHNO-GUIDE"** prepared and submitted by **Johanna Rica Rosales, Bernadeth Lantaca, Cathleen Jade Enerio, Lovelia Modejar, Tricia Mae Inso, and Daidin Tamosa** in partial fulfillment of the requirements for the subject HPC 317-RESEARCH IN HOSPITALITY for the degree of BACHELOR OF SCIENCE IN HOPITALITY MANAGEMENT has been examined and recommended for acceptance for Oral Examination.

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- The Researchers

DEDICATION

This research proposal is dedicated to the researcher's family, as we could not have achieved this milestone without their unwavering support. Their encouragement, motivation, and belief in our capabilities have been instrumental throughout this journey. Their love and guidance have enabled us to grow not only as individuals but also as dedicated researchers, for which we are deeply grateful.

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- ***Tricia Mae Inso***

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THE PROBLEM AND ITS BACKGROUND

INTRODUCTION

Rationale of the Study

The rising consumer preference for healthier snack foods has caused a major change in the food industry towards the creation of new products that focus more on the nutritional aspect of the food without compromising the taste. The conventional snacks, especially the sweet and convenient ones, are usually rich in refined sugar and unhealthy fats, which lead to health problems, including obesity and diabetes (Micha et al., 2020). In this regard, it is necessary to consider using other ingredients that can improve the nutritional value of snacks. An example of such an ingredient is squash (Cucurbita maxima), which is high in vitamins, minerals, and dietary fiber and has the potential to replace conventional ingredients in snack formulations.

Munchkin is a snack that is widely consumed, and it is usually prepared using traditional biscuit ingredients, which might not be in tandem with the emerging health-conscious consumer trends. Although Munchkin is consumed due to its flavor and convenience, its traditional composition usually does not contain the nutritional value that contemporary consumers demand.

Despite Munchkin's popularity among younger consumers, few studies have been done to modify this snack and include healthier ingredients such as squash. The major part of the already existing research is devoted to the sensory

qualities and consumer acceptance of traditional Munchkin prepared with the use of biscuit ingredients, without the discussion of the possible advantages of replacing them with healthier alternatives (Kumar et al., 2021). This gap indicates the necessity of researching to analyze the impact of adding squash on the sensory properties of Munchkin, including taste, texture, aroma, and appearance, which are the key determinants of consumer preferences (Stone & Sidel, 2020).

This study addressed this gap by establishing the sensory acceptability of Munchkin's use of squash as an alternative to the conventional ingredients of this biscuit. The study provides data on the impact of adding squash on the overall acceptability of the product by conducting a sensory evaluation survey with a broad spectrum of respondents. The secret to effective, healthier snack option development and commercialization lies in understanding consumer preferences.

Furthermore, the study will increase our understanding of functional foods and how they contribute to health and well-being. With consumers growing more health-conscious, the demand is growing for snacks that would not only curb hunger but also provide nutritional value (Roininen et al., 2021). The results obtained in this research may help food producers and medical workers to understand whether squash-based snacks are viable on the market, and, thus, new methods of product development may emerge. Moreover, the results can be used as a basis for community-based livelihood programs through encouraging the use of indigenous crops in small-scale food processing programs.

Theoretical Background

In this section, we will talk about the theoretical background of the research. We will focus on the key theories and describe the various legal foundations that are important to our study.

Theory

This study is **operated from the HBM, created** by Irwin Rosenstock in the 1950s. This psychological theory describes the health-related behaviors in terms of the beliefs and attitudes of individuals towards health problems. The HBM has been extensively used in many areas, such as public health, nutrition, and consumer behavior, and thus it is a useful tool in the study of dietary choices. The study was conducted by the principles of the Health Belief Model, since it investigates the possibility of the sensory acceptability of Munchkin made with squash to affect consumer behavior depending on their perceptions of health risks posed by traditional snacks. Specifically, the study is devoted to the importance of perceived vulnerability to health issues, such as obesity and diabetes, and perceived seriousness of the latter in promoting consumers to choose healthier.

Furthermore, the perceived benefits of using Munchkin made with squash, e.g., improved nutritional value and taste, are also the factors that can enhance consumer acceptance. This research will help to overcome the possible obstacles, including the false beliefs about the flavor of vegetable-based snacks, and offer insights that can promote healthier eating habits among consumers. Finally, the model explains how food preferences and consumer acceptance can be influenced by health consciousness.

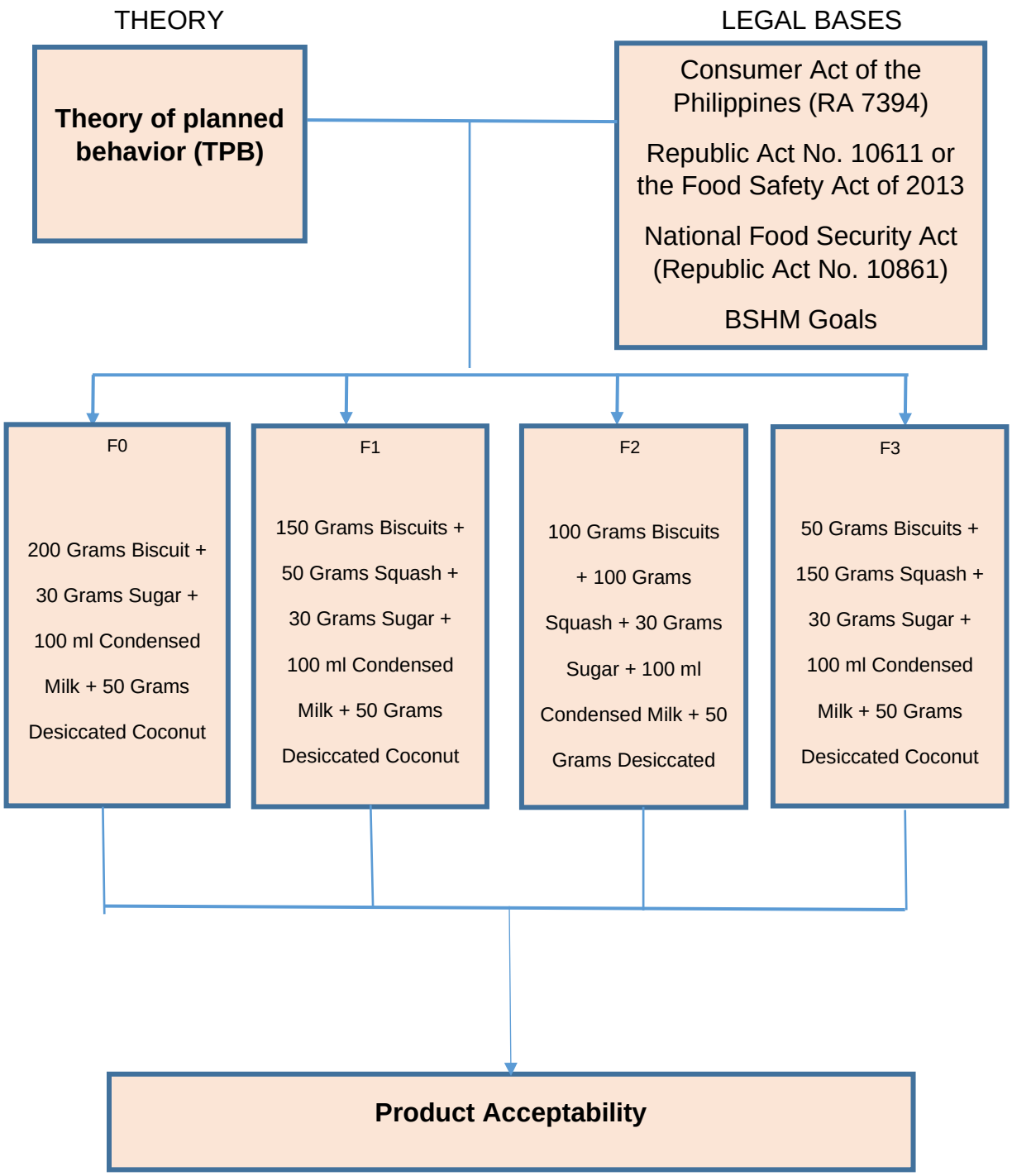

Figure 1. Theoretical Framework

Legal Bases

This study is based on the **Consumer Act of the Philippines (RA 7394)**. this law protects consumer rights by regulating product quality, safety, and fairness in business transactions. By following these rules, the study aims to ensure the product meet customers expectation and provides clear information for informed buying decisions. It follows regulations that protect consumers under Philippine law.

Another legal base that this study was anchored on was the **Republic Act No. 10611, or the Food Safety Act of 2013, which** guarantees food safety along the supply chain, i.e., production to consumption, by establishing standards on hygiene, handling, and processing. It tries to safeguard consumers against food-related threats and enhance the population's health by using science-based food safety policies. This research is in line with RA 10611 because it ensures that the production of squash-based biscuits will be carried out in a way that will not violate the food handling and safety standards. The research facilitates the aim of the law through sensory judgement and hygienic food preparation to come up with safe, nutritious and acceptable food products to the consumers.

The **National Food Security Act (Republic Act No. 10861)** was introduced to make sure that every Filipino received safe, nutritious, and sustainable food. The research was in line with this legislation since it was going to produce a less unhealthy version of the conventional Munchkin snack, where squash was going to replace the common biscuit base. The study encouraged the sustainable use of food since the fixings used were a nutrient-dense crop that was

locally grown and facilitated the creation of more nutritious and less expensive snack substitutes. This way, it helped achieve the overall objective of ensuring food security and better nutritional health of the communities nationwide. The emphasis on the local ingredients, nutritional value, and food developed innovatively directly contributed to the goal of the Act to enhance food availability by implementing sustainable and health-based solutions. It also promoted the agricultural sector by giving value to local crops that are often overlooked in commercial food production. By increasing consumer awareness and acceptance of such alternatives, the study supported long-term strategies for reducing dependency on imported or highly processed snacks.

Lastly, the **BSHM Goals** encourage students to develop creative food products that use local ingredients—the BSHM goals aimed to create professionals for the hospitality and tourism sectors. Through product evaluation, BSHM goals emphasize the significance of applying food safety standards and understanding consumer preferences. The study realizes the BSHM mission of preparing students for real-world food service and hospitality challenges by developing a new variety of dishes and assessing their acceptability. The study was aligned with the BSHM goals since it will encourage the production of new food products with local ingredients such as squash. It incorporates the product assessment and sensory testing, which is an indication of the BSHM's concern about food safety, quality standards, and consumer satisfaction. In this way, the study will help the program to fulfill its mission of equipping students with practical challenges in the hospitality and food service industry.

REVIEW OF RELATED LITERATURE AND STUDIES

As consumer awareness of nutrition increases, there is a growing demand for healthier snack options that not only satisfy cravings but also enhance overall well-being. this review of related literature and studies focusing on developing a new snack that contains healthy ingredients like squash, which is important. It examines research on taste, nutritional benefits, and consumer opinions. The goal is to provide insight into what influences consumer choices. The study helps those interested in how vegetable-based snacks can appeal to health-conscious consumer and promote better eating habits.

Related Literature

The analysis of consumer preferences for healthy snacks reveals a significant shift towards health-conscious choices, driven by increased awareness of nutrition and wellness. This trend appears in various studies that show the growing demand for healthier snack options. It affects product development and marketing strategies throughout the snack food industry. Being health-conscious has become a major factor in consumer behavior, particularly in food choices.

According to Arroyo et al. (2020), consumers are focusing more on nutritional benefits instead of traditional snack qualities such as taste, appearance, and convenience. This change shows an increasing understanding of the connection between diet and Long-term health. Results show a growing need for healthier snack options that offer both satisfaction and nutrition. This trend relates to the current study, which examines the sensory appeal of a squash-based Munchkin snack. By using nutrient-rich squash instead of the typical biscuit base,

the product aims to align with consumer preferences for healthier choices. The study looks at the need for more nutritious snacks. It also looks at whether health-conscious consumers will accept these alternatives based on taste, texture, and overall appeal.

According to Okpiaifo et al. (2023), consumers strongly prefer plant-based healthy snacks. However, this preference varies a lot across product categories and specific health benefits being promoted. This suggest that consumers view Healthy snacks are viewed differently. People choose snacks based on the nutritional claims and perceived value of each product. This insight is important for the current study. It examines the sensory appeal of a squash-based Munchkin as a healthier option compared to traditional biscuit-based versions.

By highlighting the nutritional benefits of squash, which is high in fiber, vitamins, and antioxidants, the study aligns with consumer expectations for plant-based snacks that offer. clear health benefits. Understanding how consumers perceive the squash-based Munchkin helps figure out if it will be accepted for its taste and usefulness, which makes the product more appealing to health-conscious individuals.

Roe and Levy (2021) looked at how health claims affect consumer buying habits, especially for snacks that claim to be healthy options, their study showed that consumers prefer products with clear and trustworthy health claims. These labels raise the perceived value and trust in the product's nutritional benefits. This is especially important for snacks, where consumers frequently decide between satisfaction and health. For the current study, which looks at how people respond

to a squash-based Munchkin, these insights underline the importance of communicating the nutritional benefits of squash. Clearly presenting these benefits could increase consumer acceptance and market appeal, especially among health-conscious individuals who depend on such claims. to make their food choices.

Hawkes (2020) has performed an extensive overview of the marketing techniques that are effective in facilitating healthy eating and making healthy food products more attractive. The research identified some of the most important strategies that included appealing packaging, transparent nutrition labeling, health-oriented branding, and application of positive messages to shape consumer behavior. The strategies have been observed to be very useful in promoting healthier food choices without undermining consumer interest. About the current study that examines the sensory acceptability of a squash-based Munchkin, the results of Hawkes can be used to market the product to health-conscious consumers.

Drewnowski (2020) pointed out a significant role of taste in the consumer food choice, even in the context of the obvious health benefits promotion. The research noted that most consumers are increasingly turning health-conscious, but taste is a prevailing factor that determines acceptance and subsequent consumption of a food product. This observation supports the importance of healthy food innovations that can achieve nutrition and sensory satisfaction. About the present study, whose aim is to assess the sensory acceptability of squash-based Munchkin as a substitute for a biscuit, the reflections of Drewnowski suggest

the necessity to make the product not only healthy but also pleasant to the taste. The Munchkin has to meet the consumer taste preferences regardless of its health benefits to succeed in both consumer acceptance and potential market viability.

Ares and Varela (2021) stressed the significant contribution of texture to the consumer acceptance of snack products, especially those that are produced using vegetable-based ingredients. In their study, they revealed that although a snack may have a health advantage, a poor texture may considerably decrease its overall acceptability. This shows that texture should be well taken into account in product development, as well as in sensory analysis. For the current research, which discusses the possibilities of developing a Munchkin based on squash, the texture is an essential consideration. The perception of the mouthfeel, consistency, and overall sensory experience of the product upon the addition of squash will aid in coming up with a snack that is not only healthy but also pleasant to consume.

Fisher and Birch (2022) state that family preferences and eating habits are essential factors that determine individual food choices, particularly snack intake and diet in general. Their research emphasized the importance of parents and caregivers in determining the eating habits of children, who, in most cases, dictate the kind of foods that are brought and accepted in the family. This relationship is quite pertinent in the current study that examines the sensory acceptability of a squash-based Munchkin. These dynamics of family life will be useful in influencing the way the product is created and positioned to make it more attractive to the family that is interested in healthier but still tasty snacks.

According to Story and Neumark-Sztainer (2021), to promote healthier eating and improve access to healthier food, especially at the local level, community-based programs are essential. Their review has focused on the effectiveness of the involvement of schools, local organizations, and public health promotion in the promotion of desirable dietary changes and sustainable nutrition education. This is very pertinent to the current study, which assesses the sensory acceptability of a squash-based Munchkin. The partnership with community-based programs can increase the awareness of the product, establish credibility in the eyes of the consumers, and market it as a healthy snack. These partnerships may also assist in the incorporation of the Munchkin into local food systems to aid in the achievement of both community-based livelihood projects and the promotion of public health.

Thompson and Smith (2023) state that plant-based ingredients in snack products have been gaining popularity over the years because consumers have become more aware of health and sustainability. They found that a great number of consumers have become interested in snacks that are produced with the use of natural and plant-based ingredients, as they are perceived as healthier and less harmful to the environment.

This trend is a move towards more conscious eating, with health benefits and sustainability being significant factors in the purchase process. About the current research, which focuses on the sensory acceptability of a squash-based Munchkin, this literature can be used to justify the use of squash as a plant-based alternative to the traditional ingredients used in the manufacture of biscuits. The

inclusion of squash will not only help the product to provide a healthier alternative, but it is also in line with the consumer's need to have sustainable and healthy snack alternatives.

As Lee and Kim (2021) noted, the packaging design is important to influence consumer perceptions and purchasing decisions, particularly in the case of healthy snack products. In their study, they discovered that visual factors like color, imagery, labeling, and overall design play a major role in the way consumers perceive the healthiness and appeal of a product. Good packaging will not only capture attention but also strengthen the nutritional content and credibility of the product.

As regards the present study, which is concerned with the sensory acceptability of a squash-based Munchkin, this literature brings into focus the significance of packaging in marketing strategy. With the help of clear and attractive packaging highlighting the health aspect of the product and the plant-based ingredients used in the Munchkin, the product can become more appealing to the health-conscious customers and enhance its market acceptance.

According to Chen and Zhao (2022), flavor plays a key role in whether consumers accept healthy snacks. It may even matter more than other factors like nutritional value or packaging. In their study, they found that health-conscious consumers typically avoid snacks that taste bland or unpleasant, no matter how nutritious they are. This is why it is necessary to produce healthy products that are also delicious. About the current research, which evaluates the sensory

acceptability of a squash-based Munchkin, the results justify the necessity to create a tasty product that meets the taste preferences of consumers.

Robinson and Hardman (2020) note that health perceptions play a major role in the consumption of snacks, and most people value products they think are beneficial to their health. Their qualitative research showed consumers tend to base their snack choices on more than just the real nutrition of a product but also on the perceived healthiness of a product, which is determined by the ingredients, branding, and messaging. This fact is especially applicable to the current study, where the sensory acceptability of a squash-based Munchkin as a healthier option of traditional snacks will be assessed.

Ares and Varela (2022) revealed that texture was one of the most basic sensory qualities that had a great impact on consumer acceptance of snack products. In their systematic review, they highlighted that even when nutritionally sound or tasting good, an unattractive texture was likely to cause rejection of the product, especially when the snack was prepared using non-traditional or plant-based ingredients. Texture influenced mouthfeel, satisfaction, and the overall eating experience, which is one of the critical factors in the formulation of snacks. About the current study, where the sensory acceptability of a squash-based Munchkin was assessed, it was necessary to optimize the texture. The knowledge gained in this review informed the creation of a product that satisfied not only health expectations but also provided a smooth and consistent texture, which enhances its likelihood of being accepted by its consumers.

Related Studies

Bennett and Smith (2022) have found that the consumer acceptance of squash-based snacks relied on several important factors, such as flavor, texture, appearance, and overall sensory appeal. The comparative study they conducted revealed that snacks that contained squash were well received under the condition of a careful balance and alignment of these sensory elements with consumer expectations. Products that effectively concealed or enhanced the natural taste of squash with good textures and sweetness had high chances of becoming popular. The results of this study were very useful in the current study, which considered the sensory acceptability of a squash-based Munchkin. The knowledge of Bennett and Smith was applied in developing the product to be both flavorful and textured, which would enhance the possibility of acceptance by the consumers and also make The Munchkin a healthy snack option.

Roe and Levy (2021) stated that health claims on packaging played an important role in consumer purchasing behavior, particularly in snacks branded as healthy snacks. Their research indicated that transparent, believable health claims enhanced the trust of the consumer and boosted the attractiveness of products to health-conscious consumers. These assertions tended to influence the views of the nutritional quality of a snack, as well as the intention to buy the product even before trying it. Concerning the current research, where the sensory acceptability of a squash-based Munchkin was measured, it was crucial to learn more about the effect of health claims. This information informed the possible marketing strategy of the product, which was to make sure that the nutritional value of the product—

the use of plant-based and vitamin-rich squash—was well articulated to appeal to health-conscious consumers.

As stated by Chen and Zhao (2022), flavor was a key determinant of healthy snack consumption by consumers. Their sensory evaluation study proved that, although there was an increasing interest in healthy foods, customers were not going to embrace the products that did not taste good. The study highlighted that health benefits could not be the only factor influencing the preference for a snack. Still, the product had to perform in terms of taste to guarantee consumption and market success. About the current study, which assessed the sensory acceptability of a squash-based Munchkin, these results highlighted the significance of coming up with a flavor profile that was not only pleasant but also balanced. The experiences of Chen and Zhao contributed to the development of the product to make sure that the Munchkin would suit the tastes of the consumers and would not lose its nutritional properties.

According to Raghavan and Reddy (2022), consumers are more likely to try and accept new snack products when they use familiar, natural ingredients that are connected to health benefits. This information was particularly useful for the current study, which aimed to evaluate how well people accept a squash-based Munchkin. Recognizing the positive view of natural and nutrient-rich ingredients, the researchers highlighted the health benefits of squash, such as high Vitamin and Fiber content is important in developing the products, the study focused on aligning Munchkin formulation and marketing with consumers want. The goal is to position Munchkin as a healthy and attractive choice compared to traditional

snacks. This strategy meets the rising demand for nutritious snack options and expands the product's market potential.

Duffy and Bartoshuk (2020) point out that taste plays a big role in consumer choices. In their sensory evaluation study, they found that although health concerns matter to consumers, taste remains the primary factor that determines whether a products accepted or rejected. Even when a snack has substantial nutritional value, it is often overlooked or thrown away if it does not have a satisfying flavor. This insight is especially important for the current study, which focuses on the sensory appeal of a squash-based Munchkin. While the main goal is to provide a nutritious alternative using local ingredients like squash, it is also important to make sure the final product tastes good to consumers.

The findings of Duffy and Bartoshuk had a strong impact on the formulation process of the Munchkin, which focuses on finding a balance between health benefits and taste. This study aims to create a healthier snack option while also improving its marketability and consumer satisfaction by enhancing its sensory qualities.

THE PROBLEM

Statement of the Problem

This study aims to assess how acceptable squash (Cucurbita maxima) Munchkin as biscuit substitute for students at Cebu Technological University,

Daanbantayan Campus during the first semester of the Academic Year 2024-2025. This will provide a foundation for a hospitality community livelihood techno guide.

Specifically, the study sought to answer the following questions:

1. What are the ingredient compositions of Squash Munchkin in terms of:
    1.1. F0 = 200g biscuits, 30g sugar, 100ml condensed milk, and 50g desiccated coconut;
    1.2. F1 = 150g biscuits, 50g squash, 30g sugar, 100ml condensed milk, and 50g desiccated coconut;
    1.3. F2 = 100g biscuits, 100g squash, 30g sugar, 100ml condensed milk, and 50g desiccated coconut;
    1.4. F3 = 50g biscuits, 150g squash, 30g sugar, 100ml condensed milk, and 50g desiccated coconut;
2. What are the most preferred formulation attributes among the three formulations in terms of?
    2.1 Consumers;
        2.1.1 Formulation 0;
        2.1.2 Formulation 1;
        2.1.3 Formulation 2; and
        2.1.4 Formulation 3?
    2.2 Food Experts;
        2.2.1 Formulation 0;
        2.2.2 Formulation 1;
        2.2.3 Formulation 2; and

2.2.4 Formulation 3?

3. What is the general sensory acceptability among the formulation attributes as perceived by the?
    3.1. Consumer Preferences:
        3.1.1. Color;
        3.1.2. Flavor;
        3.1.3. Odor; and
        3.1.4. Texture?
    3.2. Food Expert Preferences:
        3.2.1. Color;
        3.2.2. Flavor;
        3.2.3. Odor; and
        3.2.4. Texture?
4. Is there a significant mean difference between the most preferred formulation and the controlled formulation as evaluated by the consumers and food experts on the sensory attributes?
    4.1. Color;
    4.2. Flavor;
    4.3. Odor; and
    4.4. Texture?
5. Based on the findings, what techno-guide can be proposed for the hospitality community's livelihood engagement?

Null Hypothesis

H_0

There are no significant differences between the most liked formulation and the control formulation when it comes to color, flavor, odor, and texture.

H_1

There is a notable difference between the most liked formulations and the control formulation concerning color, flavor, odor, and texture.

Significance of the Study

The findings of this study will provide valuable insights to:

Students: This research will serve as a guide to enhance their cooking skills and foster creativity in producing healthy foods through experimentation, ultimately promoting a more health-conscious mindset.

Parents and Guardians: The study will provide parents with practical strategies to foster healthy eating habits and engage their children in cooking, reinforcing the importance of nutrition at home.

Teachers: This research will improve educators' understanding of cooking with healthy and tasty ingredients. It will help them inspire and teach future learners about the significance of nutrition and creativity in food preparation.

Culinary Students and Professionals: This study will serve as a reference for culinary programs, highlighting health-conscious cooking techniques and ingredient choices that can lead to innovative and nutritious culinary creations.

Community: The study's findings will empower the community to improve their lifestyles by embracing the findings of this study, which will provide valuable insights into nutritious foods.

Local Farmers and Agricultural Entrepreneurs: This study will provide insights into the potential of squash as a value-added product. It encourages farmers and agricultural entrepreneurs to look for different ways to use their harvest.

RESEARCH METHODOLOGY

Research Design

This research used an experimental two-group design, combining laboratory techniques and sensory evaluations to assess how much Munchkins like squash. The main objective is to examine how different ingredients and preparation methods affect the sensory qualities of the

The study adapted and modified the 5-point Likert Scale and 9-point Hedonic Scale, allowing participants to rate four sensory attributes consistently, including appearance, flavor, odor, and texture, which are critical for consumer acceptance and product development. By employing structured sensory evaluations, the study will include a group of participants who will give feedback on these attributes. These attributes help us figure out which formulations are the

most appealing. The evaluation will identify the best texture and flavor of the product. This ensures that the squash munchkin are enjoyable and matched what consumers want.

The experimental procedure will begin with making squash munchkins using a carefully chosen mix of ingredients. These ingredients were selecting for their ability to improve the nutritional value and flavor of the squash snack while keeping sustainability in mind. Squash serves as the primary ingredient, providing essential vitamins and fiber.

Raw Materials

The squash (*Cucurbita maxima*), biscuits, sugar, condensed milk, and desiccated coconut used in this study were all sourced from the local public market to ensure freshness and quality, the researchers selected mature and firm squash. They thoroughly washed the squash before peeling, steaming, and mashing it to create a smooth and uniform texture for mixing. The biscuits were finely crushed to form the base of the munchkin. To keep food safe during preparation, a 50 parts per million (ppm) sodium hypochlorite solution was used to sanitize the squash and all utensils and equipment that came into contact with the ingredients, researchers took important steps to remove harmful microorganisms.

Materials Needed:

	Measuring cup – Used to accurately measure liquid and dry ingredients such as condensed milk, sugar and biscuit to maintain consistency across all formulation.
	Steamer – Employed to cook the squash until soft preserving its nutrients and natural flavor without the need for oil.
	Mixing Bowl – Served as the main container for combining all ingredients during the preparation of each formulation.
	Food Masher – Used to mash the steamed squash into a smooth and uniform texture before mixing with other ingredients.
	Tissue- Used to place over the cooked squash to prevent moisture buildup and preserve texture during cooling.
	Small Bowls- Used to hold measured sugar and condensed milk after portioning, keeping ingredients organized before mixing.
	Tablespoon and fork- Used for mixing ingredients manually and shaping the munchkin for uniformity.

Figure 2. Utensils and Equipment Used

Figure 2 Continuation

	Cutting Board -Provided a clean and stable surface for slicing the squash before steaming.
	Plate- Used for placing and cooling the finished munchkins after shaping prior to packaging.
	Chef's Knife – Used for cutting and peeling the squash into smaller pieces for steaming.
	Food safe packaging- Ensured hygienic storage and presentation of the finished product for sensory evaluation and distribution.

	**INGREDIENTS** 150g squash 50g Biscuit 50g desiccated coconut 30g refined sugar 100ml condensed milk
	PROCEDURE
	1. Bring 4 cups of water to a boil and steam the squash until tender.
	2. In a mixing bowl, mash the cooked squash and incorporate the biscuit, refined sugar, condensed milk, and mix thoroughly.
	3. Using your hands, take one scoop of the squash mixture, and shape it into a circle.
	4. Once the circle is shape, immediately roll them in desiccated coconut.

Figure 3. Basic Ingredients Used

They practiced strict hygiene. They wore clean kitchen clothes, including gloves, aprons, and hairnets to avoid contamination. They selected additional ingredients like sugar, condensed milk, and desiccated coconut were chosen for their quality and how they match the desired taste and texture of the product. All materials were stored in clean, dry conditions and followed the proper food handling rules before use.

Flow of the Study

The research flow outlines of input, process, and output of the study, providing a clear path from formulation to market introduction.

The **input** includes the key formula of squash munchkin, which focuses on their development, nutritional value, and appeal. This stage ensures the product meet sustainability and consumer preference standards.

The **process** involves several steps: creating the squash munchkin recipe, conducting the study, and performing. sensory evaluations, collecting and organizing data, interpreting results, and drawing conclusions. These steps will be carried out methodically to assess the product's sensory qualities and overall feasibility. Data gathered will inform decisions about the final product and its potential for market introduction.

The **output** will be the creation of a Techno Guide that details the final recipe and procedure for producing sustainable squash munchkins with desiccated coconut. Additionally, an extension program and commercialization plan will be developed to present the product to the market, aiming to increase its utilization.

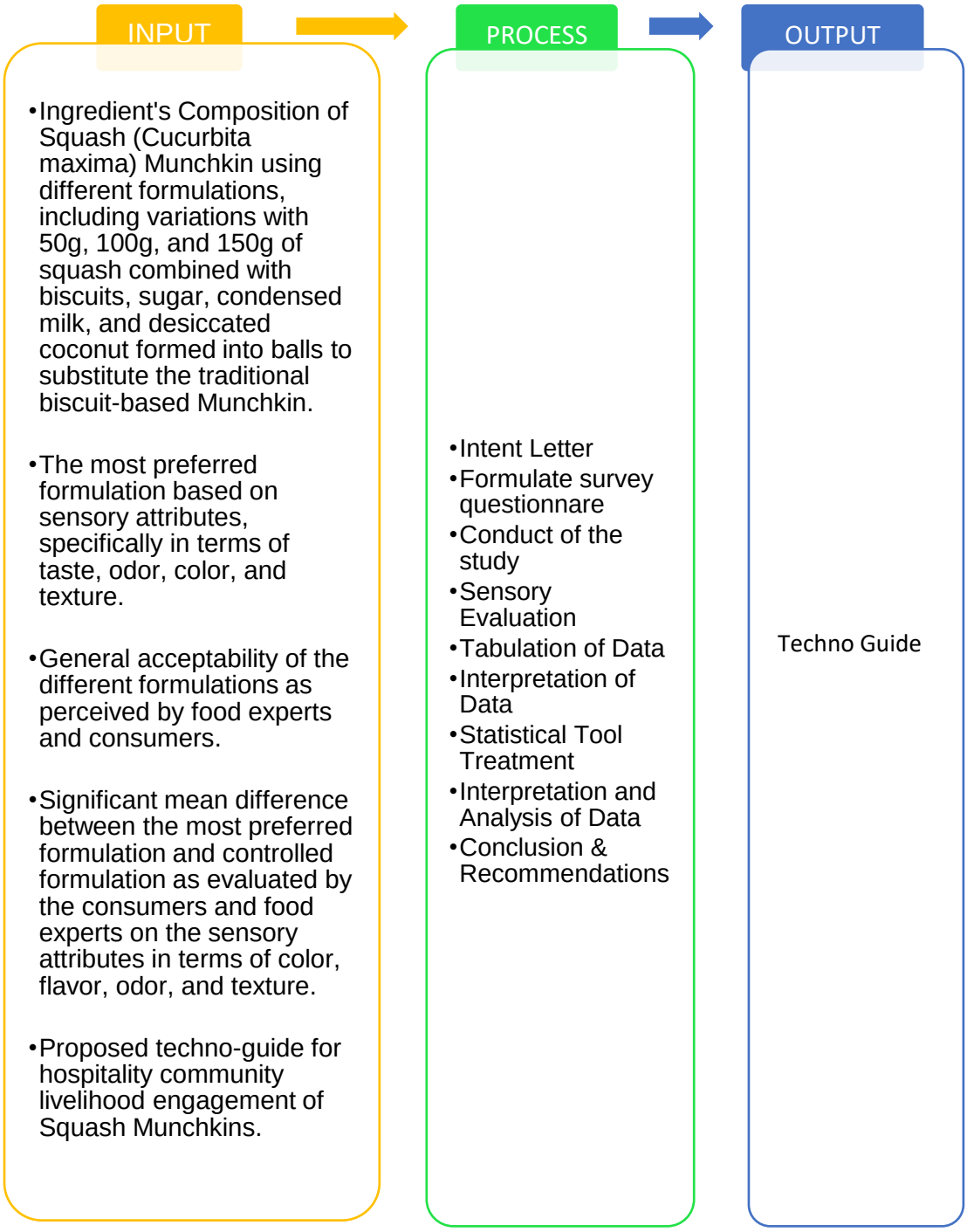

Figure 4. Flow of the Study

Research Environment

The study was conducted at Cebu Technological University (CTU), located in Daanbantayan, Cebu, which is one of the nine satellite campuses of CTU in the province. CTU is a renowned educational institution that stands out as a center of excellence in technological education. It has an ISO 9001:2008 certification from the Anglo-Japanese-American Registrars, showing its commitment to quality and ongoing improvement in education.

Cebu Technological University Daanbantayan Campus provides important academic and research facilities like the Food Innovation Center, Hospitality Management Laboratory and the DOST-FNRI Food Laboratory, which were essential to this study. These facilities provided the technical resources necessary for developing food products, testing, and sensory evaluation. CTU previously known as the Cebu State College of Science and Technology (CSCST), became a university on November 10, 2009, under Republic Act No. 9744 during President Gloria Macapagal-Arroyo's administration. This change marked an important phase in the institution's history and enhanced its academic and research capabilities.

As a state university, CTU is committed to offering innovative and relevant degree programs that meet the needs of the global knowledge economy and the emerging Fifth Industrial Revolution. Beyond instruction, CTU actively engages in research, extension services, and sustainable development initiatives that address both local and national challenges.

Figure 5. Research Locale

Research Participants

The participants of this research comprise 60 Consumers and 15 Food Experts from Technological University Daanbantayan Campus for a total of 75. They were given two sensory evaluation rubrics to evaluate the sensory quality of the product.

Table 1
Distribution of Participants
N=75

PARTICIPANTS	FREQUENCY (f)	PERCENTAGE (%)
CONSUMERS	60	80%
FOOD EXPERTS	15	20%
TOTAL	**75**	**100%**

The participants of this study were the students and food experts from the Bachelor of Science in Hospitality Management and Bachelor of Technology and Livelihood Education of Cebu Technological University Daanbantayan Campus, as they are the ones who are relevant to this study. The basis for the selection of these individuals or participants is that they are closely related to the study and have a basic understanding and practical experience in food preparation and evaluation, along with other related principles. 60 students and 15 food experts will participate, with a total of 75 participants.

Research Instruments

The main tool used in this study was a descriptive sensory evaluation test, this method involved the organized assessment of the developed snack product, Squash—

Munchkin, by 75 respondents. Under the supervision of our research instructor, the evaluation process was collaboratively planned and executed. A standardized score sheet collected feedback from respondents on important sensory attributes, such as odor, texture, taste, and appearance. To provide a complete evaluation, the survey used both a 5-point Likert scale and a 9-point Hedonic scale to assess levels of acceptability and preference. Using these two scales together gave a better understanding of consumer perception and the overall acceptability of the product formulation.

Data Gathering Procedures

The researcher employed the scores from descriptive and preference tests to gather comprehensive insights from the respondents. Detailed instructions were provided to the participants on how to accurately complete the evaluation process, ensuring clarity in the product tasting involved participants in gathering feedback from respondents. They evaluated the sensory score sheets in different areas, focusing on odor, texture, taste, and appearance. This organized approach aimed to capture detailed feedback and provide a complete look at consumer preferences for the squash munchkin product. Involving participants this way helped improve the reliability of the data collected. This ultimately helped create a stronger understanding of the product's sensory qualities.

Statistical Treatment

This consists of mathematical methods to arrange, examine, and interpret data.

Weighted Mean

The weighted mean (WM) was taken by multiplying the sum (∑*f)* by the frequency.

(0) and weight (W). The product was divided by the total number of participants. The following was the formula:

WM= $\Sigma\frac{fw}{n}$

Where:

WM = Weighted Mean

Σ = Summation

F = Frequency

W = Weight

N = Number of respondents

Percentile

The percentile formula is used to determine the position of a specific value in a dataset by showing the percentage of values that fall below it. The formula is:

P=(*f*/*n*)100

Where:

P = Percentage

F = Frequency for each category

n =total number of respondents

100 = constant value

T-tests

The mean differences between the three formulations were analyzed using an independent samples t-test to compare the sensory attributes. This approach was chosen to evaluate specific contrasts of interest between formulations directly.

Table 2

T-Test

Variance Source	Sum of Squares	Df	Mean Squares	F-ratio
Between	SS_{bg}	df_{bg}	MS_{bg}	***F***
Within	SS_{wh}	df_{wg}	MS_{wg}	

Formula:

$$F = \frac{MSbg}{MSwg}$$

Where;

F = coefficient of Anova

MS_{bg} = *mean sum of squares between the groups*

MS_{wg} = *mean sum of squares within groups*

While,

$$MS_{bg} = \frac{\text{SSbg}}{\text{dfbg}}$$

Where;

MS_{bg} = *mean sum of squares between the groups*

SS_{bg} = *sum of squares between the groups*

df_{bg} = *between group degrees of freedom; where*

df_{bg} = *k-1, in which k is the number of groups*

On the other hand,

$$MS_{bg} = \frac{\text{SSwg}}{\text{dfwg}}$$

Where;

MS_{wg} = *mean sum of squares between the groups*

SS_{wg} = *sum of squares between the groups*

df_{wg} = *within group degrees of freedom; where* df_{wg}*=k-1, in which n is the total number of respondents and k is the number of independent variables*

Furthermore,

$$SS_{bg}=\left[\frac{(\sum x_1)2}{n}+\frac{(\sum x_2)2}{n^2}+\ldots+\frac{(\sum x_k)2}{n_x}\right]-\left[\frac{(\sum x_1+\sum x_2+\ldots+\sum x_k)2}{N_{total}}\right]$$

Where;

SS_{bg} = *sum of squares between the groups*

Additionally,

$$SS_{wg}=[\sum x_{1^2}+\sum x_{2^2}+\ldots+\sum x_{k^2}]-\left[\frac{(\sum x_1)2}{n}+\frac{(\sum x_2)2}{n^2}+\ldots+\frac{(\sum x_k)2}{n_x}\right]$$

Where;

SS_{wg} = *sum of squares within the group; and*

n = *sample size per group*

Scoring Procedures

In scoring the degree of Squash *(Cucurbita maxima*) Munchkin as evaluated by the respondents, adverbial scoring was used in the evaluation as follows:

5-Likert Non-Parametric Scale is a rating instrument used to evaluate participants' attitudes and opinions. This scale offers five response options that go from two extreme values to a neutral midpoint. It includes intermediate choices that represent different levels of agreement or disagreement, as shown in Table 3.

To understand how respondents view the findings, we will evaluate the data using a 5-point Likert scale. This scale ranges from 1.00 to 5.00. Higher scores

indicate more positive evaluations of sensory attributes like color, flavor, odor, and texture.

Table 3

5-Likert Non-Parametric Scale

SCALE	CATEGORY
4.21-5.00	Very Much Acceptable
3.41 – 4.20	Acceptable
2.61 – 3.40	Undecided
1.81-2.60	Unacceptable
1.00 -1.80	Very Much Unacceptable

The 5-point Likert Quality Scoring method is commonly used to assess product quality in sensory research. In this study, we used it to evaluate the sensory attributes of color, flavor, odor, and texture of Squash (*Cucurbita maxima*) Munchkin, as shown in Table 4. This method helps us measure how subjects perceive these qualities. structured format, facilitating the identification of the formulation that most closely aligns with consumer preferences.

This scale helps researchers measure feelings that are hard to quantify. It provides insight into whether the product is generally acceptable or needs changes. It helps to identify the strength and weakness of how acceptable the product is. It provides useful data for comparing what participants prefer. it also gives important information about consumer attitudes. This insight can help researchers improve their products and services.

Table 4
5-Point Quality Scoring

SCALE	COLOR	ODOR	FLAVOR	TEXTURE
4.50-5.00	Golden Brown	Most Pleasant	Balance Sweet	Most Soft and Smooth
3.50-4.49	Dark Brown	Very Pleasant	Acceptably Sweet	Very Soft and Smooth
2.50-3.49	Medium Brown	Pleasant	Moderately Sweet	Soft and Smooth
1.50-2.49	Brown	Less Pleasant	Very Sweet	Less Soft and Smooth
1.00-1.49	Yellow	Not Pleasant	Excessively Sweet	Not Soft and Smooth

The **9-Point Hedonic Scale** is a sensory evaluation tool used to measure the degree of liking or disliking of a product. It ranges from "dislike extremely" to "like extremely," with a neutral midpoint, typically "neither like nor dislike." Respondents rate their preferences based on attributes like taste, texture, appearance, and odor.

Table 5
9-Point Hedonic Scale

INDICATOR	RESPONSE
8.50-9.0	Like Extremely
7.50-8.49	Like Very Much
6.50-7.49	Like Moderately
5.50-6.49	Like Slightly
4.50-5.49	Neither Like Nor Dislike
3.50-4.49	Dislike Slightly
2.50-3.49	Dislike Moderately
1.50-2.49	Dislike Very Much
0-1.49	Dislike Extremely

This tool gives clear results of the level of participants' liking or disliking towards certain aspects of the squash (Cucurbita maxima) munchkin. From the results, researchers can determine where improvements should be made (e.g., low scores for texture). The results enable the evaluation of the total acceptability of the product and its ability to meet the consumers' needs.

Ethical Consideration

The study followed the principles of the Helsinki Declaration, and the guidelines from The Philippine Health Regulation Ethical Board (PHREB) guidelines were followed. It also complied with Republic Act 10352, the Philippine National Health System Research Act of 2013, and CHED Memorandum Order no. 34 of 2007. These rules required a review of research involving human subjects.

Data Management

In this study, the researchers will systematically collect data derived from both experimental procedures and credible external sources to substantiate their findings. The data collection process will commence with a thorough review of relevant literature and related studies, followed by the execution of the experiments. Subsequently, the results obtained from these experiments will be compiled as data. Both sources of data, literature and Experimental results, will be organized together.

The experimental data will be processed clearly and shown in tables to make the analysis easier. This organization will help researchers understand the

results. The data processing will involve carefully organized and classification of information was the collected data allows the researcher to create tables as organizing references. The researchers will review how the data is interpreted. They will focus on the effective traits observed during data collection.

. The researchers will use proper documentation and secure storage practices. All data will be stored in password-protected digital files. and back up regularly to prevent loss or unauthorized access. Ethical considerations, such as respondent anonymity and voluntary participation, will be maintained throughout the study. By following these standards, the researchers want to protect data accuracy and adhere to ethical research rules. They will use secure storage and data validation methods to verify the accuracy and consistency of the information they gather. The researchers will check their work by comparing experimental data with existing literature. They will repeat some trials to confirm the results. they will review and correct any differences found during validation to ensure the dataset is reliable.

This process will help reduce errors and improve the credibility of the findings. By using the right scientific tools, the researchers will uncover important patterns and insights in the dataset. they will document the results of these analyses in detail to support the study goals and contribute to the wider field of knowledge. This will include organized data management practices.

DEFINITION OF TERMS

To ensure and understanding the study provided clear definitions for key terms. This approach aimed to explain the specific meanings the researchers assigned to these terms in the context of the study.

Appearance- The visual characteristics of an object or product includes color, shape, size, and overall presentation. These factors can influence consumer preferences and acceptability.

Aroma - A specific type of odor that is often associated with food and beverages, typically referring to the more pleasant and complex scents that can enhance the overall sensory experience.

Consumer: Hospitality Management students from Cebu Technological University, Daanbantayan Campus.

Culinary: refers to the art and practice of food preparation and cooking, particularly in the context of creating innovative and appealing food products.

Descriptive Test, a sensory evaluation method, involves trained panelists or consumers assessing and measuring the qualities of a product. It provides detailed descriptions of its sensory properties.

Dense- describes a product with a compact or thick consistency. it often suggests richness or heaviness in texture.

Exploration -is the process of examining or investigating a product's

attributes or qualities. This often includes sensory evaluation to understand its characteristics better.

Firm- is a term that describes a product's resistance to pressure or deformation. It suggests a solid structure that can be appealing in certain food applications.

Odor - refers to the unique smell of a substance, which we perceive through our sense of smell. Odor can greatly influence our perceptions of food and beverages.

Squash- is a type of fruit from the gourd family, Cucurbita. It is commonly used in cooking. Varieties of squash can differ in flavor, texture, and nutritional value.

Sustainability- refers to the product's ability to maintain quality by using local, eco-friendly ingredients while also supporting the livelihoods of the community.

Texture, the concrete quality of a substance, is perceived through touch. It includes features like smoothness, hardness, or graininess. These qualities can affect the overall eating experience.

Techno Guide – A structured, instructional document that provides technical guidance, step-by-step procedures, and standardized information for producing or processing a product.

Treatment - a specific condition or level of the independent variable applied to a group in an experiment.

Chapter II

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This presents findings of an investigation in the sensory acceptability of Cucurbita maxima (munchkin squash) as a potential substitute for conventional biscuits. Overall acceptability ratings and sensory attributes—which include components like flavor, texture, aroma, and aesthetic appeal—are the two main categories into which the collected data is separated. This chapter presents the findings of a study that aimed to evaluate the sensory acceptability of squash (Cucurbita maxima) munchkin as a biscuit substitute. The collected data has two main categories: overall acceptability and sensory attributes The study of sensory and preference characteristics focused on evaluating the product's attributes, such as color, flavor, aroma, texture, and overall acceptability, using descriptive and preference tests administered by both consumer groups and expert evaluator.

THE INGREDIENTS' COMPOSITION OF SQUASH (*Cucurbita maxima*) MUNCHKIN AS BISCUIT SUBSTITUTE

This assessment yielded valuable insights into the product's viability and potential for culinary innovation, considering its distinctive ingredient combination and sensory properties. Desiccated coconut, mashed squash, crushed biscuit, condensed milk, and refined sugar are the ingredients of Squash (Cucurbita maxima) Munchkin, a biscuit substitute. Mashed squash serves as the primary ingredient, contributing moisture, natural sweetness, and vital nutrients like beta-carotene and fiber. Along with adding a recognizable crunch and texture

reminiscent of classic baked goods, crushed biscuits give the dish structure and body. Refined sugar adds sweetness overall and balances the squash's earthy flavor. Condensed milk gives a smooth, creamy texture and improves its flavor. Desiccated coconut adds chewiness and a subtle nutty flavor, giving the profile a touch of the tropic. Together, these components produce a tasty, wholesome, and regionally inspired treat that provides both sensory enjoyment and an inventive way to utilize local produce.

Table 6 lists the components of squash (Cucurbita maxima) munchkin as biscuits substitute, as well as the formulation techniques employed.

Table 6
Formulation Treatments of Squash (*Cucurbita maxima*) munchkin as biscuit substitute evaluated by Consumers and Food Experts

N=75

INGREDIENTS	Treatments											
	Trial 1				*Trial 2*				*Trial 3*			
	F0	F1	F2	F3	F0	F1	F2	F3	F0	F1	F2	F3
Squash	-	50g	100g	150g	-	50g	100g	150g	-	50g	100g	150g
Biscuit	200g	150g	100g	50g	200g	150g	100g	50g	200g	150g	100g	50g
Sugar	30g	30g	30g	30g	30g	30g	30g	30g	30g	30g	30g	30g
Condensed Milk	100ml	100ml	100ml	100ml	100ml	100ml	100ml	100ml	100ml	100ml	100ml	100ml
Desiccated Coconut	50g	50g	50g	50g	50g	50g	50g	50g	50g	50g	50g	50g
AWM	3.11	3.20	3.91	3.55	2.89	3.01	3.18	3.33	3.98	4.24	4.09	4.33
VD	Und	Und	A	A	Und	Und	Und	Und	A	VMA	A	VMA

Legend:

4.21-5.00	-Very Much Acceptable (VMA)
3.41-4.20	-Acceptable (A)
2.61-3.40	-Undecided (Und)
1.81-2.60	-Unacceptable (UnA)
1.00-1.80	-Very Much Unacceptable (VMU

Trial 1

The surveyed consumers and food experts rated Formulation 2 as Acceptable (A), with an Average Weighted Mean (AWM) of 3.91, making it the most acceptable formulation for making Squash Munchkin. It has 100g of mashed squash, 50g of desiccated coconut, 30g of refined sugar, 100ml of condensed milk, and 100g of crushed biscuits. Because it produced a pleasing balance of sweetness, texture, and visual appeal, this combination was the best choice in this trial.

Trial 2

In the second trial, Formulation 3 was the most acceptable and remained within the Acceptable (A) range with an AWM of 3.33. It contained 100ml of condensed milk, 150g of mashed squash, 50g of desiccated coconut, 30g of refined sugar, and 150g of crushed biscuit. The consistent use of condensed milk and a slight increase in sugar content improved overall sweetness and texture, and there was a moderate improvement in mouthfeel and flavor when compared to the other formulations.

Trial 3

Formulation 3 was determined to be the most acceptable formulation with the highest AWM of 4.33, or Very Much Acceptable (VMA). A well-balanced

product that satisfied consumer and expert standards for market potential in terms of flavor, moisture, and mouthfeel was produced by combining 150g of mashed squash, 30g of refined sugar, 100ml of condensed milk, 50g of crushed biscuits, and 50g of desiccated coconut.

General Implications

The results of all the trials indicate that increasing the amount of mashed squash and condensed milk, while maintaining the exact amounts of crushed biscuit and desiccated coconut, significantly enhances consumer acceptability. Formulation 3 produced the best results, especially in Trial 3, suggesting that this ingredient ratio is ideal for creating a market-ready and popular squash snack product. The study emphasizes the significance of ingredient proportion in making tasty and nutritious food innovations utilizing locally sourced agricultural products.

The Most Preferred Formulation Attributes of Squash (*Cucurbita maxima*) Munchkin as Biscuit Substitute Evaluated by the Consumers and Food Experts

This section of the study presents the results of an experimental investigation into the development of squash (Cucurbita maxima) munchkin as a biscuit substitute. Different ingredient ratios were tested, with variations in the amounts of mashed squash and refined sugar.

In contrast, the amounts of other ingredients, such as crushed biscuit, condensed milk, and desiccated coconut, stayed constant. One of the primary objectives was to determine the most popular formulation based on sensory

attributes, including color, flavor, odor, and texture. The table below displays the average ratings and scores for these sensory attributes for the most popular Squash Munchkin formulation.

Table 7
Descriptive Mean Scores and Ratings of the Consumers on the Most Preferred Formulation among the Four Sensory Attributes of Squash (*Cucurbita maxima*) Munchkin as Biscuit Substitute

N=60

Attributes	Formulations								Overall Mean	
	F0		F1		F2		F3			
	X	***VD***	***X***	***VD***	***X***	***VD***	***X***	***VD***	***OMA***	***VD***
Color	3.38	MB	3.48	DB	3.51	DB	3.46	MB	3.46	MP
Flavor	2.60	MS	2.98	MS	3.38	MS	3.64	AS	3.15	MP
Odor	3.09	P	3.17	P	3.31	P	3.57	VP	3.29	MP
Texture	3.42	SS	3.34	SS	3.48	SS	3.75	VSS	3.50	MP

Legend: *4.21-5.00-Very Much Preferred (VMP); 3.41-4.20-Moderately Preferred (MP); 2.61-3.40 Undecided (Und); 1.81-2.60-Moderately Not Preferred (MNP); 1.00-1.80-Not Preferred (NP)*

Legend:

Weight	Scale	Category			
		Color	Flavor	Odor	Texture
5	4.50-5.00	Golden Brown	Balanced Sweet	Most Pleasant	Most Soft and Smooth
4	3.50-4.49	Dark Brown	Acceptably Sweet	Very Pleasant	Very Soft and Smooth
3	2.50-3.49	Medium Brown	Moderately Sweet	Pleasant	Soft and Smooth
2	1.50-2.49	Brown	Very Sweet	Less Pleasant	Less Soft and Smooth
1	1.0-1.49	Yellow	Excessively Sweet	Not Pleasant	Not Soft and Smooth

Formulation 0

The findings indicated that the most preferred sensory attribute in Formulation 0 was texture, which was described as "soft and smooth" and had a mean score of 3.42. These results suggest that while mashed squash and dairy-based ingredients such as condensed milk produced a pleasing texture, flavor enhancements—perhaps by varying the amount of condensed milk or refined sugar—are needed to improve overall taste acceptability.

Formulation 1

The results indicated that the most favored attribute in Formulation 1 was color, with a mean score of 3.48, or Dark Brown. This suggests that the natural color of the mashed squash was enhanced by the biscuit, and a minor browning that occurred during preparation improved the product's aesthetic appeal. Features such as flavor and softness could still be improved to enhance customer satisfaction.

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Formulation 2

The result demonstrates that while the mashed squash, biscuit, refined sugar, and condensed milk were all well-balanced to produce a visually and texturally pleasing product, the flavor still requires work to realize its full sensory potential. With a mean score of 3.48, texture—which was characterized as "soft and smooth"—was the most highly rated attribute in Formulation 2.

Formulation 3

According to the results, texture was the most valued feature in Formulation 3, with a mean score of 3.75 and a description of Very Soft and Smooth. These results showed that combining mashed squash, biscuits, and sweetened ingredients produced the most popular formulation, resulting in a well-rounded and appealing product in terms of both taste and texture.

Table 8
Descriptive Mean Scores and Ratings of the Food Experts on the Most Preferred Formulation among the Four Sensory Attributes of Squash (*Cucurbita maxima*) Munchkin as Biscuit Substitute

N=15

Attributes	Formulations							
	F0		F1		F2		F3	
	X	***VD***	***X***	***VD***	***X***	***VD***	***X***	***VD***
Color	8.26	LVM	8.2	LVM	8.00	LVM	8.33	LVM
Flavor	8.66	LE	8.33	LVM	8.13	LVM	7.93	LVM
Odor	8.6	LVM	8.26	LVM	8.46	LVM	8.46	LVM
Texture	8.53	LE	8.33	LVM	8.6	LVM	8.46	LVM

Legend:

8.50-9.0 **-***Like Extremely (LE)*	4.50-5.49 *-Neither Like nor Dislike (NLD)*
7.50-8.49 *-Like Very Much (LVM)*	3.50-4.49 *-Dislike Lightly (DL)*
6.50-7.49 *-Like Moderately (LM)*	2.50-3.49 *-Dislike Moderately (DM)*
5.50-6.49 *-Like Slightly (LS)*	1.50-2.49 *-Dislike Very Much (DVM)*

Formulation 0

Flavor, which fell into the "Like Extremely" category, was Formulation 0's most favored feature, with a mean score of 8.66. This suggests a very agreeable

flavor profile, the panel of experts said. Professional preferences indicate that these results demonstrate the careful integration of mashed squash, biscuits, and sweetened ingredients to create a formulation with high sensory appeal, especially in taste and aroma.

Formulation 1

The results showed that the flavor and texture of Formulation 1 were the most preferred aspects, with mean scores of 8.33, placing it in the "Like Very Much" category. These results suggest that Formulation 1 provided the experts with a comprehensive sensory experience. It wasn't the best, but it showed promise and could be improved with minor adjustments to the flavor or balance of ingredients.

Formulation 2

With mean scores of 8.60 and 8.46, respectively, falling into the Like Very Much category, the results demonstrated that texture and odor were two of Formulation 2's most sought-after attributes. These results showed that Formulation 2 was generally well-received, with its tactile and aromatic characteristics being particularly notable. The pleasant texture may be due to the addition of desiccated coconut and the fine consistency of the mashed squash, and the aroma suggests that the ingredients are interacting well. The acceptability of this formulation may increase with further improvement in flavor complexity.

Formulation 3

Color was the most favored feature in Formulation 3, according to the results, which had a mean score of 8.33, indicating a rating of "Like Very Much." These results suggest that while the formulation's texture and appearance were pleasing, its flavor may not have had the same effect as that of other formulations. Variations in the ingredient ratios, particularly those of the biscuit, squash, and sweet ingredients, may account for this. With a slight flavor change, Formulation 3 may achieve a more consistent expert preference across all sensory dimensions.

SENSORY ACCEPTABILITY OF SQUASH (*Cucurbita maxima*) MUNCHKIN AS BISCUIT SUBSTITUTE

The following is a list of respondents' descriptive preferences and sensory acceptability ratings for the squash (Cucurbita maxima) munchkin. The descriptive preferences and ratings of respondents regarding the sensory acceptability of squash (Cucurbita maxima) Munchkin as a biscuit substitute are presented to evaluate how consumers and food experts perceive the product across four formulation attributes: color, flavor, odor, and texture. These are essential in determining a product's overall acceptability, as they influence mouthfeel, visual appeal, taste satisfaction, and aroma perception. The evaluations were based on a 5-point Likert scale and were interpreted using standardized verbal descriptors that ranged from Very Much Acceptable to Very Much Unacceptable. Table 9 presents consumer descriptive ratings and preferences regarding the sensory acceptability of squash (Cucurbita maxima) Munchkin as a biscuit substitute, with a focus on the qualities of color, flavor, odor, and texture.

Table 9 shows the descriptive ratings and preferences of 60 consumers regarding the sensory acceptability of squash (*Cucurbita maxima*) munchkin as biscuit substitute, focusing on the attributes of color, flavor, odor, and texture.

Table 9
SENSORY ACCEPTABILITY OF SQUASH (*Cucurbita maxima*) MUNCHKIN AS BISCUIT SUBSTITUTE: TECHNO-GUIDE
N=75

Attributes	F_1			VD	F_2			VD	F_3			VD
	Con	Food Exp.	**Over-all Mean**		Con	Food Exp.	**Over-all Mean**		Con	Food Exp.	**Over-all Mean**	
Color	3.48	3.64	3.56	A	3.51	3.42	3.46	A	4.04	3.58	3.81	A
Flavor	2.98	2.98	2.98	UND	3.38	3.38	3.38	UND	3.93	3.64	3.78	A
Odor	3.17	3.02	3.09	UND	3.31	3.38	3.34	UND	3.87	3.67	3.77	A
Texture	3.34	3.07	3.20	UND	3.48	3.44	3.46	A	3.89	3.69	3.79	A
Grand Mean	3.24	3.18	3.18	UND	3.42	3.40	3.47	A	3.93	3.64	3.79	A

***Legend**: 4.21 – 5.00 Very Much Acceptable (VMA), 3.41 - 4.20 Acceptable (A), 2.61 – 3.40 Undecided (Und), 1.81- 2.60 Unacceptable (Una), 1.00 – 1.80 Very Much Unacceptable (VMU)*

The table displaying the findings of the sensory evaluation presents the participants' perceptions of the three different Squash Munchkin formulations in terms of color, flavor, odor, and texture. Both food specialists and consumers took part in the assessment. With an overall grand mean of 3.79, which is deemed acceptable (A), Formulation 3 continuously performed better than the other two in every category. The highest ratings for color (3.81), flavor (3.78), odor (3.77), and texture (3.79) indicate that this formulation was generally very popular.

Conversely, Formulation 1, which was categorized as Undecided (UND), had the lowest grand mean (3.18). Although its color was judged acceptable (3.56), its flavor (2.98), odor (3.09), and texture (3.20) were all rated as undecided, suggesting that the formulation balance needs improvement.

Overall, the results showed that the panelists preferred Formulation 3, which contained 150g of mashed squash, 50g of crushed biscuit, 30g of sugar, 100ml of condensed milk, and 50g of desiccated coconut. Formulation 2 outperformed F1 overall, especially in texture (3.46) and odor (3.34), and its moderate grand mean of 3.47 was within the Acceptable (A) range. The high ratings for each sensory attribute indicate that this ingredient combination provides a well-balanced flavor, appearance, and mouthfeel. It is therefore most appropriate for upcoming product development and potential sales.

SIGNIFICANT MEAN DIFFERENCES BETWEEN THE MOST PREFERRED FORMULATION ATTRIBUTES AND THE CONTROLLED FORMULATION OF SQUASH *(CUCURBITA MAXIMA)* MUNCHKIN

The significant mean differences between the four developed treatments were determined using the t-test. The t-test was used to determine which relationships between the sensory attributes were significant and which were not. The results provided a strong scientific basis for comparing the four treatments. The investigation aimed to draw a scientific conclusion based on the presented data.

Color

The following tables demonstrate how to apply an independent samples t-test to ascertain whether the mean differences between squash (Cucurbita maxima) munchkins and biscuits were statistically significant. The statistical approach determines whether the observed variations in sensory attributes are merely due to chance or statistically significant. There were no statistically significant differences between consumers' and food experts' assessments of the appearance of the two formulations. Because the evaluators believed the visual characteristics of the two squash munchkin versions were nearly identical, it can be inferred from the assessments of both groups that the formulation changes did not produce noticeable differences in appearance.

Table 10
Significant Difference on Color Attribute of the squash (*Cucurbita maxima*) munchkin as biscuit using Descriptive Test as Evaluated by Consumers

N=60

Compound Group	X	Standard Deviation	t-value	df	alpha	cv	Decision	Interpretation
F0	7.38	0.61010017	-0.7407206	59	0.05	59	Accept H_0	Insignificant
F3	7.47	0.60194287						

Table 11

Significant Difference on Color Attribute of the squash (*Cucurbita maxima*) munchkin as biscuit using Descriptive Test as Evaluated by Food Experts N=15

Compound Group	X	Standard Deviation	t-value	df	alpha	cv	Decision	Interpretation
F0	7.22	0.4114756	-0.4003815	14	0.05	14	Accept H_0	Insignificant
F3	7.29	0.41531527						

It can be seen in the table that both consumers and food experts rated the appearance similarly across the two formulations, with statistical analysis showing no significant differences. This indicates that the visual characteristics of both squash munchkin versions were perceived nearly identically by evaluators, suggesting the formulation changes did not produce noticeable differences in appearance according to either group's assessment.

Flavor

The table below shows the results of a comparison test between two types of squash munchkin biscuits. The findings provide practical guidance for developing squash munchkin recipes that better appeal to consumers' tastes.

Table 12

Significant Difference on Flavor Attribute of the squash (cucurbita maxima) munchkin as bicuit using Descriptive Test as Evaluated by Consumers

N=60

Compound Group	X	Standard Deviation	t-value	df	alpha	cv	Decision	Interpretation
F0	7.47	0.455971006	-1.41519293	59	0.05	2.00	Accept H_0	Insignificant
F3	7.31	0.61022878						

Table 13

Significant Difference on Flavor Attribute of the squash (*Cucurbita maxima*) munchkin as biscuit using Descriptive Test as Evaluated by Food Experts

N=15

Compound Group	X	Standard Deviation	t-value	df	alpha	cv	Decision	Interpretation
F0	7.53	0.32853692	-0.43495884	2.145	0.05	2.145	Accept H_0	Insignificant
F3	7.47	0.39440532						

The data in Table 12 showed that customers did not perceive a statistically significant difference in flavor between Formulation 0 and Formulation 3. Since the calculated t-value of -1.42 is less than the critical value of 2.00 at a 5% level of significance, the null hypothesis (H_0) is accepted. This implies that the change in ingredient proportion has no discernible effect on consumers' opinion of taste. Similarly, Table 13 displays the flavor evaluation of food experts, where the F-the mean score for Formulation 0 is slightly higher than the F-score for Formulation 33. Experts did not detect any appreciable flavor differences between the two formulations, as indicated by the t-value of -0.43, which is much lower than the critical value of 2.145. Finally, evaluations by consumers and experts confirm that Formulation 0 and Formulation 3 do not significantly differ in squash munchkin flavor. This suggests that the two versions have roughly equal levels of flavor.

Odor

The tables below demonstrate the test of significant mean differences in the odor attribute of squash (Cucurbita maxima) munchkin as a biscuit substitute using an independent samples t-test. This statistical method was used to determine whether the Munchkin differences in sensory scores between formulations are statistically significant or just the product of chance. Understanding these results aids in the development of consumer-friendly snack products. By examining the numerical results, we can determine whether differences in odor perception are helpful in real-world food applications.

Table 14

Significant Difference on Odor Attribute of the squash (*Cucurbita maxima)* munchkin as biscuit using Descriptive Test as Evaluated by Consumers

N=60

Compound Group	X	Standard Deviation	t-value	df	alpha	cv	Decision	Interpretation
F0	7.40	0.52364074	-1.14	59	0.05	2.00	Accept H_0	Insignificant
F3	7.29	0.55052335						

Table 15

Significant Difference on Oodr Attribute of the squash (*Cucurbita maxima*) munchkin as biscuit using Descriptive Test as Evaluated by Food Experts

N=15

Compound Group	X	Standard Deviation	t-value	df	alpha	cv	Decision	Interpretation
F0	7.56	0.43033148	-0.39	14	0.05	2.145	Accept H_0	Insignificant
F3	7.49	0.41531527						

Tables 14 and 15 demonstrate that, according to consumer and food expert opinions, there is no statistically significant difference in the odor attribute between Formulation 0 and Formulation 3. Since the t-values (-0.39 for experts and -1.14 for consumers) are less than their respective critical values (2.00 and 2.145), the null hypothesis (H_0) is accepted in both cases. These findings suggest that the variations in ingredient composition between F0 and F3 have no discernible effect on the odor of the squash munchkin. Although both formulations were evaluated favorably, the differences were not statistically significant. This demonstrates how consistently assessors perceive odor and validates the product's aromatic appeal.

Texture

The tables below compare the textures of two squash (Cucurbita maxima) munchkin formulations based on consumer and food expert evaluations using an independent samples t-test. This statistical method determines whether the observed differences in texture ratings are statistically significant or just the product of chance. The findings offer valuable suggestions for enhancing the textural qualities of the product, which are crucial for ensuring customer satisfaction.

Table 16

Significant Difference on Texture Attribute of the squash (*Cucurbita maxima*) munchkin as biscuit using Descriptive Test as Evaluated by Consumers

N=60

Compound Group	X	Standard Deviation	t-value	df	alpha	cv	Decision	Interpretation
F0	7.58	0.58424062	-2.06	59	0.05	2.00	Reject H_0	Significant
F3	7.39	0.608064654						

Table 17

Significant Difference on Texture Attribute of the squash (*Cucurbita maxima*) munchkin as biscuit using Descriptive Test as Evaluated by Food Experts

N=15

Compound Group	X	Standard Deviation	t-value	df	alpha	cv	Decision	Interpretation
F0	7.38	0.39574456	-0.63	14	0.05	2.145	Accept H_0	Insignificant
F3	7.49	0.65303524						

Tables 16 and 17 display the texture evaluation results for Squash Munchkin formulations. The consumer evaluation in Table 16 indicates that there is statistically significant texture difference between Formulation 0 and Formulation 3, with a t-value of -2.06, greater than the critical value of 2.00 at a

5% level of significance. The null hypothesis (H_0) was rejected, indicating that customers perceived a discernible difference in texture between the two formulations. However, Table 17's evaluation by food experts yielded a t-value of -0.63, which is less than the critical value of 2.145. Since the food experts did not find the texture difference between the two formulations to be statistically significant, the null hypothesis (H_0) appears to have been accepted.

In conclusion, consumers noticed a noticeable change in texture even though food experts did not. This suggests that customers are sensitive to texture and that it may have a greater impact on whether they accept the product overall. This illustrates the importance of tailoring texture enhancements to consumer preferences when creating new products.

CHAPTER III

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The most relevant outcomes of the sensory evaluation and analysis carried out for the obtained squash (Cucurbita maxima) in the shape of a munchkin as a biscuit are described in this chapter. It summarizes the findings of the results and provides suggestions for research, improvement of initial products, and prospective applications in the food sector. The discourse is based on sensory acceptability attributes, flavor, taste, odor, texture, and overall acceptance evaluated by consumer and expert panelists. In addition, this chapter demonstrates the possibility of using squash products as a healthier, sustainable alternative to conventional biscuits. It provides directions for future enhancements, methodological refinements, product development, and commercialization opportunities within the snack or functional food market.

Summary

The Cebu Technological University Daanbantayan Campus conducted research in the academic year 2024–2025 to evaluate the sensory acceptability of squash (Cucurbita maxima) munchkin to serve as an alternative biscuit replacement snack, focusing on a sustainable and nutrient-dense snack alternative. The dish comprised squash, crushed cookies, sugar, sweetened condensed milk, and desiccated coconut.

Seventy-five respondents, faculty experts and BSHM students, evaluated four formulations that varied in the amount of squash and biscuit. Organized

sensory assessment sheets assessed the samples based on color, taste, odor, and texture. Data were analysed using statistical measures (percentage, weighted mean, and ANOVA), which showed that the formulation groups differ significantly. Formulation 3 was finally selected as the most preferred due to an overwhelming balance of flavor, texture, and overall acceptability.

It is recommended that a Techno-Guide be developed to support small-scale production, campus-based food entrepreneurship, and further commercialization within the local food industry.

Conclusion

Based on the study's results, the researchers concluded that Formulation 3, which contained 150 grams of squash and 50 grams of biscuit, was the most favorable among the four treatments regarding sensory attributes, as rated by both consumer and expert respondents.

This formulation contained 50 grams of desiccated coconut, 100 100 mL of evaporated milk, and 30 grams of sugar, all adding to its pleasing taste, texture, and well-balanced flavor. With a Verbal Description (VD) of "Acceptable (A)" and the highest Grand The mean of 3.73, it was the most sensory-accepted. The ANOVA analysis showed significant differences based on the consumer panel's evaluation of taste and odor. But there were no noticeable differences in color or texture. The skilled assessors found substantial variations in every sensory attribute, suggesting a more thorough and astute data analysis. This indicates that general consumers might pay attention to dominant features, and that professional

advice is essential for product development and improvement. Formulation 3 showed the most agreeable and well-balanced sensory profile overall, which makes it a viable choice for additional improvement. It is highly recommended for further research, small-scale production, and marketing, especially as a nutritious substitute for biscuits in schools and local food service establishments. A Techno-Guide should be developed to promote standardization and help prospective entrepreneurs successfully replicate the product.

Recommendation

Future researchers, product developers, and innovators working in academic institutions and the food service sector may find this helpful study. It supports targeted efforts in sustainable food innovation, health-conscious snack alternatives, and consumer-driven product refinement. The following suggestions are put forth in light of the findings and conclusions:

- **Refine the formulation** of the Squash Munchkin by experimenting with slight adjustments to squash, biscuit, and desiccated coconut proportions to enhance flavor, texture, and overall sensory balance.
- **Conduct shelf-life and storage studies** to evaluate the product's physical and microbiological stability and determine appropriate packaging methods that ensure quality and food safety.
- **Broaden the scope of sensory evaluations** by including a more diverse group of respondents across different age ranges, lifestyles, and geographic locations to assess wider market acceptability.

- **Perform a market feasibility and cost-benefit analysis** to explore the commercial viability of the most preferred formulation, considering production scalability, affordability, packaging, and distribution strategies.

CHAPTER IV

OUTPUT

OF

THE STUDY

TECHNO GUIDE IN SQUASH (*Cucurbita maxima*) MUNCHKIN AS BISCUIT SUBSTITUTE

Proprietors:

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LOVELLA CHRISTIANNE A. GULLE, Ph.D.

Techno-Guide in Squash Munchkin

II. Introduction

Making Squash (Cucurbita maxima) Munchkin, a biscuit substitute made with biscuit, sugar, condensed milk, and dried coconut, is made easier with the help of this Techno-Guide. It aims to equip pupils, creative minds, and entrepreneurs with the abilities to create sustainable and nutritious snacks using locally sourced tropical ingredients. The guide also recommends using scientific sensory evaluation techniques to improve quality and increase consumer satisfaction.

II. Rationale

Squash-based delicacies are increasingly recognized for their nutritional value and versatility in culinary applications, especially in promoting local and sustainable food innovations. With their soft texture, natural sweetness, and rich nutritional content, squashes, particularly the munchkin variety, offer a promising base for creative and health-oriented snack formulations.

Filipinos have long used squash in a variety of savory and sweet dishes. Through structured sensory evaluation and controlled formulation adjustments, this research aims to identify the most acceptable version of the product and contribute to the development of innovative, nutritious, and culturally relevant snack options.

III. Objectives

- **To provide step-by-step procedures** for preparing a squash-based delicacy using tested and accepted culinary methods, incorporating squash, biscuit, sugar**,** condensed milk**,** and desiccated coconut, ensuring desirable texture, flavor, and sensory acceptability.
- **To promote indigenous ingredients**, such as squash and coconut, in product development, highlighting their nutritional benefits and supporting cost-effective, locally available food sources.
- **To disseminate food innovation knowledge and technology** to Community-Based Organizations (CBOs) and Small Food Enterprises (SFEs), enhancing local livelihood opportunities through squash-based product development.

- **To ensure that the squash munchkin formulation is safe and of good quality** by following the proper steps for handling food, processing it cleanly, and packing it correctly.

- **To encourage innovation and entrepreneurship in local communities** by making a value-added product from squash and coconut that encourages culinary creativity, cultural relevance, and adaptability to changing customer tastes.

IV. Implementation

Using the squash munchkin as a biscuit substitute was organized and methodical. The first step was planning, during which the researchers gathered necessary raw materials, including fresh squash, crushed biscuits, sugar,

condensed milk, and desiccated coconut, and thoroughly reviewed relevant literature, during which multiple trial batches were prepared using varying ingredient ratios to determine the most acceptable formulation based on sensory attributes. Following the selection of the final formulation, seventy-five (75) respondents—consisting of BSHM staff members who were food experts and students who were consumers—participated in a sensory evaluation. Taste, texture, aroma, and general acceptability were used to evaluate the product. The data analysis phase was guided by the feedback received. Statistical tools such as percentage, weighted mean, and ANOVA were used to interpret the results, evaluate the product's viability, and identify areas for potential improvement. In the output development stage, the final product was refined, the complete formulation and evaluation process was thoroughly documented, and this Techno-Guide was developed to support future replication, encourage food innovation, and assist in the potential commercialization of the squash munchkin product within the food service and hospitality industry.

V. Materials

The following are the ingredients, utensils, and equipment of Squash Munchkin as a biscuit substitute, as a technology adoption of a product. There is a need to follow the procedure and the ingredients needed.

Ingredients:

150 grams Squash
30 grams Sugar
50 grams Desiccated Coconut
50 grams Biscuit
100ml Condensed Milk

Utensils and Equipment:

Measuring Cup	Mixing Bowl
Steamer	Food Masher
Cutting Board	Plate
Chef's Knife	Food Safe Packaging
Tablespoon and Fork	Small Bowls

VI. Methods

1. Sanitize all utensils, tools, and equipment using a 5ppm hypochlorite solution to ensure cleanliness and food safety. This includes bowls, knives, chopping boards, steamers, measuring cups, and any surface that will come into contact with the ingredients. Peel the squash thoroughly to remove the tough outer skin using a clean knife or vegetable peeler. eliminating some necessary ingredients to prevent the finished product from having an undesirable texture or bitterness.
2. Peel the squash and steam it until it's small. In a steamer set over boiling water, cook the squash pieces for 10 to 15 minutes, or until they are completely tender.
3. Once the squash has steamed, take it off the heat and let it cool at room temperature for a few minutes.
4. After cooling, transfer the steamed squash to a sanitized mixing bowl and mash it with a spoon, potato masher, or fork. Mash the squash until it's lump-free and smooth. The aim is a pleasing and uniform texture that will mix well with the other ingredients and create a cohesive mixture. Add the

main ingredients into the mashed squash one at a time. Add the sugar to add sweetness, pour the condensed milk, and gradually add the crushed biscuits while mixing, using a scooper or spoon, portion the mixture, then roll it between clean hands into small, uniform balls roughly the size of a typical munchkin. Ensure that every ball is smooth and compact. The presentation of the finished product is enhanced by consistent sizing, which also guarantees consistent texture and setting after refrigeration.

5. Roll each squash ball in desiccated coconut by gently pressing and turning it in a shallow bowl filled with coconut. Make sure each ball is fully coated on all sides. The desiccated coconut adds an appealing texture and flavor contrast while giving the munchkins a visually attractive finish.
6. Arrange the coated squash munchkins neatly on a clean serving tray or place them in food-grade containers. Line the trays or containers with wax or parchment paper to prevent sticking. Ensure enough space between each ball so they do not touch.
7. Refrigerate the prepared squash munchkins for at least 30 minutes before serving. This crucial step allows the mixture to firm up and hold its shape. Chilling also enhances the flavor and texture of the munchkins, making them more pleasant to eat and easier to handle when packaging or presenting.

BROCHURE

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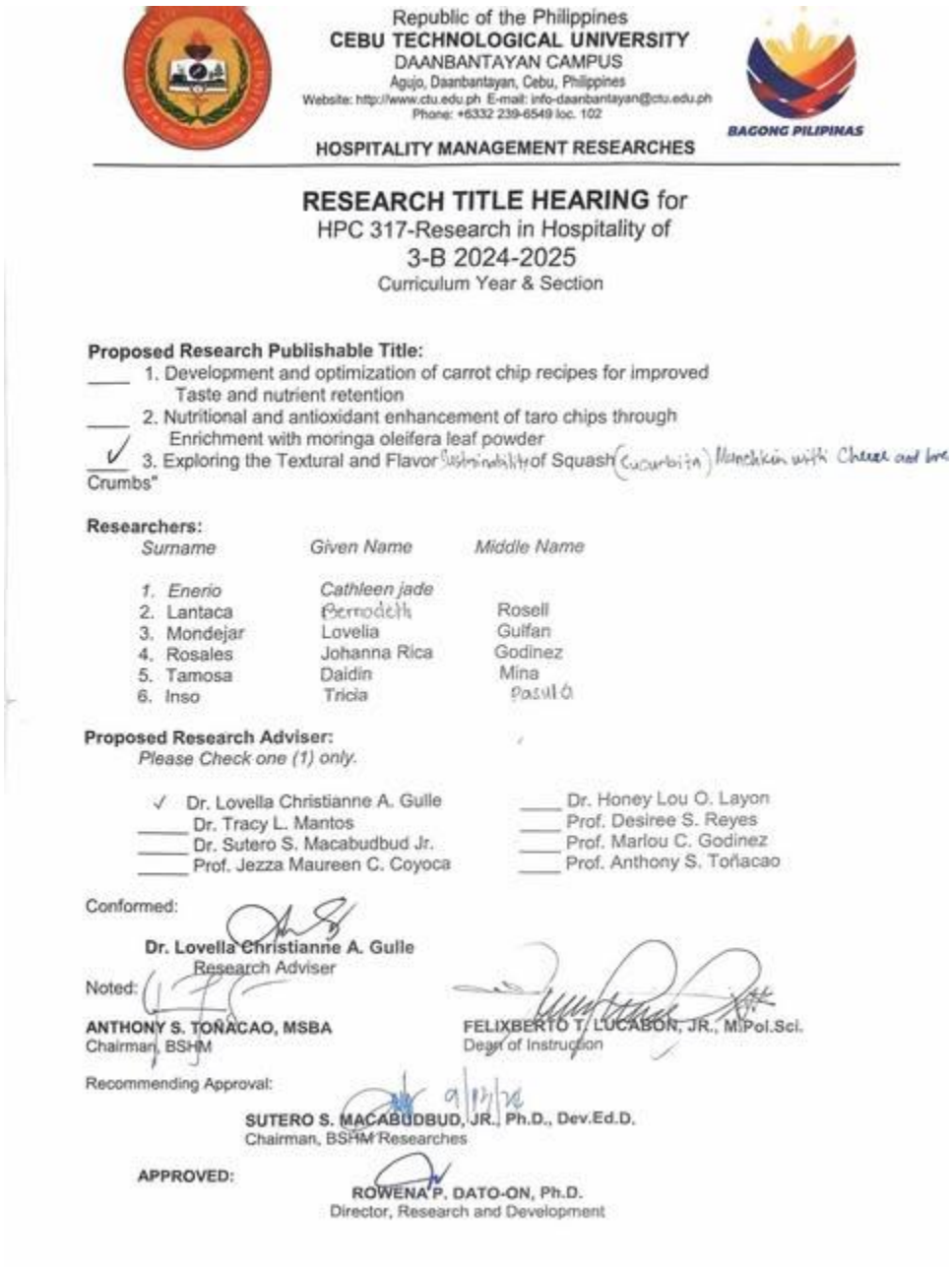
APPENDICES

Appendix A

Approved Title



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BAGONG PILIPINAS

HOSPITALITY MANAGEMENT RESEARCHES

RESEARCH TITLE HEARING for
HPC 317-Research in Hospitality of
3-B 2024-2025
Curriculum Year & Section

Proposed Research Publishable Title:

____ 1. Development and optimization of carrot chip recipes for improved Taste and nutrient retention
____ 2. Nutritional and antioxidant enhancement of taro chips through Enrichment with moringa oleifera leaf powder
__✓__ 3. Exploring the Textural and Flavor Sustainability of Squash (Cucurbita) Munchkin with Cheese and Bre Crumbs"

Researchers:

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3.	Mondejar	Lovelia	Gulfan
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APPROVED:

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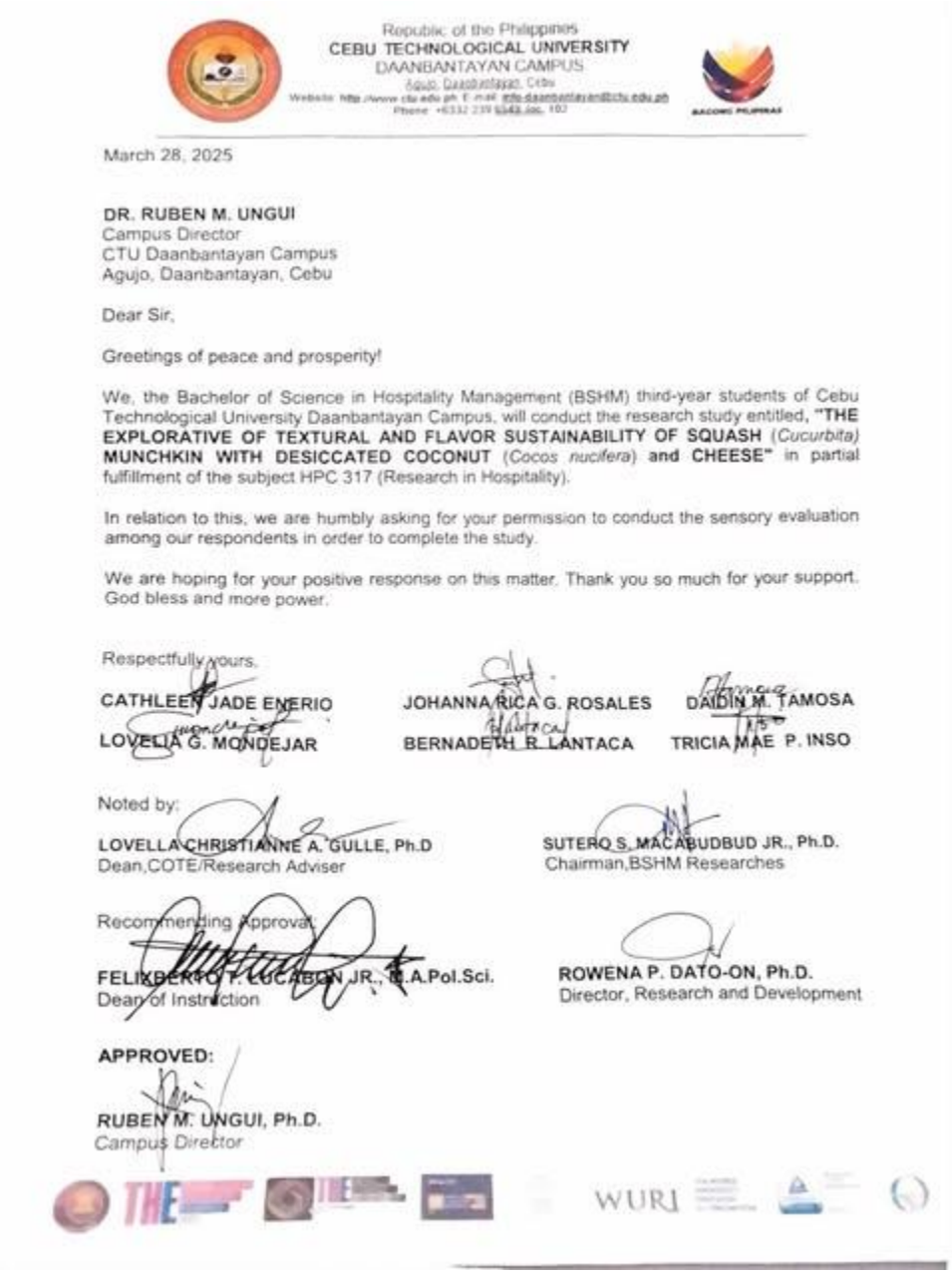
Director, Research and Development

Appendix B

Approved Request Letter



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BACONG PILIPINAS

March 28, 2025

DR. RUBEN M. UNGUI
Campus Director
CTU Daanbantayan Campus
Agujo, Daanbantayan, Cebu

Dear Sir,

Greetings of peace and prosperity!

We, the Bachelor of Science in Hospitality Management (BSHM) third-year students of Cebu Technological University Daanbantayan Campus, will conduct the research study entitled, **"THE EXPLORATIVE OF TEXTURAL AND FLAVOR SUSTAINABILITY OF SQUASH** (*Cucurbita*) **MUNCHKIN WITH DESICCATED COCONUT** (*Cocos nucifera*) **and CHEESE"** in partial fulfillment of the subject HPC 317 (Research in Hospitality).

In relation to this, we are humbly asking for your permission to conduct the sensory evaluation among our respondents in order to complete the study.

We are hoping for your positive response on this matter. Thank you so much for your support. God bless and more power.

Respectfully yours,

CATHLEEN JADE ENERIO — **JOHANNA RICA G. ROSALES** — **DAIDIN M. TAMOSA**
LOVELIA G. MONDEJAR — **BERNADETH R. LANTACA** — **TRICIA MAE P. INSO**

Noted by:

LOVELLA CHRISTIANNE A. GULLE, Ph.D
Dean,COTE/Research Adviser

SUTERO S. MACABUDBUD JR., Ph.D.
Chairman,BSHM Researches

Recommending Approval:

FELIXBERTO T. LUCABON JR., E.A.Pol.Sci.
Dean of Instruction

ROWENA P. DATO-ON, Ph.D.
Director, Research and Development

APPROVED:

RUBEN M. UNGUI, Ph.D.
Campus Director

Appendix C

Sample Questionnaires

SENSORY EVALUATION RUBRICS FOR THE DEVELOPMENT AND SENSORY EVALUATION OF SENSORY ACCEPTABILITY OF SQUASH (Cucurita maxima) MUNCHKIN AS BISCUIT SUBSTITUTE: TECHNO GUIDE

Dear Ma'am/Sir,

Greetings of Joy and Harmony!

We, the Bachelor of Science in Hospitality Management (BSHM) students of Cebu Technological University – Daanbantayan Campus currently conducting our research study entitled **"SENSORY ACCEPTABILITY OF SQUASH (Cucurita maxima) MUNCHKIN AS BISCUIT SUBSTITUTE: TECHNO GUIDE" at this campus.**

In this regard, we kindly request a few minutes of your time to complete this evaluation. Please take a moment to read carefully all parameters, which will help you make an informed decision about your voluntary participation. In compliance with ethical research standards, your identity and responses will remain strictly confidential. Pursuant to RA No.10173 also known as the Data Privacy Act of 2012, the data collected by the researchers will be protected and anonymized and used solely for research and academic purposes only. Thank you for sharing your valuable time in answering this rubric. God Bless.

Name (Optional): _____ Sex: _____ Age: _____ Date: _____

Instruction: Please evaluate the labeled samples based on the given description. Check the description appropriately for each attribute. If you have food allergy, kindly refrain from tasting the samples. Please don't forget to drink water every after tasting each sample.

	Sample Code			
Color	**001**	**002**	**003**	**004**
(5) Golden Brown	___	___	___	___
(4) Dark Brown	___	___	___	___
(3) Medium Brown	___	___	___	___
(2) Brown	___	___	___	___
(1) Yellow	___	___	___	___
Flavor				
(5) Balanced Sweet	___	___	___	___
(4) Acceptably Sweet	___	___	___	___
(3) Moderately Sweet	___	___	___	___
(2) Very Sweet	___	___	___	___
(1) Excessively Sweet	___	___	___	___
Odor				
(5) Most Pleasant	___	___	___	___
(4) Very Pleasant	___	___	___	___
(3) Pleasant	___	___	___	___
(2) Less Pleasant	___	___	___	___
(1) Not Pleasant	___	___	___	___
Texture				
(5) Most Soft and Smooth	___	___	___	___
(4) Very soft and Smooth	___	___	___	___
(3) Soft and Smooth	___	___	___	___
(2) Less Soft and Smooth	___	___	___	___
(1) Not Soft and Smooth	___	___	___	___

Comments/Suggestions

_____

_____

SENSORY EVALUATION RUBRICS FOR THE DEVELOPMENT AND SENSORY EVALUATION OF SENSORY ACCEPTABILITY OF SQUASH (Cucurita maxima) MUNCHKIN AS BISCUIT SUBSTITUTE: TECHNO GUIDE

Dear Ma'am/Sir,

Greetings of Joy and Harmony!

We, the Bachelor of Science in Hospitality Management (BSHM) students of Cebu Technological University – Daanbantayan Campus currently conducting our research study entitled "**SENSORY ACCEPTABILITY OF SQUASH (Cucurita maxima) MUNCHKIN AS BISCUIT SUBSTITUTE: TECHNO GUIDE**" at this campus.

In this regard, we kindly request a few minutes of your time to complete this evaluation. Please take a moment to read carefully all parameters, which will help you make an informed decision about your voluntary participation. In compliance with ethical research standards, your identity and responses will remain strictly confidential. Pursuant to RA No.10173 also known as the Data Privacy Act of 2012, the data collected by the researchers will be protected and anonymized and used solely for research and academic purposes only. Thank you for sharing your valuable time in answering this rubric. God Bless.

Name (Optional): _____ Sex: _____ Age: _____ Date: _____

Instruction: Please evaluate the labeled samples based on the given description. Check the description appropriately for each attribute. If you have food allergy, kindly refrain from tasting the samples. Please don't forget to drink water every after tasting each sample.

	Sample Code			
	001	002	003	004
Color	___	___	___	___
Flavor	___	___	___	___
Odor	___	___	___	___
Texture	___	___	___	___

(9)-Point Hedonic Scale

(9) - Like Extremely
(8) - Like Very Much
(7) - Like Moderately
(6) - Like Slightly
(5) - Neither like or dislike
(4) - Dislike Slightly
(3) - Dislike moderately
(2) - Dislike very much
(1) –Dislike extremely

Comments/suggestions:

_____

Appendix D

Tally Result Score Sheet
Descriptive Test (Trial 1)

(N=60)

Formulations	Sensory Attributes																							
	Color					Total	Odor					Total	Taste					Total	Texture					Total
	5	4	3	2	1		5	4	3	2	1		5	4	3	2	1		5	4	3	2	1	
Formulation 0	0	15	23	13	9	60	0	2	37	12	9	60	0	0	3	20	37	60	0	18	13	23	6	60
Formulation 1	0	3	45	12	0	60	0	1	43	14	2	60	0	0	5	39	16	60	0	32	10	16	2	60
Formulation 2	0	1	42	15	2	60	0	1	43	14	2	60	0	0	5	38	17	60	0	16	23	15	6	60
Formulation 3	0	3	46	11	0	60	0	10	49	1	0	60	0	3	46	11	0	60	0	33	19	7	1	60

(N=15)

Formulations	Sensory Attributes																							
	Color					Total	Odor					Total	Taste					Total	Texture					Total
	5	4	3	2	1		5	4	3	2	1		5	4	3	2	1		5	4	3	2	1	
Formulation 0	0	2	7	4	2	15	0	1	9	5	0	15	0	0	2	7	6	15	0	5	6	4	0	15
Formulation 1	0	0	11	4	0	15	0	0	6	9	0	15	0	0	0	7	8	15	0	2	6	4	3	15
Formulation 2	0	2	11	2	0	15	0	1	10	4	0	15	0	2	12	1	0	15	0	4	8	3	0	15
Formulation 3	0	1	11	3	0	15	0	4	11	0	0	15	0	4	9	2	0	15	0	5	4	4	2	15

Tally Result Score Sheet
Descriptive Test (Trial 2)

(N=60)

Formulations	Sensory Attributes																							
	Color					Total	Odor					Total	Taste					Total	Texture					Total
	5	4	3	2	1		5	4	3	2	1		5	4	3	2	1		5	4	3	2	1	
Formulation 0	0	22	26	12	0	60	0	8	39	10	3	60	0	8	22	21	9	60	0	39	14	2	5	60

Formulation 1	0	16	34	10	1	60	0	4	38	16	2	60	0	2	18	36	4	60	0	30	23	3	4	60
Formulation 2	0	24	30	6	0	60	0	13	38	9	0	60	0	14	30	15	1	60	0	36	21	1	2	60
Formulation 3	0	24	30	6	0	60	0	27	31	2	0	60	0	10	40	7	3	60	0	47	9	1	3	60

(N=15)

Formulations	Sensory Attributes																						
	Color					Total	Odor					Total	Taste					Total	Texture					Total
	5	4	3	2	1		5	4	3	2	1		5	4	3	2	1		5	4	3	2	1	
Formulation 0	0	2	3	10	0	15	O	0	7	7	1	15	0	0	3	6	6	15	0	4	3	6	2	15
Formulation 1	0	8	7	0	0	15	0	8	6	1	0	15	0	4	10	1	0	15	0	14	1	0	0	15
Formulation 2	0	2	8	5	0	15	0	3	11	1	0	15	0	0	11	4	0	15	0	10	3	2	1	15
Formulation 3	0	7	5	3	0	15	0	7	6	2	0	15	0	7	3	4	0	15	0	13	2	0	0	15

Tally Result Score Sheet
Descriptive Test (Trial 3)

(N=60)

Formulations	Sensory Attributes																						
	Color					Total	Odor					Total	Taste					Total	Texture					Total
	5	4	3	2	1		5	4	3	2	1		5	4	3	2	1		5	4	3	2	1	
Formulation 0	33	16	6	3	2	60	14	27	17	2	0	60	24	22	13	0	1	60	20	26	13	1	0	60
Formulation 1	39	15	4	2	0	60	19	24	16	1	0	60	28	20	10	2	0	60	17	29	11	3	0	60
Formulation 2	37	17	4	2	0	60	21	23	13	3	0	60	26	25	8	1	0	60	17	30	11	2	3	60
Formulation 3	28	22	5	5	0	60	28	14	16	0	0	60	27	22	11	0	0	60	28	18	11	3	0	60

(N=15)

Formulations	Sensory Attributes																					
	Color					Total	Odor					Total	Taste					Total	Texture					Total
	5	4	3	2	1		5	4	3	2	1		5	4	3	2	1		5	4	3	2	1	
Formulation 0	0	9	2	0	0	15	3	2	10	0	0	15	7	5	3	0	0	15	3	7	5	0	0	15
Formulation 1	12	2	0	1	0	15	4	4	7	0	0	15	7	5	3	0	0	15	4	9	2	0	0	15
Formulation 2	10	3	1	1	0	15	2	10	2	1	0	15	6	6	1	0	0	15	2	3	9	3	0	15
Formulation 3	11	2	2	0	0	15	6	5	3	1	0	15	9	5	1	0	0	15	2	11	2	0	0	15

Tally Result Score Sheet
9-Point Hedonic Scale (Trial 1)

(N=60)

9-Point Hedonic Scale	F0				F1				F2				F3			
	F	O	C	T	F	O	C	T	F	O	C	T	F	O	C	T
9-Like Extremely	0	0	0	0	o	0	0	0	0	0	2	0	0	0	0	1
8-Like Very Much	16	8	16	21	10	15	17	14	7	12	14	11	9	13	10	14
7-Like Moderately	12	25	18	14	20	25	19	21	20	15	17	13	17	16	18	18
6-Like Slightly	19	21	13	17	22	14	18	17	19	24	19	23	15	17	18	17
5-Neither Like nor Dislike	9	5	7	4	4	3	5	5	11	8	8	7	12	9	13	4
4-Dislike Slightly	3	0	5	2	3	3	1	3	0	1	0	3	4	3	1	4
3-Dislike Moderately	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0
2-Dislike Very Much	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-Dislike Extremely	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

(N=15)

9-Point Hedonic Scale	F0				F1				F2				F3			
	C	F	O	T	C	F	O	T	C	F	O	T	C	F	O	T

9-Like Extremely	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-Like Very Much	1	3	4	3	2	4	4	4	0	2	4	5	4	4	2	4
7-Like Moderately	3	6	4	3	6	5	4	6	2	8	9	6	3	5	11	6
6-Like Slightly	5	5	6	5	6	5	3	1	11	4	1	4	6	4	2	3
5-Neither Like nor Dislike	6	1	1	1	1	1	4	4	2	0	0	0	2	2	0	2
4-Dislike Slightly	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
3-Dislike Moderately	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-Dislike Very Much	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-Dislike Extremely	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

Tally Result Score Sheet
9-Point Hedonic Scale (Trial 2)

(N=60)

9-Point Hedonic Scale	F0				F1				F2				F3			
	F	O	C	T	F	O	C	T	F	O	C	T	F	O	C	T
9-Like Extremely	10	12	5	15	17	13	20	19	12	14	22	14	17	10	18	12
8-Like Very Much	33	13	23	26	20	17	28	18	20	23	18	17	15	19	20	17
7-Like Moderately	6	22	27	12	15	23	9	10	18	15	8	20	19	20	16	13
6-Like Slightly	9	11	8	12	8	6	2	7	5	5	5	1	5	9	4	10
5-Neither Like nor Dislike	1	1	1	1	0	0	1	4	3	3	3	6	3	1	1	7
4-Dislike Slightly	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0
3-Dislike Moderately	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
2-Dislike Very Much	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-Dislike Extremely	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

(N=15)

9-Point Hedonic Scale	F0				F1				F2				F3			
	C	F	O	T	C	F	O	T	C	F	O	T	C	F	O	T
9-Like Extremely	1	0	1	1	2	0	0	2	1	0	0	0	1	1	1	3
8-Like Very Much	6	5	5	4	5	7	3	4	4	5	4	5	3	6	4	4
7-Like Moderately	7	8	7	6	6	4	9	9	8	8	8	5	6	5	5	3
6-Like Slightly	1	2	2	3	2	4	2	2	2	2	3	4	4	3	4	3
5-Neither Like nor Dislike	0	0	1	1	0	0	1	1	0	0	0	1	1	0	1	2
4-Dislike Slightly	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3-Dislike Moderately	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-Dislike Very Much	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-Dislike Extremely	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

Tally Result Score Sheet
9-Point Hedonic Scale (Trial 3)

(N=60)

9-Point Hedonic Scale	F0				F1				F2				F3			
	C	F	O	T	C	F	O	T	C	F	O	T	C	F	O	T
9-Like Extremely	23	20	24	18	13	17	17	13	16	20	12	17	23	26	17	23
8-Like Very Much	31	35	27	35	38	28	27	35	39	32	38	37	28	21	29	25
7-Like Moderately	5	5	9	6	8	14	13	11	5	7	10	8	8	13	11	11
6-Like Slightly	1	0	0	1	1	1	3	0	0	1	0	0	1	0	2	1

5-Neither Like nor Dislike	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4-Dislike Slightly	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3-Dislike Moderately	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-Dislike Very Much	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-Dislike Extremely	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

(N=15)

9-Point Hedonic Scale	F0				F1				F2				F3			
	C	F	O	T	C	F	O	T	C	F	O	T	C	F	O	T
9-Like Extremely	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-Like Very Much	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
7-Like Moderately	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2
6-Like Slightly	9	5	5	7	11	10	11	10	11	13	8	6	5	3	6	4
5-Neither Like nor Dislike	5	10	10	8	4	5	4	5	4	2	7	9	8	10	8	9
4-Dislike Slightly	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3-Dislike Moderately	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-Dislike Very Much	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-Dislike Extremely	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15

Appendix F

Documentation

CURRICULUM

VITAE

PERSONAL INFORMATION

Name : Johanna Rica G. Rosales
Age : 22
Birthdate : March 18, 2003
Birthplace : Kawit, Medellin, Cebu
Religion : Roman Catholic
Citizenship : Filipino
Gender : Female
Mobile number : 09311267519
Father's name : Mr. Recardo M. Rosales
Mother's name : Mrs. Jovelyn G. Rosales

EDUCATIONAL ATTAINMENT

Tertiary

School : Cebu Technological University – Daanbantayan Campus
campus Address : Agujo, Daanbantayan, Cebu
Course : Bachelor of Science in Hospitality Management
Year graduated : On going

Secondary

School : Kawit National High School
Address : Kawit, Medellin, Cebu
Year graduated : 2021-2022

Primary

School : Kawit Elementarty School
Address : Kawit, Medellin, Cebu
Year graduated : 2014-2015

PERSONAL INFORMATION

Name : Cathleen Jade Enerio

Age : 23

Birthdate : August 22, 2001

Birthplace : Poblacion, Daanbantayan, Cebu

Religion : Roman Catholic

Citizenship : Filipino

Gender : Female

Mobile number : 09632130830

Father's name : Mr. Luis A. Capangpangan

Mother's name : Mrs. Mary Grace Enerio

EDUCATIONAL ATTAINMENT

Tertiary

School : Cebu Technological University – Daanbantayan Campus
campus Address : Agujo, Daanbantayan, Cebu

Course : Bachelor of Science in Hospitality Management

Year graduated : On going

Secondary

School : Daanbantayan National High School

Address : Poblacion Daanbantayan, Cebu

Year graduated : 2021-2022

Primary

School : Daanbantayan Central School

Address : Poblacion Daanbantayan, Cebu

Year graduated : 2014-2015

PERSONAL INFORMATION

Name	: Tricia Mae P. Inso
Age	: 21
Birthdate	: July 19, 2003
Birthplace	: Tindog, Medellin, Cebu
Religion	: Roman Catholic
Citizenship	: Filipino
Gender	: Female
Mobile number	: 09615652316
Father's name	: Mr. Jose Dunge M. Inso
Mother's name	: Mrs. Felna P. Inso

EDUCATIONAL ATTAINMENT

Tertiary

School	: Cebu Technological University – Daanbantayan Campus
campus Address	: Agujo, Daanbantayan, Cebu
Course	: Bachelor of Science in Hospitality Management
Year graduated	: On going

Secondary

School	: Curva National High School
Address	: Curva, Medellin, Cebu
Year graduated	: 2021-2022

Primary

School	: Tindog Elementary School
Address	: Tindog, Medellin, Cebu
Year graduated	: 2014-2015

PERSONAL INFORMATION

Name : Daidin M. Tamosa

Age : 22

Birthdate : November 25, 2001

Birthplace : Tindog, Medellin, Cebu

Religion : Roman Catholic

Citizenship : Filipino

Gender : Female

Mobile number : 09628403937

Father's name : Mr. Gilson B. Tamosa

Mother's name : Mrs. Nova M. Tamosa

EDUCATIONAL ATTAINMENT

Tertiary

School : Cebu Technological University – Daanbantayan Campus

campus Address : Agujo, Daanbantayan, Cebu

Course : Bachelor of Science in Hospitality Management

Year graduated : On going

Secondary

School : Curva National High School

Address : Curva, Medellin, Cebu

Year graduated : 2021-2022

Primary

School : Tindog Elementary School

Address : Tindog, Medellin, Cebu

Year graduated : 2014-2015

PERSONAL INFORMATION

Name : Lovelia G. Mondejar

Age : 21

Birthdate : November 19, 2003

Birthplace : Poblacion Daanbantayan Cebu

Religion : Roman Catholic

Citizenship : Filipino

Gender : Female

Mobile number : 09364354697

Father's name : Mr. Enrique D. Mondejar

Mother's name : Mrs. Sonia C. Gulfan

EDUCATIONAL ATTAINMENT

Tertiary

School : Cebu Technological University – Daanbantayan Campus

campus Address : Agujo, Daanbantayan, Cebu

Course : Bachelor of Science in Hospitality Management

Year graduated : On going

Secondary

School : Daanbantayan National High School

Address : Poblacion, Daanbantayan, Cebu

Year graduated : 2020-2021

Primary

School : Daanbantayan Central School

Address : Poblacion, Daanbantayan, Cebu

Year graduated : 2014-2015

PERSONAL INFORMATION

Name : Bernadeth R. Lantaca

Age : 20

Birthdate : October 3, 2004

Birthplace : Poblacion, Daanbantayan, Cebu

Religion : Roman Catholic

Citizenship : Filipino

Gender : Female

Mobile number : 09093989284

Father's name : Mr. Bernardo Lantaca

Mother's name : Mrs. Maricel C. Rosell

EDUCATIONAL ATTAINMENT

Tertiary

School : Cebu Technological University – Daanbantayan Campus

campus Address : Agujo, Daanbantayan, Cebu

Course : Bachelor of Science in Hospitality Management

Year graduated : On going

Secondary

School : Daanbantayan National High School

Address : Poblacion, Daanbantayan, Cebu

Year graduated : 2020-2021

Primary

School : Daanbantayan Central School

Address : Poblacion, Daanbantayan, Cebu

Year graduated : 2014-2015