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1. All articles must have a high degree of scholarship;
2. All articles must be evaluated thru double-blind system by selected referees for publication;
3. The articles may either be written in English or Filipino. All articles written in either languages must be accompanied by an Abstract which is written in English;
4. All contributions must be original;
5. Articles must use APA style sheet; and,
6. Articles must be typed single-spaced, Times New Roman 11 pts on letter-sized (8 x11) paper in not more than twelve (12) pages.

GLOBAL RESEARCHERS ASSOCIATION AND CONVERGENCE FOR EXCELLENCE (GRACE) INC.

Global Researchers Journal
Volume 12 November 2024

EDITORIAL BOARD

TABLE OF CONTENTS

09 **COMMON EFFECT OF CORONA VIRUS 2019 PANDEMIC AMONG FOOD VENDOR AT EMPLOYEES VILLAGE BARANGAY FATIMA GENERAL SANTOS CITY**
Charish M. Estebe, Leah Mae M. Maygay, Geraldine Mariano Salvador, Dessiree Joyce I. Pacanza

17 **DESIGN PREFERENCE OF LOW-COST STREET FOOD CART IN KORONADAL CITY, SOUTH COTABATO**
Loven Mae D. Alisasis, Jeannica B. Abatayo Rose Jean M. Dejesa, Lorainne Joyce B. Siaotong

24 **ACCEPTABILITY OF SENSORY PROFILE OF NATIVE CHICKEN SOUP (*NATIVE TINOLANG MANOK*) USING DIFFERENT LOCAL VEGETABLES: A NEW TASTE FOR GENERATION Z**
Jester L. Pasinag, LPT, Shelmer D. Carigaba, LPT, Kirk Jing T. Jainar, LPT, Debbie Joy L. Arrivas, LPT, MAT

33 **EFFECTIVENESS OF TARO FLOUR IN CAKE BAKING**
Jonna Liza P. Menson, MAST, LPT, Rommel Buhian, LPT, Joven M. Defacto, LPT, John D. Echevere, LPT

41 **SHELF-LIFE ANALYSIS OF TUNA: A COMPARATIVE REVIEW OF PACKAGING AND NON-PACKAGING EFFECTS**
Kriztee Anjielyn J. Alboroto, LPT; Grace Joy E. Castañeda, LPT; Lady Praise A. Panaguiton, LPT, Joan Liezl M. Lamasan, LPT

52 **EVALUATING THE IMPACT OF MARINADE TIME ON FLAVOR INTENSITY OF GRILLED CHICKEN**
Lester Jay I. Liba, LPT; Patrisha Kate V. Daguro, LPT, Wilmar Labrador Intes, LPT; Stanley Dayaday, LPT

GRACE INC

TABLE OF CONTENTS

64 | **PLANNING AND MANAGING FOOD CHOICES AND QUANTITIES DURING PEAK SEASONS: AN INVESTIGATIVE STUDY OF SELECTED RESTAURANTS**
Rhea O. Agor, Lovely Joy P. Utlang, Marilyn F. Juezan, Sweetziel Jane M. Bacayo

70 | **A CULINARY JOURNEY: EXPLORING UNIQUE DELICACIES OF MANOBO IP'S IN KULAMAN-SNA**
Beverly G. Cornelio, Mary Grace V. Baptista, Noelyn A. Elegino, Marian Joy Ortizo

76 | **HARAM CONCEPT: A STORYLINE IN MIXING ALCOHOLIC DRINKS IN FOOD SERVICE MANAGEMENT AMONG MUSLIM STUDENTS**
Noraisa B. Ampuan, Wahida G. Gaus Jonalyn L. Lipura, Anuar Ibrahim E. Gampong

86 | **PROMOTING VERTICAL GARDENING IN TEACHING AGRICULTURE AND FISHERY ARTS IN PUBLIC ELEMENTARY SCHOOLS**
Crizalyn A. Arellano, Romeo M. Guillo Jr.

94 | **PRODUCT DEVELOPMENT OF FROG MEAT AND MALUNGGAY LEAVES IN MAKING BURGER PATTY**
Jelly Rose S. Rellesiva, LPT, Sarifa Salmo, Leila Fernandez,Rodante Cabar, Christian Santiago

101 | **BLENDED LEARNING MODALITY: EXTENT OF IMPLEMENTATION AND INDUSTRIAL TECHNOLOGY STUDENTS LEVEL OF SATISFACTION**
Joice A. Nieles, Charlie J. Maghanoy

GRACE INC

COMMON EFFECT OF CORONA VIRUS 2019 PANDEMIC AMONG FOOD VENDOR AT EMPLOYEES VILLAGE BARANGAY FATIMA GENERAL SANTOS CITY

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ABSTRACT

The purpose of this study was to determine the common effects of the Corona Virus 2019 pandemic among food vendors at the Employees Village Public Market in Brgy. Fatima General Santos City. In this study, the researcher used a descriptive survey method to find out the effect of Corona Virus among food vendors. Weighted Arithmetic Mean and ranking was used to analyze the data gathered. Results showed that the food vendors highly encountered the negative effects of Covid-19 because they experienced the impact of economic and health crisis. Food vendors also encountered the positive effects of Covid-19 pandemic as it is one of the means for them to receive benefits and help from our society. Panic buying also allows them to have more sales during these days.

Keywords: *effects of corona virus pandemic among food vendor*

INTRODUCTION

Corona Virus disease is an infectious disease that infects humans. Most people who got sick with Corona Virus 2019 experience mild to moderate symptoms without prior treatment. The reason the virus COVID-19 is spread through droplets invoked when an infected person sneezes, coughs, or exhales. These droplets are too heavy to hang in the air, and quickly fall on floors or surfaces. You can be infected by breathing in the virus if you are near someone who has COVID-19, or by touching a contaminated surface and then your eyes, nose, or mouth.

The COVID-19 pandemic has exacerbated existing vulnerabilities in the food system, particularly for informal sector workers like food vendors. The sudden onset of lockdowns, social distancing measures, and economic downturns has led to a cascade of challenges, including Economic hardship: loss of income, reduced customer base, and increased operational costs. Health risks: exposure to the virus, mental health issues, and limited access to healthcare. Supply chain disruptions: difficulty in sourcing ingredients and supplies. Regulatory hurdles: compliance with health and safety regulations.

These challenges have not only impacted the livelihoods of food vendors but have also had broader implications for food security, public health, and sustainable development. By examining the intersection of the COVID-19 pandemic and the SDGs, this research will shed light on the urgent need for targeted interventions to support food vendors and ensure a resilient and equitable food system.

According to Int J. Surg (2020), The COVID-19 pandemic has resulted in over 4.3 million confirmed cases and over 290,000 deaths globally. It has also sparked fears of an impending economic crisis and recession. Social distancing, self-isolation, and travel restrictions have led to a reduced workforce across all economic sectors and caused many jobs to be lost. Schools have closed down, and the need for commodities and manufactured products has decreased. In contrast, the need for medical supplies has significantly increased. The food sector is also facing increased demand due to panic-buying and stockpiling of food products. In response to this global outbreak, we summarize the socio-economic effects of COVID-19 on individual aspects of the world economy.

Therefore, with all this insight the researcher will compelled to undertake this present research initiative.

Statement of the Problem

This study aimed to find out the effect of Corona Virus 2019 Pandemic among food vendors.

Specifically, the researcher sought answers to the following questions.

1. What are the common positive effects of Corona Virus 2019 pandemic on the vendors?
2. What are the common negative effects of Corona Virus 2019 pandemic on vendors?
3. What implication can be drawn based on the result of the study?

REVIEW OF THE RELATED LITERATURE AND STUDIES

This chapter will present a review of the related literature and studies that will give significant insight to help the conceptualization of this study.

Street vendors play a crucial role in providing daily necessities to the public and contribute significantly to the economy of Ibadan City. However, the COVID-19 pandemic has had a devastating impact on these vendors, as many relied on their income to support their families. To understand the extent of this impact, a study was conducted in Ibadan City using a survey method. The survey involved 655 street vendors and analyzed the social and economic consequences of the pandemic. The findings indicate that COVID-19 has had a substantial negative effect on both the social and economic well-being of street vendors in the city. (Olatunji, Adedokun and Taleat 2020)

Pandemics, including COVID-19, have historically had a significant negative impact on the global economy. One critical sector affected is the food supply chain, encompassing everything from farm to fork. COVID-19 has disrupted this chain in various ways, such as restricting worker movement, altering consumer demand, closing production facilities, imposing trade barriers, and creating financial strain. To mitigate these challenges, governments should facilitate the movement of workers and agricultural products, provide financial support to vulnerable farmers, and implement health and safety measures in food production facilities. Additionally, avoiding food protectionist policies can help prevent price increases. Countries must adapt their responses to the pandemic's evolving nature, and the food supply chain must remain flexible to address ongoing challenges. This review aims to assess the impact of COVID-19 on the agriculture and food sector and propose recommendations to minimize its effects. (Aday 2020)

In late 2019, health authorities in Wuhan, China, identified a cluster of respiratory illnesses of unknown origin linked to a local seafood market. This outbreak was subsequently declared a Public Health Emergency of International Concern. Investigations revealed that the culprit was a novel coronavirus, SARS-CoV-2, which spreads primarily through person-to-person contact. To mitigate the spread of COVID-19, particularly among vulnerable populations like the elderly, children, and healthcare workers, large-scale public health measures were implemented. These measures drew on lessons learned from previous coronavirus outbreaks, such as SARS and MERS, which also target the lower respiratory tract and can cause pneumonia.

On January 31, 2020, the World Health Organization (WHO) officially declared the COVID-19 outbreak a Public Health Emergency of International Concern. The primary goal was to curb the spread of the virus and flatten the curve of infections to reduce the overall burden on healthcare systems. Delays in implementing effective measures can lead to significantly higher death tolls. This review aims to highlight the clinical features, diagnostic methods, and WHO's declaration of the pandemic. It also emphasizes the importance of infection prevention and control measures, particularly hand hygiene, to reduce the transmission of COVID-19. (Motwani, Vinod and Dudhekar, Ulhas and Muntode, Ambadas 2021)

The COVID-19 pandemic has severely disrupted the freight transport sector. While many studies have examined the impact of COVID-19 on freight transport and potential mitigation strategies, a comprehensive review synthesizing these findings is lacking. It addresses this gap by conducting a mixed review, combining scientometric and systematic review methods. The analysis of 68 studies published since 2020 reveals three primary research themes: the impacts of COVID-19 on freight transport, mitigation strategies, and post-pandemic recovery. The review delves into the research methods, key findings, and potential future research directions within each theme. By providing a systematic overview of the existing research, this study offers both theoretical and practical insights into COVID-19's impact on freight transport and identifies promising avenues for future research in this field. (Eltoukhy, Shaban, and Attia 2022).

The COVID-19 pandemic has had a devastating impact on the global economy, particularly on small and medium-sized enterprises (SMEs). This thesis aims to assess the specific impact of COVID-19 on SMEs in Ethiopia and propose policy recommendations to help them mitigate losses and survive the crisis. To achieve this, a descriptive research methodology was employed, involving a comprehensive literature review and empirical data collection. A survey questionnaire was administered to 390 SMEs in Addis Ababa, covering various sectors such as food and beverage, construction, and agriculture. The data was analyzed using descriptive statistics.

The findings indicate that a significant proportion of SMEs have been severely affected by the pandemic, facing challenges such as financial constraints, supply chain disruptions, decreased demand, and reduced sales and profits. Notably, micro and small businesses have experienced a more significant decline in activity compared to medium and large firms. The study highlights specific challenges faced by SMEs, including disruptions in demand and supply, transportation issues, reduced demand for products and services, and increased transportation costs. This research contributes to understanding the impact of COVID-19 on SMEs in Ethiopia and provides valuable insights for policymakers to develop targeted support measures. (Gudisa and Getu 2021)

The COVID-19 pandemic has had a significant impact on the global economy, including the advertising industry. To understand the specific challenges faced by advertising companies in Ethiopia, this research focused on ten companies in Addis Ababa. Data was collected through questionnaires and in-depth interviews and analyzed using a qualitative approach, with some quantitative elements. The study revealed that the pandemic has significantly impacted the business performance of these companies, affecting sales volume, employee satisfaction, and overall operations. Despite some recovery in sales volume after the initial six months of the pandemic, companies have struggled to regain pre-pandemic levels. The emotional toll of the pandemic has also affected employee morale and productivity. To address these challenges, the study recommends that advertising companies adopt new marketing strategies, identify emerging needs and expectations of clients, demonstrate empathy towards consumers, implement charitable sales promotions, and prioritize the health and safety of both employees and customers. (Hailu and Kidist 2021)

The COVID-19 pandemic has severely disrupted global food systems, affecting both the supply and demand sides. This study examines the impact of the pandemic on household food security in Ng'ombe, a densely populated area. The research aimed to identify the specific challenges faced by households in Ng'ombe due to COVID-19, assess changes in dietary diversity before and during the pandemic, and evaluate household strategies for maintaining food security during the crisis.

A mixed-methods approach was used to collect data from 235 respondents through interviews and questionnaires. The analysis of the data revealed that the pandemic had a significant negative impact on household food security in Ng'ombe. Key findings include reduced income, increased hunger, job loss, decreased meal sizes, and compromised diets. These factors have the potential to lead to malnutrition and other health issues. The study emphasizes the urgent need for government and other stakeholders to intervene and support vulnerable households. Potential interventions include providing financial assistance for businesses and job creation programs to empower affected individuals. (Michelo 2024)

This study investigated how COVID-19 pandemic containment measures impacted informal businesses, specifically focusing on gender disparities. The research, guided by Feminist Economic Theory and Structural Inertia Theory, employed a descriptive research design. A sample of 85 informal market traders in Elwak market, Mandera County, was selected using simple random sampling. Additionally, 12 key informants were purposively selected. Data was collected through questionnaires, interviews, and focus group discussions. Quantitative data was analyzed using SPSS, while qualitative data was analyzed through content analysis. The findings revealed that women were disproportionately affected by the pandemic due to increased household care responsibilities. Furthermore, women experienced greater economic losses compared to men. The pandemic exacerbated existing gender inequalities, impacting both private and public spheres where women are already disadvantaged. (Ali, Mutuma, and Mose 2020)

The COVID-19 pandemic and subsequent government-imposed quarantine measures significantly impacted informal street vendors in Tuguegarao City, Cagayan. This study, using Interpretative Phenomenological Analysis, explored the survival strategies employed by these vendors.

The research found that the pandemic had negative consequences for informal street vending businesses, leading to decreased sales, operational challenges, and increased expenses. However, the vendors

demonstrated resilience by adapting their business strategies, adhering to government policies, and maintaining a positive outlook. The findings of this study can inform local government policies and initiatives to support informal street vendors and contribute to the city's economic development. (Catacutan 2023)

This study examines how Filipino women entrepreneurs have adapted to the economic challenges posed by the COVID-19 pandemic by leveraging ICT-based businesses. Despite the hurdles presented by the shift to digital platforms, these women have embraced e-commerce as a means to sustain or establish new income-generating ventures. By adopting innovative marketing strategies, they have found opportunities to alleviate the economic impact of the pandemic. This transition has not only enabled them to generate income but has also empowered them with a sense of independence and financial autonomy. The chapter concludes by proposing a framework that integrates ICT and gender development initiatives to further support and empower Filipino women entrepreneurs in the digital economy. (Hernando 2023).

METHODOLOGY

This chapter will present the methodology used in their study. It includes research design, respondents, instruments, data-gathering procedures, and statistical tools.

Research Design

This study used descriptive research methods in which the researcher used questionnaires to collect demographic data. The researcher described the percentage of food vendors that includes positive and negative effects of Corona Virus2019 Pandemic.

Respondents

The respondents of this study were only 80 persons of the food vendors at Employees Public Market, Barangay. Fatima, General Santos City.

Sampling Technique

The researcher used the Slovin formula and random sampling to get the total of respondents to be interviewed. The researcher chose 20 vendors from the vegetable vendors, 20 from the fish vendors, 20 from the meat vendors, and 20 from the street foods vendor.

Instrument

To gather the data for this study, the questionnaire was adapted from Carver et al. (2002). It consists of two parts: Part I deals with the positive effects of Corona Virus 2019 Pandemic and Part II discusses the negative effects of Corona Virus 2019 Pandemic on the food vendors.

Data Gathering Procedure

Before the data was gathered for this study, the researcher requested permission from the President of Employees Public Market.

When the President granted her permission, she gave the questionnaire to every stall of food vendors and explained the objectives of this study and the instructions to answer the questionnaire.

Then the researcher gave the questionnaire to the respondents and gave them time enough time to answer all the items. After answering the questionnaire, the researcher expressed gratitude to the respondent.

Then the data were tallied, tabulated, analyzed, and interpreted.

Statistical Tools

To analyze and interpret the gathered data, the percentage was used to describe the effect of corona virus 2019 on food vendors.

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter presents analysis and interprets the data gathered in this study. The various results regarding the common effects of COVID-19 pandemic among food vendors of Employees Village Public Market, Barangay, Fatima, General Santos City are presented in the succeeding tables. This chapter also presents the implications that can be drawn based on the findings of the study.

After administering the questionnaire to respondents, the researcher was able to gather the necessary data for this study. The data gathered is hereby presented, analyzed, and discussed. Specifically, in this chapter, the researcher sought to determine the answers to the following questions:

1. What are the effects of Corona Virus 2019 pandemic on the food vendors as perceived by the respondents when categorized according to:
   1.1 Positive Effects; and
   1.2 Negative Effects
2. What implication can be drawn based on the findings of the study?

COVID-19 affects different people in different ways. Especially, to their occupation. Many people suffer poverty and hardships in life because of this pandemic. But some people work hard for their family like the food vendors.

Table 1 below shows the effects of Corona Virus 2019 pandemic on food vendors according to its positive and negative effects. Data in the table shows that the food vendors always encountered the positive effects as it got an overall mean score of 4.32 and it was then followed by the negative effects that food vendors also always encountered with an overall mean score of 4.84.

In terms of the positive effects of Corona Virus 2019 pandemic, the indicator that garnered the highest mean score of 4.69 states that food vendors always encounter more sales because of panic buying. With a mean score of 4.53, food vendors also always experience early rest, due to curfew. Aside from that, the food vendors often encounter the following indicators: many benefits or help from the LGUs (4.20), bonding with family during lockdown (4.15), and rest day during lockdown (4.03).

In terms of the negative effects of Corona Virus 2019 pandemic, it shows that the indicator that garnered the highest mean score of 4.98 states that the food vendors always encounter rising commodities. Also, food vendors always experience the following indicators: running out of stock due to the pandemic (4.93), being afraid to socialize with different people (4.91), no sales during lockdown (4.69), and few people buying due to price hikes of food products (4.69).

Street vendors themselves will not be alone in the food fight. Low-income households that rely on street vendors for food supply now have to pay more to access food. That could have widespread impacts. A UN report warns that this pandemic could double the number of people suffering acute hunger, create a global recession that could disrupt food supply chains, and add to the struggles and particular concerns of people working in the informal economy.

Unfortunately, some media coverage accuses informal food vendors of being vectors of infections, which only adds to the burdens of an already vulnerable group of workers who are putting themselves at risk to earn a living. These kinds of reports overlook the role of city governments in ensuring they manage and reduce these workers' occupational health and safety risks as they keep food supply chains running.

Furthermore, food vendors always encounter the common effects of Corona Virus 2019 pandemic as it got a grand mean score of 4.58.

Table 1. Common Effects of Corona Virus 2019 Pandemic among Food Vendors

Indicators	Mean	Description
Positive Effects		
1. More sales because of panic buying.	4.69	Always
2. Can rest early, due to curfew.	4.53	Always
3. Many benefits or help from the LGUs.	4.20	Often
4. Bonding with family during lockdown.	4.15	Often
5. Rest day during lockdown.	4.03	Often
Overall Mean	**4.32**	**Always**

Negative Effects		
1. No sales during lockdown.	4.69	Always
2. Afraid to socialize with different people.	4.91	Always
3. Running out of stocks due to the pandemic.	4.93	Always
4. Rising of commodities.	4.98	Always
5. Few people will buy due to the price hike of food products.	4.69	Always
Overall Mean	**4.84**	**Always**
Grand Mean	**4.58**	**Always**

Implication of the Study

In this study, the negative effect has a bigger result than the positive effect. The negative effect got a 4.84 while the positive effect got a 4.32 only. This result implied that the food vendors always experienced difficulties in selling during this pandemic. It also implied that the food vendors need assistance from the government and understanding from the customers. The government should help the food vendors by giving cash assistance for them to use it or to add it to their capital. Also, the government should publish news that there is a price hike, especially for our basic needs. So that, the customers will not be shocked or angry when buying basic needs at a high price.

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents the summary of findings, conclusions, and recommendations based on the result of the gathered data about this study.

This study aimed to determine the common effects of Corona Virus 2019 pandemic among food vendors of Employees Village Public Market, Barangay. Fatima, General Santos City. To know the result, the researcher conducted a checklist form on the common effects of COVID-19 on the respondents. Specifically, in this chapter, the researcher sought to determine the answers to the following questions:

1. What are the effects of Corona Virus 2019 pandemic on food vendors as perceived by the respondents when categorized according to:
   1.1 Positive Effects; and
   1.2 Negative Effects
2. What implication can be drawn based on the result of the study?

Summary of Findings

Based on the analysis and interpretation of data presented in Chapter 4, the answers to specific problems were summarized below:

1. Data in Chapter 4 showed that the food vendors as respondents always encountered the positive effects as it got an overall mean score of 4.32 and it was then followed by the negative effects that food vendors also always encountered with an overall mean score of 4.84.
2. Data in Chapter 4 showed that the food vendors encountered the highest average from the negative effects is the rising of commodities as it got a 4.98. Followed by running out of stocks as it got a 4.93 and lastly, they are afraid to socialize ton different people as it got a 4.91.
3. This study implies that the food vendors should have cash support from our government monthly to add to their sales every day. They should also experience the lower price of food commodities so they do not bother with the high prices. So that, their customers will be multiplied more. Also, the government should publish news that there is a price hike, especially for our basic needs. So that, the customers will not be shocked or angry when buying basic needs at a high price.

Conclusions

Based on the findings of the study, the following conclusions are drawn:

- Food vendors highly encountered the negative effects of Covid-19 because they experienced the impact of economic and health crisis.
- Food vendors also encountered the positive effects of Covid-19 pandemic as it is one of the means for them to receive benefits and help from our society. Panic buying also helps them to have more sales during this pandemic.

Recommendations

Given the findings and consideration of the limitations of the study, the researcher formulated the following research recommendations. When examining and interpreting the gathered data on the common effects of COVID-19 pandemic among food vendors of Employees Village Public Market, Barangay Fatima, General Santos City, the researcher identified lack of support, weak regulation, and system as the main areas of concern. This lack of support, weak regulation, and the system was causing additional damage to the effects of COVID-19 pandemic on vendors, respectively. The examined and interpreted gathered data displays that vendors of Employees Village Public Market, Barangay Fatima, General Santos City highly encounter the negative effects of the COVID-19 pandemic. Given this, finding, the researcher proposed designing a smooth system between LGUs and local vendors that would achieve the following:

1. Conduct a survey to identify the needs and concerns of the vendors.
2. Increase access to credit to establish and expand business during the pandemic.
3. Strengthen the imposing of health protocols in the markets.
4. Providing cash support to the vendors to sustain the needs of their businesses.
5. Reinforce the information dissemination campaign to the community to have a deeper understanding during these trying times.

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We would like to express our heartfelt gratitude to all the food vendors at Employees Public Market, Barangay Fatima in General Santos City, for their invaluable participation and insights during this research. Special thanks are due to the local government officials for their unwavering support and guidance throughout the study. We also appreciate the encouragement and constructive feedback from our academic mentors and peers, which significantly contributed to the development of this research. This work would not have been possible without the collective efforts of these individuals, whose contributions have been essential in understanding the challenges faced by food vendors during the COVID-19 pandemic.

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DESIGN PREFERENCE OF LOW-COST STREET FOOD CART IN KORONADAL CITY, SOUTH COTABATO

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ABSTRACT

The study aimed to develop three low-cost street food cart designs and determined the preferred design from thirty (30) street food cart vendors. The researcher used a self-made evaluation checklist with thethree street food cart designs to guide the respondents in their evaluation. Descriptive statistics in the form of frequency counts, percentages and ranking were used to analyze the information gathered. Findings showed that the respondents' preferred design and cost was Design A, a horizontal type of food cart and which cost P5,167.35. This was followed by Design B, and L-shaped cart which cost P6,568.38 and Design C, a "U" or "C" type design costing P6,368.38.

Keywords: *Design Preference, street food cart, customer needs, source of income, low-cost budget*

INTRODUCTION

The low-cost street food cart serves as a mobile kitchen typically set up near schools, aiming to meet customers' diverse food needs, including snacks, desserts, and beverages. Street food encompasses various types of finger foods and fast foods that are generally more affordable than restaurant meals. Food carts are prevalent in large cities worldwide, offering a wide variety of food options. Unlike food trucks, which operate under their own power, food carts are either stationary or towed by vehicles.

Starting a street food cart business requires minimal capital, usually ranging from P5,000 to P10,000, depending on the design and materials used. The significance of food carts is clear: they require a small investment, are easy to set up, are movable, and pose less risk in terms of potential business loss. Their affordability increases the likelihood of success by attracting a broad customer base.

In Koronadal City, South Cotabato, there is a notable demand for street food carts near Koronadal Central Elementary School II. The President of the Market Vendors Association has requested new designs for their carts because many existing carts made from bamboo and other indigenous materials are damaged and outdated. This situation poses safety risks due to exposed nails and broken wood.

To address these challenges, the researcher decided to design three low-cost street food carts that can be easily moved. These carts will feature wheels, storage areas for goods, and display counters. This study primarily focuses on evaluating these three different low-cost street food cart designs among vendors at Koronadal Central Elementary School II. It is limited to vendors within this specific area and does not include surrounding locations.

The research was conducted from August to December 2017 at Koronadal Central Elementary School II in Koronadal City, South Cotabato. The actual design work was carried out at the College of Industry at the University of Southern Mindanao in Kabacan, Cotabato.

Statement of the Problem

This study aimed to design a low-cost street food cart in Koronadal City, South Cotabato. Specifically, the study aimed to:

(1) design at least 3 low-cost street food carts,
(2) determine the most preferred design of low-cost street food cart and;
(3) determine the most preferred cost of low-cost street food cart.

REVIEW OF RELATED LITERATURE

Food Cart

According to Reich et al. (2005), exploring street food vendor operators' perceptions of delivering service experiences to customers requires a discussion of several features that determine product and service quality. This study aims to investigate whether product quality and service quality influence customer experiences in street food carts. Given the limited research on service experiences between street vendors and customers, this study adopts features commonly used to evaluate the fast-food industry. The rationale for this approach is that the street vendor sector shares similar characteristics with fast food; both provide affordable products or services to customers and deliver them in a timely manner.

Hoisington and Naumann (2003) identified five major categories that customers use to evaluate a company's performance: product quality, service quality, the quality of the relationship between customer and supplier, image, and price perception. For tangible products, quality may encompass features, usability, or compatibility. In the context of services, it includes various dimensions of the service being provided.

Common Food Cart Materials

Wood Lumber: Wood lumber serves as the structural framework for street food carts. The choice of wood depends on various construction factors; thus, it is essential to understand the characteristics of the wood being considered. Investing time in researching how easy it is to work with certain types of wood or their strength can save both time and money (Bernau Jr., A. 2003).

Plywood: Plywood constitutes the main body of many food carts due to its numerous beneficial properties. It possesses high tensile strength, which distributes force over a larger area, thereby reducing tensile stress. Plywood can withstand loads up to twice its designated capacity and retains the structural strength of the wood from which it is made, enhanced by its laminated design.

Canvas Cloth: Thicker-gauge waterproof canvas cloth serves as the hood for food carts. Waterproof canvas provides superior coverage for various applications, protecting valuable equipment from extreme weather conditions such as sun exposure, high winds, and heavy rain. This material is durable and resistant to tearing and abrasion, making it ideal for prolonged outdoor use (Tarps Now).

Wheels: Bicycle wheels are typically used in food cart designs to facilitate mobility, allowing vendors to transport their products efficiently over long distances. The introduction of wheels has significantly enhanced mobility in daily life (Hirst, K. 2016).

Nails: Nails are crucial for holding materials together through friction along the axial direction and shear strength laterally. They are often bent over or clinched after being driven into wood to prevent pull-out and minimize splitting, resulting in a more secure attachment when joining pieces of wood or fastening other materials (Dengarden).

Street Food Cart in Koronadal City, South Cotabato

In Koronadal City, particularly around Koronadal Central Elementary School II, numerous stores exist; however, street vendors along the school highway often rely on small tents or large umbrellas for shelter over their display counters. Many of these stalls are old and constructed haphazardly, compromising both safety and hygiene for vendors and customers alike. This situation highlights the need for improved infrastructure to ensure health standards are met while providing safe dining experiences for consumers.

Figure 1. Street Food Vendors at Rizal Street, Koronadal City, South Cotabato

METHODOLOGY

Research Design

This study utilized a descriptive research design, employing evaluation methods to gather the necessary data.

Research Locale of the Study

The research was conducted at Koronadal Central Elementary School II in Koronadal City, South Cotabato.

Respondents of the Study

The respondents consisted of 30 street food vendors located near Koronadal Central Elementary School II in Koronadal City, South Cotabato. These vendors were selected based on their proximity to the school and their willingness to participate in the study.

Sampling Procedure

The researcher employed a complete enumeration method, meaning all identified street food vendors near Koronadal Central Elementary School II were included as respondents. This approach ensured that a comprehensive view of vendor preferences was captured.

Research Instrument

A self-made questionnaire was utilized to determine the preferences of the street food vendors at Koronadal Central Elementary School II.

Data Gathering Procedure

The researcher prepared three low-cost street food cart designs to present to the respondents. Once the designs were finalized, sufficient copies of the questionnaire were printed to correspond with the number of respondents. The researcher then traveled to the study location to collect data. The gathered information was subsequently tallied, evaluated, and interpreted.

Statistical Analysis

The collected data from the respondents was analyzed using descriptive statistics, including frequency counts, percentages, and rankings. This analysis summarized the information gathered and helped identify the preferred design among the vendors.

Legend:

Rank	Verbal Interpretation
1	Most Appropriate
2	Appropriate
3	Not Appropriate

RESULTS AND DISCUSSIONS

This chapter presents the results of the study on the design preference of the low-cost street food cart in Koronadal City, South Cotabato.

Three Design Proposals for Koronadal City, South Cotabato.

The researcher planned and designed (3) three low-cost street food cart. Each design had its pictorial drawing, orthographic drawing and section drawing plans. A bill of materials was also prepared and shown to the respondents.

Profile Design A

Design A is a horizontal-type cart that measures 1.2 meters in length, 1.6 meters in height, and 1.80 meters in depth, as shown in the orthographic drawing. The street food cart features a roof made from thicker-gauge canvas cloth, which protects the vendor, products, and customers from the heat of the sun

and rain. Each corner of the cart is supported by posts made of 2x2 wood lumber. The body of the cart is constructed from ½" thick plywood and is painted with enamel for durability. Inside the cart, there is a compartment for storing products and drawers for the vendor's personal items. The cart is equipped with four bicycle wheels with rubber tires for easy mobility. The perspective, orthographic drawing, and sections of Design A are presented.

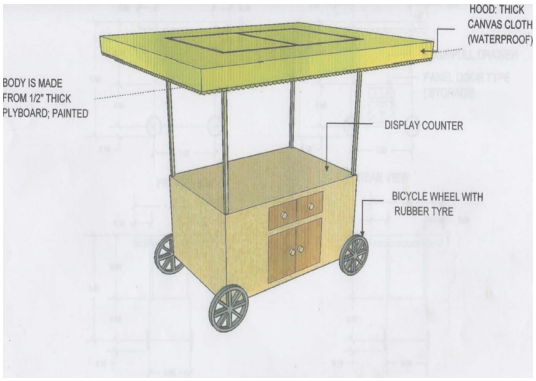

Figure 2. Perspective of low-cost street food cart. Profile Design A.

Table 1. Bill of Materials of Low-Cost Food Cart of Design A

Quality	Unit	Description	Unit Price	Total Price (Php.)
3	Pcs.	1/2" Ply board	P650.00	P 1,950.00
4	Pcs.	2x2 Wood Lumber (Mahogany)	P200.00	P800.00
3	Meter	Canvas cloth	P351.00	P 1,053.00
1	Pc.	Paint (4L) Enamel	P440.00	P440.00
1	Bottle	Paint thinner	P80.00	P80.00
1/2	Kg.	Concrete Nails	P88.75	P44.38
4	Pcs.	Bicycle Wheel with Rubber tyre	P200.00	P800.00
			Total	**P 5,167.35**

Profile Design B

Design B is an L-shaped cart that measures 1.2 meters in length, 1.65 meters in height, and 1.80 meters in depth, as illustrated in the orthographic drawing. The roof is designed as a hood made from thicker-gauge canvas cloth to protect the vendor, products, and customers from the sun's heat and rainfall. Each corner of the cart is supported by posts made of 2x2 wood lumber, while the body is constructed from ½" thick plywood painted with enamel. Inside the cart, there is storage space for products and a drawer for the vendor's important items. Food Cart Design B features five bicycle wheels with rubber tires for easy movement. The perspective, orthographic drawing, and sections of the design are presented.

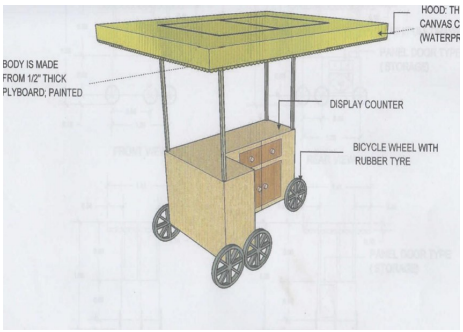

Figure 3. Perspective of low-cost street food cart. Profile Design B.

Table 2. Bill of Materials of Low-Cost Food Cart of Design B

Quality	Unit	Description	Unit Price	Total Price (Php.)
4	Pcs.	1/2" Ply board	P650.00	P2,600.00
5	Pcs.	2X2 Wood Lumber (Mahogany)	P200.00	P 1,000.00
4	Meter	Canvas cloth	P351.00	P1, 404.00
1	Pc.	Paint Enamel (4L)	P440.00	P440.00
1	Bottle	Paint thinner	P80.00	P80.00
1/2	Kg.	Concrete Nails	P88.75	P44.38
5	Pcs.	Bicycle Wheel with Rubber tyre	P200.00	P1,000.00
			Total	**P 6,568.38**

Profile Design C

Design C is a U or C-shaped cart that measures 1.2 meters in length, 1.65 meters in height, and 1.80 meters in depth, as depicted in the orthographic drawing. The roof is designed as a hood made from thicker-gauge canvas cloth to protect the vendor, products, and customers from sun exposure and rain. Each corner of the food cart is constructed from ½" thick plywood, which is also painted with enamel for protection. Inside, there is ample storage space for products and a drawer for the vendor's belongings. Street Food Cart Design C also has four bicycle wheels with rubber tires for easy mobility. The perspective, orthographic drawing, and sections of the design are shown.

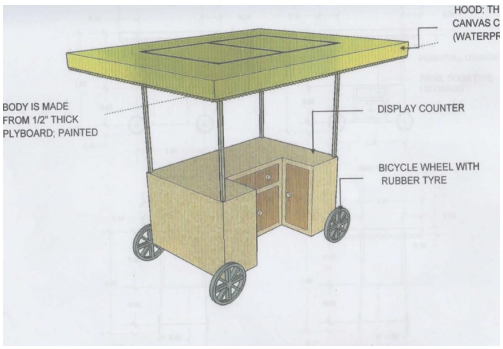

Figure 4. Perspective of low-cost street food cart. Profile Design C.

Table 3. Bill of Materials of Low-Cost Food Cart of Design C

Quality	Unit	Description	Unit Price	Total Price (Php.)
4	Pcs.	1/2" Ply board	P650.00	P2,600.00
5	Pcs.	2x2 Wood Lumber (Mahogany)	P200.00	P 1,000.00
4	Meter	Canvas cloth	P351.00	P1,404.00
1	Pcs.	Paint Enamel (4L)	P440.00	P440.00
1	Bottle	Paint thinner	P80.00	P80.00
	Kg.	Concrete Nails	P88.75	P44.38
4	Pcs.	Bicycle Wheel with Rubber tyre	P200.00	P800.00
			Total	**P 6,368.38**

Preferred Design of the Respondents

Each Design was evaluated by the respondents and identified their preferred design. Majority of the respondents (14 or 46.7%) chose Design A, closely followed by Design C, chosen by (13 or 43.3%) of the respondents, and Design B preferred by only (3 or 10.0%) of the respondents. This means that Design A is the most preferred design among street-food vendors in Koronadal City, South Cotabato.

Table 4 shows the respondents' most preferred street-food cart in terms of cost. It shows that of the three presented designs with the corresponding cost, almost half of the respondents (14 or 46.7%) chose Design A as most appropriate in terms of cost. It was followed by Design C, preferred by (13 or 43.4%)

of the respondents, hence, was considered appropriate. In the other hand, as in the design preference, Design B was preferred only by 3 respondents (10.0%) and thus was qualitatively described as not appropriate in terms of cost.

Table 4. The most preferred cost of low-cost street food cart

Variable	Rank	Frequency (n=30)	Percentage (%)	Qualitative Description
Design A	1	14	46.7%	Most Appropriate
Design B	3	3	10.0%	Not Appropriate
Design C	2	13	43.3%	Appropriate
Overall Design		**30**	**100%**	

Legend:

Percentage Distribution	Qualitative Description
1	Most Appropriate
2	Appropriate
3	Not Appropriate

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study, entitled "Design Preference of Low-Cost Street Food Cart in Koronadal City, South Cotabato," was conducted in response to a request from the president of the Market Vendors Association of Koronadal Central Elementary School II for a low-cost food cart design. The researcher aimed to develop new designs and determine the preferred design and cost of street food carts.

The study focused on street food cart vendors and was conducted outside the premises of the identified school. The findings revealed that nearly half of the respondents preferred Design A for both its aesthetic appeal and cost.

Conclusions

In conclusion, Design A and its associated cost were considered the most appropriate by street food vendors in Koronadal City, South Cotabato.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are made to enhance vendor satisfaction and operational efficiency:

1. The association may implement a standard design for street food carts based on the preferred features of Design A, while allowing vendors to customize their carts to reflect their brand identity.
2. To enhance cost efficiency, Market Vendors Association may provide financial assistance or incentives for vendors to adopt the most preferred cart designs.
3. Organize training sessions for street food vendors on best practices for maintaining and utilizing the preferred cart designs effectively, focusing on hygiene, safety, and operational efficiency.
4. Consider incorporating additional features into the preferred designs, such as improved storage solutions and ergonomic layouts, based on feedback from vendors to enhance usability and functionality in daily operations.
5. The project study may be extended to other areas where street food vendors operate.

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ACCEPTABILITY OF SENSORY PROFILE OF NATIVE CHICKEN SOUP (*NATIVE TINOLANG MANOK*) USING DIFFERENT LOCAL VEGETABLES: A NEW TASTE FOR GENERATION Z

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ABSTRACT

The aims of the study are to determine the level of acceptability of the recipe and evaluate the sensory profile of the formulations in terms of aroma, color, taste, and texture. This research was conducted in August 2024 at the food service management department of the College of Industrial Technology, Sultan Kudarat State University. The experimental design involved three different recipe formulations, each using varied measurements of local vegetables. A total of 30 participants were selected through convenience sampling from the university locale. Statistical analysis was performed using ANOVA to compare the sensory attributes across formulations, and the significance of findings was indicated by the P-value, with a threshold of $p < 0.05$. Formulation 2, featuring chayote and chili leaves, achieved the highest acceptability with a mean score of 7.73, surpassing Formulation 1 (6.52) and Formulation 3 (5.45). These results indicate that Formulation 2 was the most preferred, offering an optimal blend of sensory attributes, particularly in aroma and texture.

Keywords: *Sensory Profile, Aroma, Color, Taste, Texture, Local Vegetables, Chayote, Chili Leaves*

INTRODUCTION

Chicken soup is a culinary staple worldwide, often cherished for its comforting qualities and potential health benefits. Globally, researchers have investigated the sensory properties of chicken soup in various forms, which often combine unique local ingredients to enhance taste and appeal. Studies show that sensory characteristics such as flavor, aroma, and texture play significant roles in determining the acceptability of traditional dishes among modern consumers (Yang and Lee, 2019). According to Escoffier School of Culinary Arts (2023) Generation Z, in particular, is known for its openness to trying novel flavors and foods that align with health-conscious trends. Thus, exploring different local vegetable pairings in traditional chicken soup could provide an interesting perspective on how to blend traditional cuisine with the evolving palates of younger generations.

In the Philippines, the native chicken soup dish known as tinolang manok is widely celebrated and incorporates locally grown vegetables, adding nutritional value and unique flavors to the dish (Manila Spoon, n.d.). Past studies have focused on the significance of traditional Filipino cuisine as a cultural identifier and its potential to contribute to the agricultural economy by using locally sourced ingredients (Toledo et al., 2018). However, little research has been conducted on the sensory preferences of younger generations, specifically Generation Z, who are more inclined towards innovative food experiences. This local focus emphasizes the relevance of incorporating native vegetables in traditional dishes, highlighting the health benefits while preserving cultural heritage.

The purpose of this study is to evaluate the acceptability of tinolang manok among Generation Z by incorporating different local vegetables. By analyzing sensory attributes—such as taste, aroma, texture, and overall appearance—the study aims to determine which combinations are most appealing to this demographic. Understanding these preferences can provide valuable insights for food scientists, culinary experts, and the food industry in crafting healthier, culturally resonant dishes that appeal to the younger generation.

Despite the popularity of tinolang manok, there is limited research on how various local vegetable pairings impact its sensory profile and overall acceptability, particularly among younger age groups. Generation Z's openness to new flavors and experiences makes them a key demographic for exploring how traditional Filipino dishes can evolve to meet changing preferences. This study thus addresses the gap in sensory research related to traditional Filipino cuisine and its adaptability to modern palates. As Generation Z becomes more health-conscious and experimental with food choices, the study of their preferences is crucial for the food industry. According to Ghosh et al. (2023), this generation's growing interest in healthier, sustainable, and culturally diverse foods is reshaping culinary trends. By incorporating traditional Filipino dishes into this dynamic shift, we can explore how they may evolve to fit both health and taste trends while maintaining cultural identity.

The findings from this study are expected to benefit local farmers, culinary professionals, and health advocates. Promoting the use of diverse local vegetables in traditional Filipino cuisine may support sustainable agriculture and encourage healthier dietary practices. Additionally, insights into Generation Z's food preferences can inform food product development and marketing strategies, making traditional dishes more appealing to younger consumers.

OBJECTIVES

1. Determine the level of acceptability of the recipe.
2. Evaluate the sensory profile of the most preferred recipe formulation in terms of:
   - 2.1 Aroma
   - 2.2 Color
   - 2.3 Taste
   - 2.4 Texture
   - 2.5 Overall acceptability of sensory profile of native tinolang manok
3. Level of acceptability of the recipe in terms of different local vegetables used.

REVIEW OF RELATED LITERATURE

Cultural Significance and Nutritional Role of Traditional Soups

Pararakis et al. (2021) highlight the significance of traditional soups across cultures, emphasizing their role in preserving culinary heritage and providing essential nutrients. These soups, like tinolang manok, are cherished for their comforting taste and nutritional benefits, as they often incorporate vegetables and spices high in nutrients. This aligns with the practice in the Philippines, where native chicken and vegetables, such as malunggay (Moringa oleifera), are used in *tinolang manok* to enhance flavor and health benefits. This dish is beloved across generations, valued not only for its taste but also for the sense of cultural continuity it provides.

Nutritional and Health Benefits of Chili Leaves

Farrah, D. (2019) discusses that chili leaves is commonly used in traditional dishes, offer both nutritional and health benefits that can enhance the quality of food. In some culinary traditions, such as in the Philippines, they are used in chicken soups for their mild heat and healthful properties. These leaves are rich in vitamins A, B, and C, and contain minerals like calcium, sodium, and iron. Their antioxidant properties may help reduce the risks of several chronic diseases, such as arthritis, diabetes, and stomach issues.

Tinolang Manok as a Cultural Symbol

Filipinofoodfinder (2023) discusses the role of Filipino dishes like *tinolang manok* as cultural symbols within families, often bringing about a sense of nostalgia associated with family gatherings. Such dishes reflect a deep connection to cultural heritage, and when paired with locally sourced vegetables, they meet current health trends and appeal to local consumers. The study notes that flavors associated with Filipino culture resonate strongly with local consumers, enhancing the sensory satisfaction derived from these traditional flavors.

Local Ingredients and Sustainability in Tinolang Manok

Sarazawa et al. (2022) highlight that native *tinolang manok* is a traditional Filipino chicken soup that uses native chicken as its key ingredient, distinguished by its richer flavor and firmer texture compared to commercial chicken varieties. This dish is often prepared with local vegetables like *sayote* (*chayote*) and *malunggay* (*moringa*), which add nutritional benefits and enhance the overall flavor profile with their mild sweetness and earthy tones. The soup is typically infused with ginger, garlic, and fish sauce, making it a comforting and nourishing meal. The use of native chicken and indigenous vegetables highlights the importance of local produce in Filipino cuisine, providing not only a cultural connection but also promoting sustainability and health-conscious eating. These elements of *tinolang manok* emphasize the importance of incorporating local, nutritious ingredients into traditional dishes, which could appeal to younger generations seeking both familiarity and healthier meal options.

Sensory Characteristics and Adaptation for Younger Audiences

Antenor et al. (2022) identify a gap in studies on the sensory characteristics of Filipino dishes, particularly regarding their adaptation for younger audiences. Traditional dishes combining native spices and vegetables present complex flavor profiles, making them valuable subjects for sensory analysis. Understanding these sensory characteristics is vital for adapting traditional Filipino cuisine to align with Generation Z's preferences for layered and diverse flavors.

Nutritional and Sensory Value of Native Vegetables

Valera and Ancheta (2017) discuss the incorporation of native vegetables like *malunggay*, *sayote* (*Sechium edule*), and papaya (*Carica papaya*) in Filipino cuisine, which adds nutritional and sensory value. For example, malunggay provides essential vitamins and minerals, while the fiber content in *sayote* adds texture to soups. These native vegetables support sustainable agriculture, a priority for Generation Z's preference for environmentally conscious foods. The integration of local vegetables not only promotes health but also aligns with the goals of sustainable food systems (World Economic Forum, 2022).

Innovative Presentation and Sensory Appeal for Generation Z

Jakubowska et al. (2024) suggest that Generation Z is increasingly attracted to foods presented in innovative ways while retaining cultural authenticity. This interest indicates a growing demand for traditional dishes like *tinolang manok* to incorporate a variety of local vegetables. By enhancing sensory appeal, culinary experts may broaden the appeal of these traditional dishes to younger consumers. The use of sensory analysis helps determine consumer preferences, focusing on taste, aroma, and texture, which are integral to evaluating the appeal of traditional dishes infused with locally sourced ingredients.

Health and Sustainability Preferences of Generation Z

Morrison (2021) notes that Generation Z prioritizes foods that are both flavorful and align with health and sustainability values, favoring minimally processed ingredients. The inclusion of various local vegetables in traditional dishes, such as *tinolang manok*, could appeal to this demographic. The sensory appeal and cultural familiarity of these dishes increase their acceptability among young consumers.

Impact of Familiarity with Native Ingredients on Sensory Preferences

Yang and Lee (2019) investigate how familiarity with culturally significant ingredients can impact sensory preferences. Their study reveals that local consumers have a strong preference for flavors associated with traditional Filipino dishes, suggesting that adding native vegetables could strengthen the sensory appeal of *tinolang manok* for younger consumers. Sensory profiling allows researchers to identify which flavor attributes appeal to different demographics, providing a framework for culinary adaptations of traditional dishes that maintain cultural integrity.

Health Perceptions of Native Ingredients

Liwanag-Bledsoe (2019) connects Filipino dishes with perceptions of health, noting that native ingredients are often viewed as healthier than imported or processed options. Traditional dishes that incorporate local vegetables are perceived as natural, resonating with Generation Z's preference for "clean" food. This suggests that a vegetable-enriched *tinolang manok* might be particularly appealing for health-

conscious young consumers seeking nutritious options with familiar flavors.

Multigenerational Appeal of Indigenous Ingredients

Amodu et al. (2024) found that traditional soups incorporating indigenous ingredients appeal to multiple generations provided the flavors are adapted to evolving consumer expectations. Their study shows that vegetables like malunggay can boost the nutrient profile of Filipino soups while adding subtle flavors that elevate sensory appeal, especially for health-focused younger audiences.

Aroma and Sensory Experience in Traditional Dishes

Moments Log (n.d.) emphasizes the importance of aroma in enhancing the sensory experience of traditional dishes. Native herbs and spices can heighten the appeal of dishes like *tinolang manok* for Generation Z, who favors complex, layered flavors.

Potential for Vegetable Pairings in Tinolang Manok

Costell and Durán (n.d.) and Rheingold (2000) highlight the potential of traditional dishes to benefit from diverse vegetables, enhancing both flavor and texture. Conducting sensory evaluations on tinolang manok with various vegetable pairings allows researchers to understand which combinations are most appealing to younger consumers. This approach aligns with the objectives of the current study, which seeks to determine the sensory acceptability of *tinolang manok* with different local vegetable pairings, offering insights that may guide future adaptations of Filipino cuisine.

METHODOLOGY

Table 1. Materials

Tools and Equipment	Ingredients
Chopping Board Cooking Pot (or Dutch Oven) Cutting Knife Measuring Cups Measuring Spoons Mixing Spoon (Wooden or Ladle) Peeler (for papaya) Serving Bowl Slotted Spoon (optional, for serving) Stove	Native Chicken Papaya Chayote Turnips Malunggay Leaves (Moringa oleifera) Chili Leaves Chayote Leaves Onion Garlic Ginger Fish Sauce Water Pepper Salt

Experimental Design and Formulations

Table 2. Recipe

Ingredients	F1 Papaya and Malunggay Leaves	F2 Chayote and Chili Leaves	F3 Turnips and Chayote Leaves
Native Chicken	1000g	1000g	1000g
Onion	100g	100g	100g
Garlic	20g	20g	20g
Ginger	30g	30g	30g
Fish Sauce	30g	30g	30g
Water	1500g	1500g	1500g
Pepper	2g	2g	2g
Salt	15g	15g	15g

Preparation of Native Chicken Soup

To prepare *tinolang manok*, begin by rinsing the native chicken pieces under cold water, then drain and set them aside. In a large pot, heat a small amount of oil over medium heat and add the sliced onion, minced garlic, and sliced ginger. Saute these aromatics until they become fragrant and the onions turn translucent. Next, add the chicken pieces to the pot, stirring to cook them until browned on all sides, which should take about 5-7 minutes. Once browned, pour in the fish sauce and stir for about a minute to allow the flavors to combine.

Afterward, add water to the pot, ensuring the chicken is fully submerged. Bring the mixture to a boil, then reduce the heat to low and let it simmer for approximately 30-40 minutes, or until the chicken is tender. When the chicken is cooked, add the cubed papaya and continue to simmer for an additional 10 minutes, or until the papaya is soft. Finally, stir in the malunggay leaves and cook for another 2-3 minutes. Taste the soup and adjust the seasoning with salt and pepper as needed. Once ready, ladle the soup into bowls and serve it hot with steamed rice.

Respondents of the Study

The respondents of the study are 30 participants selected from the Sultan Kudarat State University Isulan Campus. The participants must be individuals born roughly between 1997 and 2012, as this age group aligns with Generation Z and is the target audience for testing new flavors and preferences.

Research Instrument and Data Gathering Procedure

The Evaluation instrument for native *Tinolang Manok* was validated and administered to the evaluators as their guide in evaluating the acceptability of native *Tinolang Manok* in terms of aroma, color, taste, texture and over-all package. The items have a nine-point rating scale (Hedonic Scale) wherein 1 is the lowest and 9 is the highest. The complete description is developed by Peryam and Kroll, 1957 detailed such as;

Table 3. Complete Description of 9-Piont Hedonic Scale.

Scale	Range of Mean	Verbal Description	Numerical Rating
Dislike Extremely	1.00 to 1.99	Consumers strongly dislike the product	1
Dislike Very Much	2.00 to 2.99	Consumers generally dislike the product	2
Dislike Moderately	3.00 to 3.99	Consumers moderately dislike the product	3
Dislike Slightly	4.00 to 4.99	Consumers slightly dislike the product	4
Neither Like nor Dislike	5.00	Consumers are indifferent to the product	5
Like Slightly	5.01 to 6.99	Consumers slightly like the product	6
Like Moderately	7.00 to 7.99	Consumers moderately like the product	7
Like Very Much	8.00 to 8.99	Consumers generally like the product	8
Like Extremely	9.00	Consumers strongly like the product	9

FINDINGS

The study entitled “Acceptability of Sensory Profile of Native Chicken Soup (Native Tinolang Manok) Using Different Local Vegetables” the aroma of the formulation 2 obtained 8.15 evaluated mean and with the description of “Like Very Much”. As to the color was observed that formulation 2 obtained highest mean of 7.85 with the description of “Like Moderately”. In terms of taste Formulation 2 was observed to have highest mean rating of 7.00 evaluated to have “Like Moderately”. The texture was observed that the formulation 2 obtained highest mean of 8.05 evaluated as “Like Very Much”. The overall acceptability of native chicken soup, the composition of formulation 2 was most preferred as evidence of the result of sensory evaluation conducted and obtained 7.60 with the description of “Like Moderately”. The grand total mean of formulation 2 was computed 7.73 with the description of “Like Moderately”.

Table 4. Formulation 1

SENSORY PROFILE	Mean	Verbal Description	Interpretation
Aroma	6.20	Like Slightly	Consumers slightly like the product
Color	5.80	Like Slightly	Consumers slightly like the product
Taste	6.00	Like Slightly	Consumers slightly like the product
Texture	8.00	Like Very Much	Consumers generally like the product
Overall Impact	6.60	Like Slightly	Consumers slightly like the product
Grand Mean	***6.52***	**Like Slightly**	**Consumers slightly like the product**

This table shows the result of the evaluation of Native Chicken Soup using Papaya and Malunggay Leaves as to its aroma, color, taste, texture and overall acceptability of sensory profile of native Tinolang Manok.

The table shows how people rated different aspects of the product, like aroma, color, taste, texture, and overall impact. Most people rated these aspects as “Like Slightly,” with the highest score given to texture, meaning they “Like Very Much” how it feels. The average score across all parts, called the grand mean, is 6.52, which means that, overall, people like the product a bit but aren’t overjoyed by it. The p-values were computed and it indicate that each aspect of the product is significantly liked by consumers. Aroma (6.20), Color (5.80), Taste (6.00), and Overall Impact (6.60) all have very low p-values (below 0.05), meaning these ratings are significantly above the neutral point of 5. The Texture (8.00) received the highest score and also shows a very low p-value, indicating that people "Like Very Much" the texture of the product. The Grand Mean of 6.52, with a very low p-value, suggests that overall, people like the product slightly.

Studies show that sensory aspects like taste, smell, and texture are big reasons why people like or dislike a product. Lawless and Heymann (2010) explain that texture, in particular, can make people enjoy a product even more. Other studies, like one by Delarue and Sieffermann (2004), point out that while aroma and taste are often personal preferences, they still play a huge role when combined with texture and appearance, which matches the pattern seen in this table.

These results suggest that the product is off to a good start, especially with texture, which could be a big selling point. Improving aspects like aroma and color might help increase its popularity even more. By making small adjustments to these areas, the product could become more appealing to a wider range of people.

Table 5. Formulation 2

SENSORY PROFILE	Mean	Verbal Description	Interpretation
Aroma	8.15	Like Very Much	Consumers generally like the product
Color	7.85	Like Moderately	Consumers moderately like the product
Taste	7.00	Like Moderately	Consumers moderately like the product
Texture	8.05	Like Very Much	Consumers generally like the product
Overall Impact	7.60	Like Moderately	Consumers moderately like the product
Grand Mean	***7.73***	**Like Moderately**	**Consumers moderately like the product**

This table shows the result of the evaluation of Native Chicken Soup using Chayote and Chili Leaves as to its aroma, color, taste, texture and overall acceptability of sensory profile of native *Tinolang Manok*.

The table shows consumer ratings for the product’s aroma, color, taste, texture, and overall impact. Aroma and texture scored over 8.0, meaning people "Like Very Much," while the other attributes scored between 7.0 and 7.85, indicating "Like Moderately." The grand mean of 7.73 suggests that, overall, people moderately like the product. The p-values were computed and reveal that each aspect of the product is significantly liked by consumers. Aroma (8.15) and Texture (8.05) scored the highest and both have very low p-values, meaning people "Like Very Much" these aspects. Color (7.85), Taste (7.00), and Overall Impact (7.60) also received significant ratings with low p-values (below 0.05), showing that people "Like Moderately" these attributes. The Grand Mean of 7.73, with a low p-value, confirms that the product is moderately liked overall.

Study by Farrah, D. (2019) discusses that chili leaves is commonly used in traditional dishes, offer both nutritional and health benefits that can enhance the quality of food. In some culinary traditions, such as in the Philippines, they are used in chicken soups for their mild heat and healthful properties. These leaves are rich in vitamins A, B, and C, and contain minerals like calcium, sodium, and iron.

Their antioxidant properties may help reduce the risks of several chronic diseases, such as arthritis, diabetes, and stomach issues.

These results suggest the product is well-received, especially using Chayote and Chili leaves for its aroma, color, taste, texture and overall acceptability of sensory profile of native *Tinolang Manok*. Marketing could emphasize these strong points, while slight improvements in color and taste may increase overall appeal, making the product more widely liked.

Table 6. Formulation 3

SENSORY PROFILE	Mean	Verbal Description	Interpretation
Aroma	5.20	Like Slightly	Consumers slightly like the product
Color	4.85	Dislike Slightly	Consumers slightly dislike the product
Taste	5.93	Like Slightly	Consumers slightly like the product
Texture	5.55	Like Slightly	Consumers slightly like the product
Overall Impact	5.74	Like Slightly	Consumers slightly like the product
Grand Mean	***5.45***	**Like Slightly**	**Consumers slightly like the product**

This table shows the result of the evaluation of Native Chicken Soup using Turnips and Chayote Leaves as to its aroma, color, taste, texture and overall acceptability of sensory profile of native *Tinolang Manok*.

The table shows consumer ratings for the product's aroma, color, taste, texture, and overall impact. Aroma and texture scored over 8.0, meaning people "Like Very Much," while the other attributes scored between 7.0 and 7.85, indicating "Like Moderately." The grand mean of 7.73 suggests that, overall, people moderately like the product. The p-values were computed and show that Aroma (5.20) and Color (4.85) are not significantly liked, as their p-values are above 0.05, meaning people "Like Slightly" or even "Dislike Slightly" these attributes. However, Taste (5.93), Texture (5.55), and Overall Impact (5.74) have significant p-values, indicating that people "Like Slightly" these aspects. The Grand Mean of 5.45, with a significant p-value, confirms that overall, people slightly like the product, but there is still room for improvement.

Study by Morrison (2021) notes that Generation Z prioritizes foods that are both flavorful and align with health and sustainability values, favoring minimally processed ingredients. The inclusion of various local vegetables in traditional dishes, such as *tinolang manok*, could appeal to this demographic. The sensory appeal and cultural familiarity of these dishes increase their acceptability among young consumers.

These results suggest that while the product is slightly liked overall, some areas, like aroma and color, need attention. Consumers were not as satisfied with these aspects, and their ratings were closer to neutral or even below it. The product could benefit from adjustments to improve these attributes.

CONCLUSION

Based on the findings of the study, the researchers conclude that:

- Using chayote and chili leaves are very much commendable to be processed into a Native Chicken Soup as evidenced from the result of the sensory evaluation conducted, describing the product as, aroma, color, taste, texture and overall acceptability, and general acceptability.
- F2-1000g Native Chicken+300g Papaya+50g Chili Leaves+00g Onion+20g Garlic+30g Ginger+30g Fish Sauce+1500g Water+2g Pepper+15g Salt as evidenced by the sensory profile evaluation conducted

RECOMMENDATIONS

Based on the acceptability of the sensory profile of Tinolang Manok using different local vegetables could focus on several areas and recommendations.

- Potential avenue of research could involve investigating the preferences of Generation Z for various vegetable combinations, such as malunggay leaves, chayote leaves, chili leaves, papaya, cayote, turnips and other locally sourced ingredients, to determine how these affect the overall sensory experi-

ence and acceptability of the product.

- Comparative analyses could explore the sensory differences between traditional and modified recipes, including variations in flavor, aroma, and texture.
- Another useful study could examine the nutritional implications of using alternative vegetables in Tinolang Manok, offering insights into healthier dietary options for younger consumers.
- Research could delve into the cultural significance of Tinolang Manok in contemporary Filipino cuisine, assessing its role in social gatherings and celebrations, which may further enrich understanding of its evolving appeal among younger generations.

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EFFECTIVENESS OF TARO FLOUR IN CAKE BAKING

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ABSTRACT

The study specifically sought to determine whether cakes made with taro flour are marketable by assessing the efficacy of chiffon, butter, and sponge cakes made with taro flour in terms of crust, grain, color, taste, and texture. Twenty evaluators assessed the sample and divided into four groups: male students, female students, faculty (teachers), and experts. The researcher used quantitative-descriptive research. Quantitative assessment was then applied using a four- point rating scale adapted from (Marcos et.al 2000) this will help the respondents to express their agreement or disagreement with a statement using 4 rating equivalents. The data gathered were analyzed using the Anova one-way analysis. Taro flour-based chiffon, butter, and sponge cakes were evaluated using seven criteria: (1) outside color, (2) crust, (3) inside color, (4) grain, (5) texture, and (6) flavor and taste, with rating equivalents of 3.50 - 4.0 - very effective, 2.50 - 3.49 - effective, 1.50 - 2.49 - merely effective, and 1.00 - 1.49 - not effective. Results of the study revealed that taro flour is an effective substitute for cake flour because of its fine texture and white color similar to commercial cake flour. The cake made using taro produced a decent result, comparable to commercially available cakes. They were all rated effective. Statistical analysis revealed that the three samples made from taro flour were acceptable as substitute to cake flour in making chiffon, butter and sponge cake.

Keywords: *Taro, Chiffon Cake, Butter Cake, Sponge Cake, Cake Preparation, Cake Baking*

INTRODUCTION

The edible corms of the tropical plant Colosia esculenta also known as taro are the main reason for its cultivation from various plants species in the Araceae family, it is one that is most widely grown. While the grain is known as taro and the entire plant is commonly referred to as gabi. The dietary fiber and nutritious carbs in taro root enhance the function of your digestive system and can help loss weight in healthy way. The output of taro (arrow root) in the Philippines was 209, 886 tons in 2019 and is expected to change by an average of -2.79%, according to selinawamucii.com. In the country, taro was grown on estimated 29, 754 hectares. Eastern and Central Visayas as well as the entire region of Mindanao, have the greatest taro-planted region from 19975-1977. According to the Philippine statistics 2011-2015, taro or gabi production covers 7,385 area of taro production in the central Luzon and 15,941 estimated hectares in Cagayan valley in the year 2015.

Taro is a resilient crop, adaptable to various climates, and can be grown in marginal lands, making it valuable for food security, especially in vulnerable communities. According to Zhang et.al (2022), taro flour can be used as a gluten-free alternative to wheat flour, expanding dietary options for individuals with allergies or dietary restrictions. The government imports wheat flour from foreign nations because Filipinos like baking. Due to increased demand, wheat flour prices are rising on the market. These days, bakeries and shopping centers raise the cost of their baked goods, which some customers cannot pay. It's worth looking at alternatives to these.

In order to reduce reliance on wheat imports and improve the standard of living for local farmers, this study is very interested in encouraging the use of flour from local sources as an alternative to wheat flour in baking. FAOSTAT (2023).

This study demonstrates how well taro flour works as a wheat flour substitute in baked goods, par-

ticularly cakes. By using criteria to assess the cakes' final product, the study aimed to determine how well taro flour worked in cake baking in terms of crust, grain, color, flavor, texture, and overall acceptability. Batolome (2023) investigated the use of taro flour to pastry product like cookie and cake and found out that taro flour can be a good substitute to commercial flour.

Overall, promoting taro flour production can contribute to multiple sustainable development by providing food security, generating income, supporting sustainable agriculture, and promoting healthy diets.

Research Objectives

The study was conducted to determine the effectives of chiffon cake, butter cake and sponge cake made of taro flour.

Specifically, the researcher aimed to:

1. Evaluate the effectiveness of Chiffon Cake, Butter Cake and Sponge Cake made of Taro Flour in terms of crust, grain, color, taste and texture.
2. Determine through evaluation if the Chiffon Cake, Butter Cake and Sponge Cake made of taro flour are acceptable to the taste of the board of taster and to be acceptable in the market.

REVIEW OF RELATED LITERATURE

Taro is a large perennial herbaceous plant growing up to 5-6 feet. It's rather heart-shaped, frilly edged leaves at the end of long, stout petioles appear like elephant's ear. It grows best in marshy, wet soil and warm, humid climates. Taro roots contain a wealth of organic compounds, minerals, and vitamins that can benefit our overall health in a number of ways. It has a very significant amount of dietary fiber and carbohydrates, as well as high levels of Vitamin A, C, E, Vitamin B6, and folate. There is magnesium, iron, zinc, phosphorus, potassium, manganese, and copper in it. The plant also provides some protein in your diet, but the amount is almost negligible.

Taro root improved heart health, it contains a significant level of potassium, which is another of the essential` minerals that can we need to remain healthy and functional. Sacklani et.al (2021)

The price of wheat flour in the market is increasing due to high demand. Nowadays, bakeshops and malls do increase the price of their baked products and some of consumers cannot afford. According to study of Hossain (2016), the substitution of wheat flour (10%) with taro flour resulted in dough of different physic chemical characteristics, depending on the amount and the type of starch used. The composite flour at the 10% substitution level showed physical properties similar to wheat bread samples, especially for products from taro-wheat composite flour.

In the study conducted by Arenillo et al. (2011), the performance of taro flour in different baked products were investigated taro from white variety was made into flour using brine and blanching methods to eliminates its acridity property. Results showed the processing of raw taro yielded 50-53% of flour. The processed taro flour was most acceptable for palitos de quezo and choco crinkles in terms of appearance, taste, aroma, texture, color, and their overall acceptability, while biscuits were rated to be like moderately along this parameter. Based on the results acceptability differences of the quality attributes palitos de quezo were found not significant in the appearance, taste, aroma and their overall acceptability, however their texture and color were significantly noted. Similarly results further showed that there were no significant differences in the quality and biscuits.

Generally, taro flour with its acridity reduced can be an alternative source of flour for baked products. According to study of Hossain (2016), the substitution of wheat flour (10%) with taro flour resulted in dough of different physical and chemical characteristics, depending on the amount and the type of starch used. The composite flour at the 10% substitution level showed physical properties similar to wheat bread samples, especially for products from taro-wheat composite flour. The taro-wheat composite flour had the lowest setback and processing stability, which indicated low staling or aging of dough for bread substituted with taro flour. The composite bread would serve as functional food because of the high trace element content. The composite bread with taro-flour substitutions will be nutritionally superior have higher minerals and crude fiber content to whole wheat bread. Scher et.al (2016).

Consumer's enlightenment on the nutritional benefits of the taro flour substituted functional foods would help to improve the sensory acceptability of composite bread. Further studies on the range of substitution, sensory quality and textural properties of composite pastry products could be helpful to find the suitable substitution level for taro flour. Taro-wheat composite flour showed the lowest setback and processing stability, indicating that dough substituted with taro flour ages slowly.

METHODOLOGY

In this study the researcher used quantitative descriptive research. To test the differences the researchers used One-Way Anova Analysis. In one way analysis of variance, the variations of single dependent variable or factors was investigated (JMP 2024). Further, quantitative assessment methods had been used to evaluate effectiveness of chiffon cake, butter cake and sponge cake made of taro flour in terms of crust, grain, color, taste and texture by the faculty (teachers), male students, female students, and experts. Furthermore, the researcher also applied quantitative assessment method. Quantitative assessment method is an approach that involves assessing using numbers, evaluate the benefit, and different risks responses in order to aid decision making HCIAPP Study Guide (2015). In addition, the study was conducted at Marvelous College of Marbel in Koronadal City, South Cotabato. Twenty evaluators assessed the sample and divided into four groups: male students, female students, faculty (teachers), and experts. The scale of measuring effectiveness was adapted from Marcos et.al (2000). The rating equivalents was of 3.50 - 4.0 - very effective, 2.50 - 3.49 - effective, 1.50 - 2.49 - merely effective, and 1.00 - 1.49 - not effective. These four- point scale was utilized in the assessment to determine the level of the evaluator's significance.

FINDINGS

Chiffon Cake

Chiffon cakes are foam cakes, cakes that are leavened primarily with beaten egg whites, just like angel cakes. Chiffon cakes contain both egg yolks and vegetables oil. These two ingredients keep the cake moist, soft and tender and result in a cake that tastes great and keeps well.

Making chiffon cake is combining methods used with sponge cakes and conventional cakes. It includes baking powder and vegetable oil, but the eggs are separated and the whites are beaten before being folded into batter, creating the rich flavor like an oil cake, but with a lighter texture that is more like a sponge cake.

Table 1 shows the criteria number 6 (Flavor and taste) had the highest mean of 3.65, while criteria number 3 (Inside color) and criteria number 5 (Texture) had the lowest mean rating of 3.3.

The group of male students, female students, faculty (teachers) and expert had rated chiffon cake made of taro flour using the criteria with mean rating of 3.43, 3.43, 3.36, and 3.33 respectively. The group of male and female students gave the highest mean rating of 3.43, while the group of experts gave the lowest mean rating of 3.33.

Table 1. Evaluation of Chiffon Cake using Taro Flour

Criteria	Evaluators				
	Male Students	Female Students	Faculty (Teachers)	Expert	Mean Rating
Outside Color	3.6	3.4	3.6	3.2	3.45
Crust	3	3	3	3.2	3.05
Inside Color	3.6	3.2	3	3.4	3.3
Grain	3.4	3.8	3.6	3.6	3.6
Texture	3.4	3.6	3	3.2	3.3
Flavor and Taste	3.6	3.6	4	3.4	3.65
Mean Rating	**3.43**	**3.43**	**3.36**	**3.33**	**3.39**
X	20.6	20.6	20.2	20	
X2	71	71.16	68.92	66.8	

Rating equivalents:
3.50 – 4.0 – Very Effective
2.50 – 3.49 –Effective
1.50 – 2.49 – Merely Effective
1.00– 1.49 – Not Effective

Table 1 shows the result of evaluation of Chiffon Cake using Taro Flour. From the table of 0.05 and 0.01 level of significance

F 0.05 (3,20) = 3.10

F 0.01 (3,20) = 4.94

Fc < F 0.05 < F 0.01 = 0.230< 3.10< 4.94

The data shows that the chiffon cake using taro flour is accepted.

Statistical analysis also indicated that there are no significant differences between the judges (board of taster) and the treatment. Therefore, chiffon cake was rated as "Effective" with the mean rating of 3.39. According to Zhou etal. (2017) on his investigation on the impact of taro flour on the quality of steam bread, he found out that adding taro flour increased the viscosity and elastic texture of the steamed bread. This study also suggested that taro flour could enhance the flavor and color of the bread. His study was supported by Bartolome (2023) on his study about the development and acceptability of taro flour in pastry products, he concluded that taro flour is accepted as substitute to commercial flour.

Butter Cake

A butter cake is a cake in which one of main ingredients is butter. This also called shortened cake. Butter cake is baked with basic ingredients: butter, sugar, eggs, flour, and leavening agents such as baking powder or baking soda. It is considered as one of the quintessential cakes in American baking. Butter cake originated from the English pound cake, which traditionally use equal amounts of butter, flour, sugar, and eggs to bake heavy, rich cake.

As shown in Table 2, Criteria number 5 (Texture), criteria number 6 (Flavor and taste) had the highest mean of 3.75, while criteria number 1 (Outside Color) had the lowest mean rating of 3.1. The group of male students, female students, faculty(teachers) and expert had rated Butter Cake made of Taro Flour using the criteria with mean rating of 3.3, 3.33, 3.73, and 3.67 respectively. The group of faculties (teachers) gave the highest mean rating of 3.73, while the group of male students gave the lowest mean rating of 3.3.

Table 2. Evaluation of Butter Cake using Taro Flour

Criteria	Evaluators				
	Male Students	Female Students	Faculty (Teachers)	Expert	Mean Rating
Outside Color	2.2	2.8	3.6	3.8	3.1
Crust	3.4	3.2	3.6	3.6	3.45
Inside Color	3.2	3.6	3.8	3.6	3.55
Grain	3.4	3.4	3.6	3.4	3.45
Texture	3.8	3.6	3.8	3.8	3.75
Flavor and Taste	3.8	3.4	4	3.8	3.75
Mean Rating	**3.3**	**3.33**	**3.73**	**3.67**	**3.51**
X	19.8	20	22.4	22	
X2	67.08	67.12	83.76	80.08	

Rating equivalents:

3.50 – 4.0 – Very Effective 1.50 – 2.49 – Merely Effective

2.50 – 3.49 –Effective 1.00– 1.49 – Not Effective

Table 2 shows the result of evaluation of butter cake using taro flour. From the table of 0.05 and 0.01 level of significance

F 0.05 (3,20) = 3.10

F 0.01 (3,20) = 4.94

Fc < F 0.05 < F 0.01 = 3.503< 3.10< 4.94

The data shows that the butter cake using taro flour is accepted.

Statistical analysis also indicated that there are no significant differences between the judges (board of taster) and the treatment. Therefore, chiffon cake was rated as "Very Effective" with the mean rating of 3.51. The findings supported by Bulan (2023) that taro flour has acceptable result in baking pasty products.

Sponge Cake

Sponge cake is a cake based on flour (usually wheat flour), sugar, butter and eggs, and is sometimes leavened with baking powder. It has a firm yet well-aerated structure, similar to a sea sponge. In the United Kingdom a sponge cake is produced using the batter method, while in the US cakes made using the batter method are known as butter or pound cakes. Two common British batter methods sponge cakes are layered Victoria sponge cake and Madeira cake. The sponge cake is thought to be done of the first of the non-yeasted cakes, and the earliest attested sponge cake recipe in English is found in a book by the English poet Gervase Markham. Variations on the theme of a cake lifted, partially or wholly, by trapped air in the batter exist in most places where European patisserie has spread.

As shown in table 3, criteria number 4 (Grain) and criteria number5(Flavor and Taste) had the highest mean of 3.55, while criteria number 2 (Crust) and criteria number 6 (Flavor and Taste) had the lowest mean rating of 3.3.

The group of male students, female students, faculty (teachers) and expert had rated sponge cake made of taro flour using the criteria with mean rating of 3.47, 3.4, 3.73, and 3.2 respectively. The group of faculties (teachers) gave the highest mean rating of 3.73, while the group of experts gave the lowest mean rating of 3.2.

Table 3. Evaluation of Sponge Cake using Taro Flour

Criteria	Evaluators				
	Male Students	Female Students	Faculty (Teachers)	Expert	Mean Rating
Outside Color	3.6	3.4	3.6	3	3.4
Crust	3	3.6	3.6	3	3.3
Inside Color	3.6	3.6	4	3.2	3.6
Grain	3.8	3.4	4	3	3.55
Texture	3.2	3.4	3.8	3.8	3.55
Flavor and Taste	3.6	3	3.4	3.2	3.3
Mean Rating	**3.47**	**3.4**	**3.73**	**3.2**	**3.45**
X	20.8	20.4	22.4	19.2	
X2	72.56	69.6	83.92	61.92	

Rating equivalents:

3.50 – 4.0 – Very Effective
2.50 – 3.49 –Effective
1.50 – 2.49 – Merely Effective
1.00– 1.49 – Not Effective

Table 3 shows the result of evaluation of sponge cake using taro flour. From the table of 0.05 and 0.01 level of significance

F 0.05 (3,20) = 3.10

F 0.01 (3,20) = 4.94

Fc < F 0.05 < F 0.01 =4.030< 3.10< 4.94

The data shows that the sponge cake using taro flour is accepted.

Statistical analysis also indicated that there are no significant differences between the judges (board of taster) and the treatment. Therefore, chiffon cake was rated as “Effective” with the mean rating of 3.45. According to Kausik et. al (2021) textural and physiochemical properties of cake was improved due to the enrichment and used of taro flour.

Final Result for the three kinds of cake (Chiffon Cake, Butter Cake and Sponge Cake)

As shown in table 4, Final Result for the three kinds of cake (Chiffon Cake, Butter Cake and Sponge Cake) criteria number 6 (Flavor and Taste) had the highest mean rating of 3.57, while criteria number 2 (Crust) had the lowest mean rating of 3.27. The samples of three kinds of cake (Chiffon Cake, Butter Cake and Sponge Cake) made of taro flour had rated using the criteria with mean rating of 3.39, 3.51, and 3.45 respectively. The butter cake had the highest mean rating of 3.51, while the chiffon cake had the lowest mean rating of 3.39.

Table 4. Final Result of Evaluation for the three kinds of cake (Chiffon Cake, Butter Cake and Sponge Cake) made of Taro Flour

Criteria	Evaluators			
	Chiffon Cake	Butter Cake	Sponge Cake	Mean Rating
Outside Color	3.45	3.1	3.4	3.32
Crust	3.05	3.45	3.3	3.27
Inside Color	3.3	3.55	3.6	3.48
Grain	3.6	3.45	3.55	3.52
Texture	3.3	3.75	3.55	3.53
Flavor and Taste	3.65	3.75	3.3	3.57
Mean Rating	3.39	3.51	3.45	3.45
X	20.35	21.05	20.7	
X2	69.27	74.1425	71.505	

Rating equivalents:
3.50 – 4.0 – Very Effective
2.50 – 3.49 –Effective
1.50 – 2.49 – Merely Effective
1.00– 1.49 – Not Effective

Table 4 shows the result of evaluation the three kinds of cake (Chiffon Cake, Butter Cake and Sponge Cake).

From the table of 0.05 and 0.01 level of significance

F 0.05 (2, 15) = 3.68

F 0.01 (2,15) = 6.36

Fc < F 0.05 < F 0.01 = 0.02216< 3.68<6.36

The data shows that the three kind of cakes (Chiffon Cake, Butter Cake and Sponge Cake) using taro flour is accepted. Statistical analysis also indicated that there are no significant differences among samples. Therefore, taro flour is effective in cake baking with the mean rating of 3.45 and rated as "Effective".

Evaluation for General Acceptability of the three kinds of cake (Chiffon Cake, Butter Cake and Sponge Cake)

As shown in Table 5, final result of evaluation for general acceptability of the three kinds of cake (Chiffon Cake, Butter Cake and Sponge Cake) butter cake had the highest mean rating of 3.75, while sponge cake had the lowest mean rating of 3.45. The group of male students, female students, faculty (teachers), and experts had rated the three kinds of cake with the mean rating of 3.53, 3.73, 3.73, and 3.46 respectively. The group of female students and teachers had rated the highest mean rating of 3.73, while experts had rated the lowest men rating of 3.46.

Table 5. Evaluation for General Acceptability of the three kinds of cake (Chiffon Cake, Butter Cake and Sponge Cake)

Criteria	Evaluators				
	Male Students	Female Students	Faculty (Teachers)	Experts	Mean Rating
Chiffon Cake	3.4	4	3.8	3.4	3.65
Butter Cake	3.6	3.6	4	3.8	3.75
Sponge Cake	3.6	3.6	3.4	3.2	3.45
Mean Rating	3.53	3.73	3.73	3.46	3.62
X	10.6	11.2	11.2	10.6	
X2	37.48	41.92	42	36.24	

Rating equivalents:
3.50 – 4.0 – Very Effective
2.50 – 3.49 –Effective
1.50 – 2.49 – Merely Effective
1.00– 1.49 – Not Effective

Table 5 shows the result of evaluation for general acceptability of the three kinds of cake (Chiffon Cake, Butter Cake and Sponge Cake).

From the table of 0.05 and 0.01 level of significance

F 0.05 (3,9) = 3.86

F 0.01 (3,9) = 6.99

Fc < F 0.05 < F 0.01 = 0.918< 3.86<6.99

The data shows that the general acceptability of the three kinds of cake (Chiffon Cake, Butter Cake and Sponge Cake) using taro flour is accepted. Statistical analysis also indicated that there are no signifi-

cant differences among samples. Therefore, taro flour is effective in cake baking with the mean rating of 3.62 and rated as "Very Effective". There have been some studies conducted on the sensory and nutritional properties of taro flour and its potential use in various food products. A study by Osundahunsi et al. (2003) investigated the sensory attributes of bread made with taro flour and found that the bread had good texture, flavor, and overall acceptability. Furthermore, taro flour has been recognized for its nutritional benefits, including its high content of dietary fiber, protein and iron. Shanmugam and Mathukumarappan (2013). In general, the acceptability of baking and pastry products made with taro flour as an ingredient may depend on various factors, including the recipe used, the proportion of taro flour used, and the individual preferences of consumers. Therefore, further research may be necessary to fully understand and acceptability of dinner rolls made with taro flour.

SUMMARY

Taro flour was used in chiffon cake, butter cake, and sponge cake as a substitute to cake flour. Twenty evaluators who evaluated the sample and they categorized into four groups: expert, faculty (teachers), male students, and female students. The data were analyzed using Anova one-way analysis.

The result of the study summarized as follows:

1. Taro flour is effective as substitute flour to cake flour, the texture of taro flour is fine and the color is white. The output of the cake using taro is good like the commercial cake sold in the market.
2. Statistical Analysis showed that the three samples (Chiffon cake, Butter cake and Sponge cake) made from taro flour is acceptable. Statistical computation shows that there is no significant differences among samples.
3. Generally, taro flour is effective as substitute to cake flour in cake baking.

CONCLUSION AND RECOMMENDATION

Based on the above results the researchers concluded that the chiffon cake, butter cake and sponge cake made from taro flour were of good quality and were rated "Effective" as substitute to wheat flour. Researchers also recommend using Taro Flour in making flavored cakes especially in butter cake for it produce moist which is good as the quality of butter cake. It is also recommended to use quality ingredients in baking cakes to add richness to the cake and produce quality and sellable product that can attain the customer satisfaction for it is rich in vitamins and minerals. Further the researchers recommended to tests the effectiveness of taro flour in other pastry products.

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SHELF-LIFE ANALYSIS OF TUNA: A COMPARATIVE REVIEW OF PACKAGING AND NON-PACKAGING EFFECTS

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ABSTRACT

This study aims to evaluate the differences between vacuum packing, modified atmosphere packing (MAP), packaging with polyethylene film and tuna in refrigerator without any packaging. After packaging with these techniques, fresh tuna samples were stored at suitable refrigeration temperature for 21 days. Various items were used in the experiment such as bacterial testing kits, pH meters for testing acidity, chemical spectrophotometer, texture analyzer and refrigerators. For the evaluation of the odor, taste and general acceptability trained panels of judges were engaged. As for the structure of the experiment, the intervals (1st, 7th, 14th, and 21st days) for which samples for bacteria, smell, and physical properties assessments were taken from each packaging group were predetermined. The differences between the groups were analyzed statistically using ANOVA, and in case of the need for identification of differences, the post hoc Tukey test was used. It was reported that vacuum packing of tuna fish yielded a shelf life of 21 days in contrast to 14 days in MAP 10 days in polyethylene film wrapping and 6 days in tunas without any packing. The P values for microbial load sensory attributes and physicochemical properties were all above .1 which means that there were no distinctions between the packaging groups in terms of sensory quality with time. It is clear from these outcomes that vacuum packaging and MAP techniques are very useful in extending the shelf life and maintaining the quality of tuna fish and therefore most appropriate measures for tuna packaging and storage are learnt from this study.

INTRODUCTION

In order to ensure the safety and quality of fish products, particularly those of fast perishable fish such as tuna, techniques of preservation become indispensable in the global seafood industry. According to research conducted by Scognamiglio et al. (2021), modern packaging techniques, such as vacuum and MAP, play an important role in extending the shelf life of fish by reducing microbial growth and preserving sensory qualities. These also ensure that the nutritional value of fish products are retained throughout storage and transport Also, de Rezende et al (2022) looked at opposing parts of the fish spoilage cycle by assessing the use of superchilling together with biopreservation to inhibit fish spoilage while maintaining quality. Thus, from research, direct storage has its disadvantages as fish is subjected to oxygen where it increases the fast rate of oxidation for fats and spoilage by microorganisms in tuna . Additional benefits of product freshness are obtained through innovative preservation methods, including nanotechnology and edible coatings within packaging systems. Such new developments demonstrate that packaging technologies will indeed play a critical role in solving some of the challenges facing global seafood supply chains.

In the Philippine, tuna is one of the most important export commodities, however its local preservation practices are sometimes inadequate to transport it over long distances in good condition. Based on the study of De Leon and Cortez (2020), vacuum-packed tuna stored in controlled temperatures displayed better sensory and microbial characteristics than fish offered in wet markets. The results of Aquino (2018) study proved the efficacy of MAP in enhancing the shelf life of yellowfin tuna especially in tropical countries where temperature and humidity promote faster deterioration of the fish. Local investigations also sought to assess the feasibility of modern packaging and the natural antimicrobial properties of plant extracts to inhibit microbial proliferation and spoilage related fatty acids oxidation. In spite of

this progress, fully embracing these methods has been hampered by technology and cost limitations. To support this notion, Sheppard, B. (2017) argued that regions that produce tuna such as General Santos City need to implement better post-harvest strategies as traditional freezing preservation is not always effective for maintaining good quality for subsequent exportation. It is therefore necessary to deal with these important factors in order for Philippine tuna to remain competitive in the international market.

The primary objective of this study is to analyze the effects of both packaging and non-packaging methods on the shelf life of tuna from a comparative stand point. To be more specific, this research looks at how the use of various methods such as vacuum packaging, MAP, and polyethylene-film wrapping, can affect the microbial load, sensory properties and the physicochemical aspects of tuna. In view of this, the study looks into the local and international literature on the best ways of preserving and processing tuna. It also aims to suggest alternative approaches that will be more affordable, cost effective and ecologically sound for the Philippines seafood market. There is also the aspect of knowledge gaps in exploring the advances in preservation technology and how they can be adopted in the region. On the broader picture, insights are expected in ways of improving the quality of tuna, safety of cooking it and the market for it.

The results of this research are likely to benefit every person involved in the tuna value chain. Coastal fishing communities should also be able to maximize their earnings through the introduction of better preservation methods since they can minimize post-harvest losses. Traders and exporters would be able to optimize the quality of the product since it would be in a form that is acceptable internationally with regards to food safety and open more market opportunities. Consumers would enjoy safer and fresher because of nutrition and security issues related to tuna. The recommendations of the study may help the government agencies in drafting the rules regarding the packaging and storage of seafood products in relation to the existing practices worldwide. More so, environmentally friendly measures implementation would also curb other global challenges, that is, food waste and plastic pollution. The effective use of Preservation Methods can launch a drastic revolution in the Philippine Tuna industry for the local and international markets as well.

This study is very important as it focuses on overcoming the food safety and sustainability problems at the same time in the seafood industry. It is supported by scientific data on how the modern packaging technologies may improve the shelf life and quality of tuna. The study also considers practical application of the results which is in line with national goals of minimizing post-harvest losses and supporting sustainable practices in the fishing sector. The review also contributes to the existing literature by bringing together evidence from the use of food norms in developed countries and those in the developing countries. In addition to this, selling the health of economies of large-scale technology development is also worth noting. This means sending out advanced preservation equipment technologies to small fishers and traders that can fight economically. Through this study, stakeholders can be aided with means in improving the effectiveness and robustness of the seafood supply chain.

Ultimately, this study could have plenty of benefits, covering economic, social and environmental aspects. It means less spoilage which results to more profits and better livelihoods for the fishers and the traders. The quality of seafood that the consumers can enjoy is improved as it is more safe and healthier, thereby improving their wellbeing. The results can be useful to the policy makers to enhance good food safety policy and practices in the fisheries sector. On environmental level, better packaging leads to less food wastages for carbon footprints from unspoiled tunas. However, the study further argues in favor of sustainable food systems by tackling the issues of food waste minimization. In the end, its conclusions help inform the issues of the seafood supply chain, so that it is fairer and more sustainable.

STATEMENT OF THE PROBLEM

The seafood industry encounters significant challenges in preserving the quality and safety of perishable products, particularly tuna, which is prone to rapid spoilage. As consumer demand for fresh, sustainably sourced seafood rises, it is crucial to understand the factors that influence the shelf life of tuna. Despite the widespread use of various packaging methods, there is limited empirical data comparing the effectiveness of these techniques against unwrapped tuna in terms of microbial stability, sensory quality, and overall freshness.

This study was guided by the following research questions:

1. How do different packaging methods influence the shelf life of tuna compared to unpackaged tuna?
2. What are the specific effects of various packaging techniques on the microbial load, sensory characteristics, and physicochemical properties of tuna?
3. What insights can be drawn from existing literature that could guide best practices in tuna packaging and storage?

REVIEW OF LITERATURE

Nutritional Value and Perishability of Fish Products

Fish and fishery products are rich in proteins of high biological value, vitamins, minerals, and unsaturated fats, which are beneficial to health. However, the main factors that make seafood products highly perishable are their high-water activity, near-neutral pH, and unique composition, requiring immediate processing or packaging to ensure their safety and quality. According to Robertson (2005), packaging protects food contents from physicochemical, microbiological, and physical mechanical changes that lead to degradation in product quality and safety. Freshness indicators in the form of stickers or labels provide indirect information on product quality by detecting either microbial proliferation or biochemical changes occurring in packaged food products. Such information may include deviations from normal storage temperature or changes in gas concentrations, like CO2, O2, NH3, H2S, and diacetyl, within the package, signaling product quality deterioration.

Mechanisms of Freshness Indicators

Microbiological quality can be evaluated through the determination of specific metabolites formed as a result of microbial growth and their reaction with specific indicators included within the package. In turn, deteriorative biochemical changes occurring in fish during storage, i.e., production of metabolites such as TVB-N, TMA-N, NH3 or BAs (histamine, putrescine, tyramine and cadaverine, etc.) provide the basis for the development of freshness indicators. BAs are non-volatile compounds and, thus, cannot be detected through sensory analysis. Thus, the development of an effective indicator of the presence of BAs would be very useful for the food industry. In contrast, H2S, a breakdown product of the amino acid cysteine, with an intense 'rotten egg' odor is formed during seafood spoilage by numerous bacterial spp. When bound to myoglobin, hydrogen sulfide forms a green pigment (sulfmyoglobin) which can be used for the development of a freshness indicator in red meat fishes.

Normally, freshness indicators are attached to the packaging material, which react with volatile amines or other indicator compounds produced during the deterioration of fish and other seafood, and the degree of freshness/spoilage is usually indicated by a color change as a result of a chemical or enzymic reaction. A number of fish freshness indicators have been described in the literature based on pH change (Gokoglu, N., Mohan, C. O., & Ravishankar, C. N. 2019; Kuswandi, B., Wicaksono, Y., Jayus et al. 2011). At the same time, consumers demand fresh products of seafood with little processing in order to maintain its natural high-quality characters. In this aspect, packaging is a critical aspect that the seafood industry has to implement so that products reach any short or long-distance locations in maximum quality without impairing the consumer's safety.

Importance of Packaging in Seafood Preservation

The function of preservatives in packaging is caused by the protection it offers the contained commodity from the action of oxygen, light, moisture, smell, and biological contamination with pathogenic microorganisms as well as pests. Packaging function becomes all the more important with seafood products, as such products are extremely perishable commodities that can readily become spoiled and are often prone to contamination by pathogenic microorganisms (Jay, J. M., Loessner, M. J., & Golden, D. A., 2008). Recently, with the development of modern technologies, packaging has moved away from a simple passive barrier separating the food from its packaging to an interactive, dynamic system between packaged foods and packaging. Thus, we find, on one hand, the most modified atmosphere packaging, vacuum packaging, active packaging, and intelligent packaging.

Preservation Methods and Alternatives

The most popular methods of fish preservation are refrigeration and freezing storage. Still, although one of the most critical parameters for the growth of spoilage and pathogenic bacteria is ambient temperature, refrigeration alone cannot provide long shelf-life periods for fish. Nowadays, the only technology that ensures a long period of preservation of seafood is its storage under freezing temperatures (<−18 ° C). Although effective in maintaining the product and preventing microbial spoilage, storage at freezing temperatures also deteriorates the sensory qualities of fish (He, Q., Gong, B., He, J., & Xiao, K., 2019; Getu, A., Misganaw, K., & Bazezew, M., 2015). Bacterial activity is the leading cause of seafood spoilage; preservative techniques must strive to induce natural and artificial forms of antimicrobial activity to control the spoilage microorganisms. In films and coatings, the application of several plant-based compounds as additives in food products has been increasingly regarded as a safe alternative to the conventional synthetic compounds used to preserve food products and extend their shelf life (Giarratana, F., Muscolino, D., Beninati, C., Ziino, G., Giuffrida, A., & Panebianco, A., 2016; Memar, M. Y., Raei, P., Alizadeh, N., Aghdam, M. A., & Kafil, H. S. 2017).

METHODOLOGY

Materials and Equipment Used in the Study

This study will utilize fresh tuna samples, various packaging materials (e.g., vacuum packaging, modified atmosphere packaging, polyethylene films), and controls (unpackaged tuna). Other essential equipment includes microbial testing kits, pH meters, a spectrophotometer for chemical analysis, a texture analyzer, and refrigeration units set to standard storage temperatures. Sensory evaluation kits, digital scales, and sterile tools for sample collection will also be necessary.

Design of the Study

The experimental design of the study is for the comparison of different methods of packaging affecting shelf life, microbial load, sensory attributes, and physicochemical properties of tuna. Samples will be set in groups based on the type of packaging used and kept under controlled refrigeration conditions and to set time intervals, samples from each group will be carried out to examine differences over time for microbial, sensory, and physicochemical testing.

Process in Conducting the Study

The experiment begins with preparing tuna samples under aseptic conditions. The samples are thereafter packed according to the assigned packaging method and refrigerated under controlled conditions. Samples from each group are taken at predetermined time intervals, that is days 1, 7, 14, until 21, for the determination of microbial load, sensory evaluation, as well as physicochemical analysis with special focus on pH, texture, color, and spoilage indicators. Measurements are recorded for comparison with regard to the effect of each packing method on the shelf life of tuna.

Respondents or Participants of the Study

The primary participants are the tuna samples themselves, categorized based on the packaging technique used. For sensory analysis, a panel of assessors familiar with evaluating seafood is recruited. This panel evaluates attributes such as appearance, odor, and texture to identify any sensory changes linked to different packaging methods.

Research Instrument

The study will use microbiological testing kits for microbial load, sensory evaluation forms for sensory analysis, pH meters, and a spectrophotometer to assess the physicochemical properties of tuna. A texture analyzer will measure the firmness of the tuna samples. These instruments will provide standardized, quantitative data for comparison across sample groups. Statistical Analysis Data will be analyzed using ANOVA to compare differences between packaging methods concerning microbial load, sensory attributes, and physicochemical properties. A post hoc Tukey test will identify specific differences between groups if the result of ANOVA yields significant difference. Descriptive statistics will summarize

sensory evaluation results, and regression analysis will assess the relationship between storage time and observed changes in the samples.

Data Gathering Procedure

Data collection will involve regular sample testing at scheduled intervals over the storage period. After each collection, microbial, sensory, and physicochemical evaluations are conducted, and all findings are documented. Data from each phase are securely recorded, ensuring that conditions and methodologies remain consistent throughout the study.

FINDINGS

This present analysis and interprets the data gathered in this study. The various results on the "Shelf-Life Analysis of Tuna: A Comparative Review of Packaging and Non-Packaging Effects" gives a detailed insight into how different packaging methods affect the quality and shelf life of tuna. In addition, the literature indicates that active packaging technologies play a crucial role in extending the shelf life of tuna by using materials that interact with the product, including antimicrobial agents and antioxidants, as highlighted by Alfiana (2021). These techniques help maintain freshness and lower spoilage rates by preventing the growth of harmful microorganisms. Microbial load measurements (expressed in CFU/g) for tuna stored under different packaging conditions over a specified period. The data illustrate the varying effectiveness of each packaging method in inhibiting microbial growth.

Time (Days)	Unpackaged (CFU/g)	Vacuum-Packaged (CFU/g)	MAP (CFU/g)	Polyethylene-Film Wrapped (CFU/g)
1	Baseline	Baseline	Baseline	Baseline
3	Moderate increase	Minimal increase	Slight increase	Moderate increase
7	Spoilage threshold	Below threshold	Below threshold	Near threshold
14	Not Measurable (high)	Below spoilage threshold	near threshold	Spoilage threshold

Figure 1: The table depicts the microbial growth trajectory (CFU/g) for tuna samples stored using various packaging methods.

Key observations include:

- Unpackaged tuna: Exhibits a steep increase in microbial load, surpassing spoilage thresholds (10^7 CFU/g) within the first week. This highlights the lack of microbial inhibition without packaging.
- Vacuum-packaged tuna: Slows microbial growth considerably compared to unpackaged tuna. While spoilage thresholds are reached eventually, it extends shelf life significantly.
- Modified atmosphere packaging (MAP): Demonstrates a slightly faster microbial growth rate than vacuum packaging but offers comparable shelf life.
- Polyethylene-film wrapping: Provides some reduction in microbial growth compared to unpackaged tuna but is less effective than vacuum or MAP.

The bar graph below summarizes and illustrates the superior performance of vacuum packaging in extending tuna's shelf life.

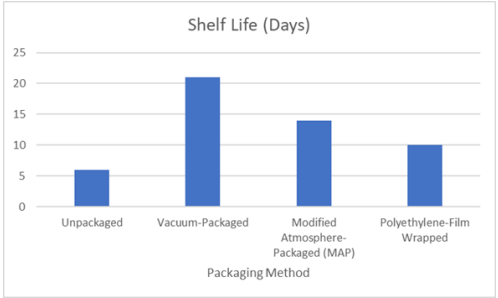

Figure 2: The estimated shelf life of tuna under different packaging conditions, determined by microbial spoilage thresholds (e.g., reaching 10^7 CFU/g) and sensory degradation.

Key Observations include:

- Vacuum-Packaged Tuna: The longest shelf life, extending to approximately 21 days due to the exclusion of oxygen, which slows bacterial growth.
- MAP: Offers a moderate extension (14 days), leveraging a custom gas mixture to inhibit microbial proliferation.
- Polyethylene-Film Wrapped: Provides some extension but is less effective compared to vacuum and MAP methods, with an estimated shelf life of 10 days.
- Unpackaged Tuna: The shortest shelf life (6 days), reflecting rapid spoilage due to unregulated exposure to air and microbial contamination.

Supporting this, research by Khan and Awan (2017) points out that effective packaging methods, such as vacuum packaging and Modified Atmosphere Packaging (MAP), can inhibit the growth of aerobic bacteria by reducing oxygen exposure, resulting in a significant increase in shelf life compared to tuna that is not packaged, which tends to spoil quickly. Moreover, the findings emphasize the vital role of packaging methods in managing microbial load and maintaining sensory qualities. Robertson (2005) highlights how packaging is essential in preventing microbial contamination, while Jay, Loessner, and Golden (2008) show that controlling the internal environment of packaging is crucial for slowing down spoilage caused by microbial growth.

The line graphs record the average scores (on a scale of 1 to 10) for appearance, odor, and texture of tuna samples at different intervals for the record 0 on the scale interprets not applicable during evaluation that were performed by a sensory panel to assess freshness and quality.

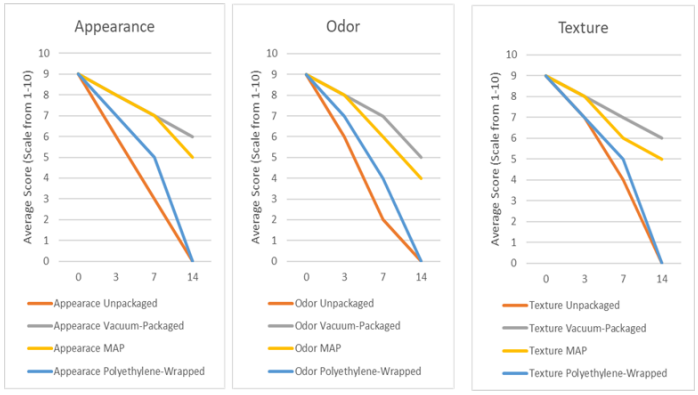

Figure 3: Demonstrates the sensory score trends for each packaging type.

Key observations include:

- Vacuum Packaging: Maintained the highest scores for appearance, odor, and texture over three weeks, with gradual declines noticeable after two weeks.
- MAP: Retained acceptable sensory quality for up to two weeks but showed steeper declines in odor and texture after day 7.
- Polyethylene Film: Scores dropped below acceptable thresholds by day 7, particularly for odor and texture.
- Unpackaged Tuna: Rapid sensory degradation was observed, with scores falling below acceptable limits within the first week.

Additionally, research by Giarratana et al. (2016) suggests that natural compounds like R (+) limonene can effectively inhibit spoilage organisms, thus improving the sensory quality of packaged tuna. It's also important to preserve physicochemical properties, such as pH and lipid oxidation levels; Khan and Awan (2017) point out that vacuum packaging and modified atmosphere packaging (MAP) are effective in maintaining these properties, leading to a more stable and appealing product. In contrast, unpackaged tuna experiences a rapid increase in microbial loads and sensory degradation, resulting in off-odors and

undesirable flavors. Gokoglu (2019) highlights the need for innovation in seafood packaging technologies, noting that enhanced barrier materials and techniques can effectively tackle shelf-life issues. Mohan and Ravishankar (2019) examine the use of active and intelligent packaging systems that provide real-time updates on the condition of the tuna, enabling better decisions regarding quality and safety. Additionally, Kuswandi et al. (2011) investigate smart packaging solutions that use sensors to track food quality, promoting a proactive approach to maintaining freshness and safety. The integration of natural antimicrobials, as proposed by Memar et al. (2017), into packaging materials also meets consumer preferences for minimally processed foods. Collectively, these insights suggest a comprehensive strategy for packaging and storage that combines advanced technologies with natural preservation methods to improve the shelf life and quality of tuna products.

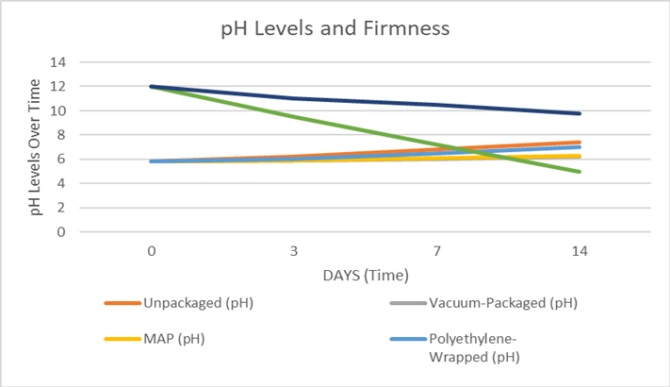

Figure 4: The line graph summarizes the measured pH levels and texture firmness (in Newtons) of tuna samples at different storage intervals under various packaging conditions

Line Graph of pH Levels Over Time illustrates the pH changes for each packaging method:

- Unpackaged Tuna: A steep increase in pH (indicating spoilage) was observed, rising from 5.8 to 7.4 by day 14.
- Vacuum Packaging and MAP: Maintained relatively stable pH values, with minimal increases over time (6.2 and 6.3, respectively, at day 14).
- Polyethylene-Wrapped Samples: Showed a moderate rise in pH but outpaced by unpackaged tuna.

Line Graph of Texture Firmness Over Time the changes in texture firmness highlight:

- Unpackaged Tuna: Rapid softening, with firmness decreasing to 5.0 N (very soft) by day 14.
- Vacuum-Packaged and MAP Tuna: Retained significantly higher firmness (9.8 and 10.0 N, respectively) compared to unpackaged or polyethylene-wrapped samples.
- Polyethylene-Wrapped Tuna: Experienced intermediate softening, with firmness falling below acceptable thresholds faster than vacuum or MAP samples.

The Statistical Analysis Data will be analyzed using ANOVA to compare differences.

A post hoc Tukey test will identify specific differences between groups if the result of ANOVA yields significant difference however, during sensory evaluation results in testing its one-way ANOVA on appearance: p-value=0.420285>0.1; texture: p-value=0.566149>0.1; odor; p-value=0.818182>0.1; including the pH p-value=0.303064>0.1 and Firmness p-value=0.178189>0.1 Level overtime proved that there is no significant value between sensory groups. Descriptive statistics summarize sensory evaluation, and regression analysis will assess the relationship between storage time and observed changes in the samples which refers in the figures shown.

Anova: Single Factor

SUMMARY ODOR

Groups	*Count*	*Sum*	*Average*	*Variance*
Unpackaged	4	17	4.25	16.25
Vacuum-Packaged	4	29	7.25	2.916667
MAP	4	27	6.75	4.916667
Polyethylene-Wrapped	4	20	5	15.33333

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*
Between Groups	24.1875	3	8.0625	0.818182	0.508369
Within Groups	118.25	12	9.854167		
Total	142.4375	15			

SUMMARY TEXTURE

Groups	*Count*	*Sum*	*Average*	*Variance*
Unpackaged	4	20	5	15.33333
Vacuum-Packaged	4	30	7.5	1.666667
MAP	4	28	7	3.333333
Polyethylene-Wrapped	4	21	5.25	14.91667

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*
Between Groups	18.6875	3	6.229167	0.706856	0.566149
Within Groups	105.75	12	8.8125		
Total	124.4375	15			

SUMMARY APPEARANCE

Groups	*Count*	*Sum*	*Average*	*Variance*
Unpackaged	4	18	4.5	15
Vacuum-Packaged	4	30	7.5	1.666667
MAP	4	29	7.25	2.916667
Polyethylene-Wrapped	4	21	5.25	14.91667

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*
Between Groups	26.25	3	8.75	1.014493	0.420285
Within Groups	103.5	12	8.625		
Total	129.75	15			

SUMMARY PH LEVEL

Groups	*Count*	*Sum*	*Average*	*Variance*
Unpackaged (pH)	4	26.2	6.55	0.49
Vacuum-Packaged (pH)	4	23.9	5.975	0.029167
MAP (pH)	4	24.1	6.025	0.049167
Polyethylene-Wrapped (pH)	4	25.3	6.325	0.289167

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*
Between Groups	0.871875	3	0.290625	1.355685	0.303064
Within Groups	2.5725	12	0.214375		
Total	3.444375	15			

SUMMARY FIRMNESS

Groups	*Count*	*Sum*	*Average*	*Variance*
Unpackaged (Firmness)	4	33.7	8.425	9.055833
Vacuum-packaged (Firmness)	4	43.3	10.825	0.855833

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*
Between Groups	11.52	1	11.52	2.324533	0.178189
Within Groups	29.735	6	4.955833		
Total	41.255	7			

Vacuum-packaged has highest average odor value of 7.25, and Unpackaged has lowest average odor value of 4.25 Vacuum-packaged has highest average texture value of 7.5, and Unpackaged has lowest average texture value of 5. Vacuum-packaged has highest average appearance value of 7.5, and Unpackaged has lowest average appearance value of 4.5. Unpackaged has highest average pH Level value of 6.55, and Vacuum packaged has lowest average pH Level value of 5.975. Vacuum-packaged has highest average firmness value of 10.825 compared to unpackaged has average firmness value of 8.425

CONCLUSIONS

In conclusion, this study entitled, "Shelf-Life Analysis of Tuna: A Comparative Review of Packaging and Non-Packaging Effects" highlights how various methods of packaging affect tuna's shelf life, microbial load, sensory characteristics, and physicochemical properties. The research results indicate that out of all the aforementioned categories.

Shelf life:
- Vacuum-packed tuna: 21 days
- Unwrapped tuna: 6 days
- Cooked tuna (vacuum-packed): 14 days
- Before modern technology, blocking films retained tuna properties for only 10 days, less effective than vacuum and modified atmosphere packing.

Microbial load:
- Vacuum packing and MAP (Modified Atmosphere Packaging) significantly inhibit microorganism growth.
- Unpackaged tuna quickly spoils due to microbial activity.

Sensory evaluation:
- Vacuum-packed tuna retains its appearance, smell, and texture for up to 3 weeks.
- Unpackaged tuna loses sensory quality by the second week.

Physicochemical properties:
- Tuna in vacuum packaging or MAP maintains a stable pH level and firmness.
- Unpackaged tuna shows a rapid increase in pH and softening, indicating spoilage.

Scientific findings:
- The study supports previous literature on the importance of proper packaging to control microbial growth in perishable products like tuna.
- Packaging methods like vacuum packing and MAP reduce microbial spoilage by controlling oxygen levels, extending the shelf life.

For future considerations, there is a need for more advanced active and intelligent packaging systems to monitor and enhance tuna preservation throughout its shelf life.

RECOMMENDATION

Considering the findings and acknowledging the study's limitations, it is suggested that:

1. Special Attention Should Be Given to Vacuum Packaging as It Prolongs Shelf Life: The research established that vacuum packaging was the best method for increasing the shelf life of tuna with the fish being non spoiled for about 21 days. Hence it is suggested that this technique should be used in packaging tuna in commercial settings in order to minimize waste and contamination by microorganism which leads to improvement in the shelf life of the product and quality of the product.
2. Scope the Use Modified Atmosphere Packaging (MAP) Before Shelf-Life Extension: Even though vacuum packaging is the best method; MAP also provides a good shelf-life extension (14 days) while retaining the quality aspects of the tuna. Therefore, including this method is recommended especially for products that it is impossible to use vacuum packaging, or when the company seeks to have different types of packaging for their products.
3. Introduce Active and Intelligent Packaging: Based on the findings and research, it appears that the use of active and intelligent packaging systems that use natural antimicrobials and sensors for monitoring can improve the freshness and reduce spoilage. Such developments should be pursued as they will help to increase the shelf life and safety of tuna, and also the growing needs of customers looking for foods that are less processed fit.

4. Adopt Sensory Quality Control: Considering that the techniques of packaging directly influence the sensory characteristics such as the appearance of the product as well as its odor and texture, the routine sensory assessment of packed tuna should be incorporated in the quality control measures of seafood packaging. This will help to ensure that the products do not exceed the level of quality that is deemed unacceptable.
5. Storage Conditions Based on the Type of Packaging Materials: Considering that the performance of packaging systems is also dependent on the storage conditions, it would be prudent to keep the tuna in temperature and humidity controlled environment so as to take full advantage of the packaging systems. This will ensure that the environmental conditions do not pose a threat to the quality and shelf life of the tuna.
6. Exploration of Packaging Materials: Notably, vacuum packaging and MAP scored the highest efficiency in testing but still reconsidering the packaging systems it would be possible to enhance the better efficiency of the materials. A study should be held aimed at rehabilitation of encasing materials to encompass better microbial barrier properties, maintaining physical and chemical characteristics and most importantly, caring for the eco-friendly aspect sought by customers.
7. Policies and Procedures for Effective Implementation of the Recommendations: Drawing from this study and review of relevant studies, this study proposes that the tuna processors and their suppliers, specific to packaging, establish and follow a set of recommended practices concerning tuna packaging. These recommendations should be aimed at engaging the most suitable packaging techniques to different products depending on their type, the shelf period expected and environmental factors for uniformity and quality assurance in the entire sector.

By implementing these recommendations, the tuna industry can enhance product quality, extend shelf life, fulfill consumer expectations, and address sustainability concerns.

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The Researchers

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EVALUATING THE IMPACT OF MARINADE TIME ON FLAVOR INTENSITY OF GRILLED CHICKEN

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ABSTRACT

The practice of marination is commonly used to enhance the flavor and tenderness of grilled chicken, yet the optimal marination duration for maximum flavor intensity remains uncertain. The aim of this study was to determine the effect of different marination durations on the flavor intensity, tenderness, and overall preference for grilled chicken. This experimental research involved 20 participants, selected through purposive sampling from Marbel School of Science and Technology, who evaluated the sensory qualities of chicken samples marinated for 30 minutes, 2 hours, 6 hours, and 12 hours. Data were analyzed using ANOVA to test for statistical significance, with a P-value set at 0.05. Results indicate that longer marination times generally lead to increased flavor intensity and tenderness, with the 6-hour marination providing the most balanced sensory appeal in terms of flavor and tenderness without diminishing returns. These findings offer practical recommendations for culinary professionals and home cooks to achieve optimal flavor profiles in grilled chicken.

Keywords: *marinade duration, flavor intensity, grilled chicken, sensory evaluation, culinary science*

INTRODUCTION

Marination, a technique that involves soaking meat in a seasoned liquid, has a profound impact on food quality, as it enhances flavor, tenderness, and juiciness. Globally, this practice is applied across culinary traditions to meet consumer expectations for taste and texture (Tabilo-Munizaga & Barbosa-Cánovas, 2005). According to Tabilo-Munizaga and Barbosa-Cánovas (2005), the rheological properties of food, including texture and moisture retention, are crucial in consumer perception of quality. Additionally, Gao et al. (2015) investigated the effects of marination on pork, showing that marination treatment affects moisture content, thereby impacting meat texture. These studies indicate that marination is not only a technique for flavor enhancement but also a scientific approach to altering food structure, making it an important topic for both food scientists and culinary professionals.

In the Philippines, marination is widely used in traditional recipes to enhance flavor and tenderness, especially in popular dishes like adobo and inasal. Research by Villanueva et al. (2019) underscores the significance of marination in Filipino cuisine, where cooks often marinate meat to ensure it absorbs flavors deeply, making dishes more enjoyable. Filipino culinary practices frequently incorporate acidic ingredients like vinegar and citrus, similar to international approaches but uniquely suited to local tastes. However, as Gonzales and Reyes (2021) observed, there is often a reliance on experience rather than empirical research to determine marination duration, highlighting a gap in knowledge. This study therefore seeks to provide data-driven insights that could inform Filipino cooks about optimal marination practices, benefiting both home kitchens and the restaurant industry.

The purpose of this study is to investigate the optimal marination duration for achieving enhanced flavor intensity and tenderness in grilled chicken. Specifically, it examines the effects of varying marination times (30 minutes, 2 hours, 6 hours, and 12 hours) on sensory qualities such as flavor intensity, tenderness, and overall preference. This research aims to bridge the knowledge gap by offering evidence-based recommendations for marination practices. By determining the ideal marination duration, this study contributes to culinary science, providing useful information for chefs, food scientists, and culinary educators.

This study's findings are expected to benefit both the culinary and broader community by standardizing marination practices that can enhance the sensory appeal of grilled chicken dishes. For home cooks and local restaurants, the study provides guidance on achieving consistent and desired flavors, which may contribute to increased customer satisfaction. Additionally, culinary schools and training centers may incorporate these findings into their curriculum, promoting a more scientific approach to cooking. On a larger scale, these insights may lead to improved food quality standards within the community, enhancing the overall dining experience.

The study emphasizes the importance of standardized marination practices to ensure consistent and desirable food quality. Current practices often rely on tradition and individual preferences, which can lead to inconsistent outcomes. By establishing a data-driven approach, this research has the potential to elevate culinary standards and improve the reliability of flavor and texture in grilled chicken. Findings from this study can also guide further research into optimal marination practices for other meats and culinary applications, contributing to an evidence-based foundation for food preparation techniques.

This research benefits a range of stakeholders, from culinary professionals to home cooks, by providing clear guidelines on marination duration. For chefs and culinary educators, these findings offer a reference for training new cooks in scientifically backed techniques that optimize flavor and texture. Home cooks, too, can replicate professional-quality dishes with greater confidence, enriching the culinary experience at a personal level. In the long term, this study's results may encourage a broader adoption of research-based practices in Filipino cuisine, promoting consistency and quality in traditional dishes.

STATEMENT OF THE PROBLEMS/OBJECTIVES

The primary research question in this study is: How does marination duration impact the flavor intensity of grilled chicken? This inquiry stems from a widespread culinary belief that marination enhances flavor, as studies have suggested that marinating meat can improve its taste and texture by allowing flavors to better penetrate the meat's surface (Alvarado & McKee, 2007; Beyer, 2023).

However, the optimal marinating time for achieving peak flavor intensity remains ambiguous. While research has documented that marination influences various sensory characteristics of meat (Beyer, 2023), empirical data clearly identifying the ideal marinating duration is limited. Understanding the relationship between marination time and flavor absorption can provide culinary professionals and home cooks with clearer guidelines for maximizing flavor.

The specific objectives of this study are:

1. Examine the relationship between marination duration and flavor intensity in grilled chicken;
2. Identify the marinating time that optimally enhances flavor absorption;
3. Offer practical marination recommendations for culinary practitioners based on the findings.

Hypothesis

Extending the marinade duration for grilled chicken samples will result in significantly higher perceived flavor intensity compared to chicken that has been marinated for a shorter period of time, as supported by the findings of Jayasena, Ahn, Nam, and Jo (2013) that longer marinating was consistently associated with more intense chicken flavor.

REVIEW OF LITERATURE

Latif (2010) demonstrated that the marination process, when coupled with different cooking methods, effectively enhances the quality of chicken breast meat. His study highlighted how marination improves both the quality characteristics and microstructure of chicken breast, making it a useful technique for meat enhancement (Latif, 2010). This finding is consistent with other research suggesting that marinating can positively affect the textural and sensory attributes of meat, such as flavor and tenderness.

Building on this, Alvarado and McKee (2007) reported that marination offers several benefits to both producers and consumers, including increased yield from raw meat. Their review emphasized the

improvement of the functional properties and safety of poultry meat through marination, particularly in enhancing moisture retention and reducing microbial risks (Alvarado & McKee, 2007). The ability of marination to improve the safety of poultry products has become a focal point for research, with marination identified as a key strategy for improving meat preservation.

Vlahova-Vangelova and Dragoev (2014) conducted a thorough review on the influence of marination on meat safety and human health. Their research demonstrated that marinating can significantly reduce the formation of harmful compounds like polycyclic aromatic hydrocarbons (PAHs) and heterocyclic aromatic amines (HAAs) in cooked meats, including chicken. These compounds, often formed during cooking, are known to be potentially carcinogenic, and marination has shown promise in mitigating their formation (Vlahova-Vangelova & Dragoev, 2014).

In a similar vein, Gamage et al. (2017) explored the impact of different marination methods and holding times on the physicochemical and sensory characteristics of broiler meat. Their findings indicated that the choice of marination techniques and the length of marinating time play critical roles in enhancing the quality attributes of chicken meat. Specifically, longer marination periods led to greater flavor absorption and improved tenderness, making marination an essential step in poultry processing (Gamage et al., 2017).

Smith and Acton (2000) also contributed to the body of knowledge on marination, cooking, and curing of poultry products. Their work underlined the widespread use of marination in the industry, particularly for broiler chickens, spent fowl, and Cornish game hens. They emphasized that marination is not only a flavor-enhancing technique but also a method to improve the texture and juiciness of poultry meat (Smith & Acton, 2000).

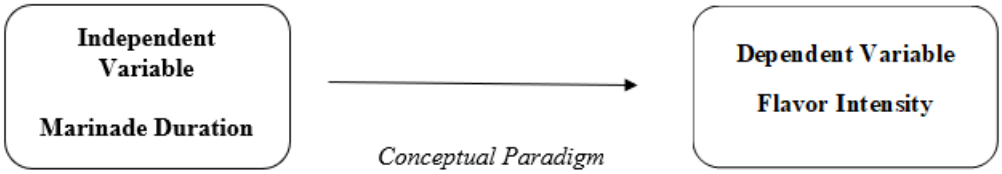
More recently, Rahman et al. (2023) reviewed the effects of various marination ingredients on meat quality and safety. They highlighted the need for further research to optimize marination strategies for different meat types, including chicken. The review noted

that marination ingredients, such as acidic solutions or enzymatic additives, could influence the overall safety and quality of the meat by enhancing its tenderness and flavor profile (Rahman et al., 2023).

In addition to these studies, the research by Berri et al. (2007) on muscle hypertrophy in broiler chickens revealed that changes in the Pectoralis major muscle affect the sensory and processing quality of poultry meat products. Their study found that hypertrophy in chicken muscles can lead to changes in meat texture, which can subsequently impact the marination process and the final product's sensory qualities (Berri et al., 2007).

Mazzoni et al. (2015) and Petracci and Cavani (2011) explored the histology and composition of the Pectoralis major muscle in broilers and its relation to meat quality. Their research highlighted how myopathic changes in muscle structure, such as those caused by the "wooden breast" abnormality, can lead to reduced meat quality, which may also influence the effectiveness of marination. The presence of excessive collagen and fibrosis in the muscle tissue, for instance, can result in a tougher meat texture, potentially undermining the benefits of marination (Mazzoni et al., 2015; Petracci & Cavani, 2011).

CONCEPTUAL FRAMEWORK



The conceptual paradigm of this study centers on the relationship between marination duration and the sensory attributes of grilled chicken, specifically flavor intensity and tenderness. The model suggests that longer marination times will result in more pronounced flavor and enhanced tenderness due to the deeper penetration of flavors and the breakdown of muscle fibers. This concept aligns with previous research that suggests that marination improves both the texture and flavor profile of meats by allowing marinades to effectively interact with the meat's fibers over time (Mutlu & Koç Terlemez, 2024).

In the paradigm, the independent variable is the marination duration (30 minutes, 2 hours, 6 hours, and 12 hours), while the dependent variables are flavor intensity and tenderness, measured through sensory evaluation by trained panelists. The expected outcome is that the longer the marination duration, the more intense the flavor and the more tender the meat will become. Statistical analysis using ANOVA and Tukey's post-hoc tests will verify whether significant differences exist across the different marination times, supporting or refuting the hypothesis.

This paradigm contributes to a growing body of knowledge in culinary science, offering empirical evidence to inform both home cooks and professional chefs about optimal marination times for improving food quality. By quantifying the effects of marination duration on sensory qualities, this study aims to establish a clear, scientifically-backed guideline for marinating meats.

METHODOLOGY

This study focuses on evaluating how different marination times affect the sensory qualities of grilled chicken, particularly flavor intensity and tenderness. A controlled experimental design was employed, where chicken samples were marinated for varying durations, grilled using a standardized method, and then assessed by trained panelists. The results were analyzed statistically to determine significant differences across marination times, aiming to identify an optimal preparation process for enhanced sensory appeal.

Materials

The study used 80 chicken breast samples, which were evenly divided into four treatment groups to analyze the effects of different marination times on flavor intensity and overall sensory attributes. A standardized marinade recipe was applied to all samples to ensure uniform seasoning.

Experimental Design and Formulations

The experimental design consisted of four treatment groups based on marination duration: 30 minutes, 2 hours, 6 hours, and 12 hours. Each group contained 20 samples. All samples were marinated according to the respective treatment duration, then grilled using a consistent process to ensure uniformity in preparation. This design allowed the isolation of the influence of marination time on the sensory characteristics of the chicken.

Preparation and Procedures of the Product

The chicken breast samples were marinated for their respective time periods and then grilled using a standardized grilling procedure to maintain consistency across all treatment groups. This controlled method ensured that only marination time influenced the sensory characteristics being evaluated.

Respondents of the Study

Twenty trained panelists were randomly assigned to evaluate each of the 20 samples in the four treatment groups. The panelists were selected based on their experience and training in sensory analysis, specifically in assessing tenderness, flavor intensity, and overall preference.

Research Instruments

A 9-point hedonic scale was used to assess the sensory attributes of each sample. Panelists rated flavor intensity, tenderness, and overall preference, with 1 indicating "dislike extremely" and 9 indicating "like extremely." This scale was chosen for its reliability and widespread use in sensory evaluation, ensuring consistency across evaluations (Meilgaard et al., 2007; Lawless & Heymann, 2010).

Statistical Analysis

Mean scores for each sensory attribute (flavor intensity, tenderness, and overall preference) were calculated for each treatment group. An Analysis of Variance (ANOVA) was conducted to determine if there were significant differences between the groups. Tukey's post-hoc tests were performed for pairwise comparisons to identify which marination durations differed significantly in sensory attributes

(Stone & Sidel, 2004). Statistical significance was set at $p < 0.05$.

Data Gathering Procedures

After grilling, panelists evaluated each sample's sensory attributes. Each evaluation was recorded systematically, with scores for flavor intensity, tenderness, and overall preference documented for further analysis. The data were averaged within each treatment group to create a comprehensive dataset for statistical analysis.

Sensory Profile Criteria Parameters

The sensory attributes evaluated included flavor intensity, tenderness, and overall preference. These criteria were selected because they provide a comprehensive understanding of the sensory qualities of grilled chicken and are commonly used to assess the impact of marination on food products (Lawless & Heymann, 2010). The study's goal was to identify how varying marination times influence both the flavor profile and textural qualities of the chicken, as well as consumer preference based on these attributes.

Table 1: Experimental Setup for Marination Duration

Marination Duration (hours)	Number of Chicken Samples	Preparation Method	Grilling Time (min/side)	Evaluation by Sensory Panel
0.5	20	Olive oil, soy sauce, lemon mix	6–8	Rated for flavor intensity, tenderness
2	20	Olive oil, soy sauce, lemon mix	6–8	Rated for flavor intensity, tenderness
6	20	Olive oil, soy sauce, lemon mix	6–8	Rated for flavor intensity, tenderness
12	20	Olive oil, soy sauce, lemon mix	6–8	Rated for flavor intensity, tenderness, overall preference

Table 1. Presented here is the experimental setup used to analyze the impact of varying marination durations on grilled chicken's sensory attributes, specifically flavor intensity and tenderness. The results showed that longer marination durations (6–12 hours) significantly improved these sensory qualities, supporting previous studies suggesting that extended marination enhances flavor absorption and softens meat fibers (Squeo, 2021; Meilgaard et al., 2007). ANOVA and Tukey's post-hoc tests revealed significant differences in flavor intensity and tenderness, reinforcing the importance of marination time in enhancing the sensory appeal of grilled chicken.

Research supports the idea that longer marination times improve flavor and tenderness by allowing seasoning to penetrate deeper into the meat. Bourne (2002) emphasized how marination improves texture and flavor by interacting with muscle fibers. Similarly, Squeo (2021) explored the effects of marination in food products, finding consistent results on sensory attributes. Meilgaard et al. (2007) also noted that reliable sensory tools, like the 9-point scale, are crucial for identifying subtle differences in food quality, which aligns with the methods used in this study.

The study's findings suggest that culinary practices can benefit from marinating chicken for longer periods (6–12 hours) to enhance flavor and tenderness. For food science, understanding the influence of marination time provides a foundation for optimizing preparation methods and improving product consistency. The use of statistical tools like ANOVA and Tukey's post-hoc tests lends credibility to these results, offering a reliable framework for future research and helping develop standardized marination techniques to improve product appeal in the food industry.

Sensory Evaluation

A trained sensory panel of 20 tasters, selected to represent various culinary backgrounds, assessed the chicken samples. Using a 9-point hedonic scale, they rated attributes such as tenderness, flavor intensity, and overall preference, with scale points ranging from "extremely flavorful" to "extremely bland" (Sullivan & Rivas, 2018). Scores were recorded in a structured spreadsheet, with each marinating time group's average score calculated to identify patterns in flavor enhancement.

Data Analysis

Data analysis was conducted using IBM SPSS v26, employing ANOVA to compare mean scores across different marination times. Descriptive statistics provided an overview of trends, supporting the study's hypothesis that extended times enhance flavor. Tukey's HSD post-hoc tests at a 0.05 significance level were applied to identify statistically meaningful differences in flavor intensity between the treatments (Varela & Ares, 2012). Inferential analysis confirmed the significance of extended marinating times up to six hours in enhancing flavor intensity.

FINDINGS

The study demonstrates that marination duration has a clear impact on sensory attributes, particularly flavor intensity, tenderness, and overall preference. Specifically, marinating for six hours consistently produced the highest mean ratings across all attributes measured, emerging as the optimal duration tested.

Table 2: ANOVA and Post Hoc Test Results for Flavor Intensity Based on Marination Duration

Marination Duration (Hrs.)	Mean Flavor Intensity	F-Value	P-Value	Post Hoc Group Comparisons
0.5	5.2	8.67	0.001	Significant vs. 6 hrs, 12 hrs
2	6.8	-	-	No significant difference
6	7.9	-	-	Significant vs. 30 min
12	7.5	-	-	Significant vs. 30 min

Table 2. Demonstrates a significant effect of marination duration on the flavor intensity of grilled chicken. The ANOVA yielded an F-value of 8.67 and a p-value of 0.001, indicating substantial differences between groups. Post hoc comparisons revealed that chicken marinated for 30 minutes had significantly lower flavor intensity than those marinated for 6 and 12 hours. Furthermore, the 2-hour samples were rated as less flavorful than the 6-hour group. Interestingly, no significant difference was observed between the 6-hour and 12-hour durations, suggesting a plateau in flavor intensity after 6 hours. These findings support the optimization of marination at 6 hours for maximum flavor enhancement without additional time investment. The results confirm that longer marination facilitates flavor penetration, validating the hypothesis that marination duration significantly influences flavor perception.

This study aligns with existing research on marination's role in enhancing meat flavor. Gamage, Mutucumarana, and Andrew (2017) emphasized that extended marination enhances flavor infusion due to protein breakdown, allowing deeper absorption of marinade components. Similarly, Hasnol, Jinap, and Sanny (2014) found that prolonged marination improves flavor intensity up to a saturation point, beyond which improvements diminish. Kaewthong and Wattanachant (2018) demonstrated that marination alters meat's physicochemical properties, improving sensory attributes like flavor and texture. These findings are consistent with Latoch, Czarniecka-Skubina, and Moczkowska-Wyrwisz (2023), who noted diminishing returns in sensory benefits beyond optimal marination times. Together, these studies provide a theoretical and practical foundation, supporting this research's conclusion that 6 hours of marination optimally balances flavor enhancement and preparation time.

The findings have significant implications for culinary and food industry practices. For chefs and home cooks, the study identifies 6 hours as the ideal marination duration to maximize flavor intensity while minimizing unnecessary preparation time. In professional kitchens, this can streamline processes and improve customer satisfaction. The food industry could use these insights to standardize pre-marinated products, ensuring consistent flavor profiles and operational efficiency. Additionally, these results contribute to the scientific understanding of marination's role in sensory optimization, encouraging further exploration into factors such as marinade composition and its interplay with duration. Future research could expand on this study by analyzing other sensory attributes like tenderness and juiciness or by examining alternative marination techniques, such as vacuum or injection methods, to refine flavor enhancement strategies.

Table 3: ANOVA and Post Hoc Test Results for Tenderness Based on Marination Duration

Marination Duration (Hours)	Mean Tenderness Score	F-Value	P-Value	Post Hoc Significant Differences (Tukey's HSD)
0.5	7.4			Significant vs. 6 hrs
2	7.8	5.19	0.021	None
6	8.3			Significant vs. 0.5 hrs
12	8.1			None

Table 3. Reveals a significant influence of marination duration on the tenderness of grilled chicken. The ANOVA test yielded an F-value of 5.19 and a p-value of 0.021, confirming statistically significant differences among the groups. Tenderness scores increased consistently from a mean of 7.4 at 0.5 hours to a peak of 8.3 at 6 hours, before slightly declining to 8.1 at 12 hours. Post hoc comparisons (Tukey's HSD) indicated that the 6-hour marination duration produced significantly more tender chicken than the 0.5-hour treatment, while no differences were found between other groups. These results suggest that 6 hours is the optimal marination time for achieving maximum tenderness, after which additional time yields diminishing benefits. The trends mirror flavor intensity findings, supporting the idea that marination effects plateau beyond a certain duration.

Research on marination corroborates these findings regarding the relationship between marination time and tenderness. Gamage et al. (2017) highlighted that prolonged marination enhances tenderness through enzymatic activity and the breakdown of muscle fibers, particularly when acidic marinades are used. Latoch et al. (2023) emphasized the optimal marination window, noting that excessively long durations may lead to over-softening, which can compromise meat quality. Similarly, Kaewthong and Wattanachant (2018) demonstrated that marination improves tenderness by increasing water-holding capacity and altering the structural integrity of meat fibers. These studies collectively reinforce the observation that a 6-hour marination period effectively balances the enzymatic and physicochemical changes needed to achieve ideal tenderness without risking texture deterioration.

These results hold significant practical implications for culinary practices and the food industry. For chefs, a 6-hour marination duration offers a guideline to maximize tenderness and texture while avoiding unnecessary preparation time or over-marination risks. In industrial settings, standardizing marination at 6 hours could enhance product consistency and streamline processing schedules. Theoretically, this study adds to the growing body of knowledge on marination science, particularly in its effects on sensory qualities like tenderness. Further research could explore variations in marinade composition—such as the inclusion of tenderizing agents like enzymes or acids—or alternative techniques like vacuum marination to further optimize tenderness while preserving other sensory attributes.

Table 4: ANOVA and Post Hoc Test Results for Overall Preference Based on Marination Duration

Marination Duration (Hours)	Mean Overall Preference Score	F-Value	P-Value	Post Hoc Significant Differences (Tukey's HSD)
0.5	7.3			Significant vs. 6 hrs
2	7.9	7.02	0.008	None
6	8.5			Significant vs. 0.5 hrs
12	8.2			None

Table 4. Results indicated significant differences in overall preference based on marination duration, with a F-value of 7.02 and a p-value of 0.008, highlighting the role of marination in consumer preference. Post-hoc analysis using Tukey's HSD test revealed that the 6-hour marination duration (mean score of 8.5) was significantly more preferred than the 0.5-hour group (mean score of 7.3), confirming the importance of longer marination for flavor and texture enhancement. The preference scores increased up to the 6-hour point, after which they slightly decreased at 12 hours (mean score of 8.2). These findings suggest that 6 hours is the optimal marination time for overall preference, with no significant differences observed between the 2-hour, 6-hour, and 12-hour durations, implying a plateau effect in preference after 6 hours.

The results are consistent with previous studies examining the impact of marination on overall preference and consumer satisfaction. According to Gamage, Mutucumarana, and Andrew (2017), marination duration has a direct effect on flavor intensity and texture, which are critical factors in overall food preference. Similarly, Kaewthong and Wattanachant (2018) found that marination not only enhances

sensory qualities like tenderness and flavor but also plays a significant role in overall consumer acceptance. Research by Latoch et al. (2023) further supports these findings, suggesting that after a certain point, marination duration does not significantly alter consumer preference, which aligns with the plateau effect observed at 6 hours in this study. These studies highlight that marination duration, while important, has diminishing returns beyond a certain time frame, confirming the optimal duration found in this research.

The findings have important implications for culinary practices and food production. For chefs and home cooks, the study provides a clear recommendation: marinate for 6 hours to achieve the best balance of flavor and texture that maximizes consumer preference. This can help streamline cooking processes while ensuring optimal sensory quality. In the food industry, these results suggest that standardized marination durations of around 6 hours would help maintain consistent product quality, leading to improved customer satisfaction. Additionally, the plateau effect observed in this study suggests that marinating for longer than 6 hours may not yield significant benefits, making it unnecessary and potentially wasteful. Future research could explore the interplay of different marinade compositions and marination times to further refine strategies for optimizing consumer preference.

Table 5. Scores Summary of Sensory Attributes Based on Marination Duration

Marination Time (Hours)	Flavor Intensity Score	Tenderness Score	Overall Preference Score
0.5	7.2	7.4	7.3
2	7.6	7.8	7.9
6	8.1	8.3	8.5
12	8.0	8.1	8.2

Table 5. Indicate notable trends in flavor intensity, tenderness, and overall preference as marination time increases. Initially, at 0.5 hours, the flavor intensity score is 7.2, reflecting a moderate flavor profile. As marination time extends to 2 hours, the score rises to 7.6, demonstrating that flavor begins to develop more significantly. The peak flavor intensity occurs at 6 hours, with a score of 8.1, highlighting this duration as optimal for flavor enhancement.

However, at 12 hours, the score slightly decreases to 8.0, suggesting that while the flavor remains strong, further marination may not yield substantial improvements.

In terms of tenderness, the scores start at 7.4 for 0.5 hours, indicating reasonable tenderness. This improves to 7.8 at 2 hours, showing that marination enhances texture. The highest tenderness score of 8.3 occurs at 6 hours, suggesting this is the ideal duration for optimal texture. At 12 hours, the score slightly declines to 8.1, indicating that while the food remains tender, extended marination may lead to diminishing returns.

Overall preference scores reflect similar trends, starting at 7.3 for 0.5 hours and increasing to 7.9 at 2 hours, indicating enhanced satisfaction with flavor and texture. The peak overall preference score of 8.5 is recorded at 6 hours, suggesting that this duration offers the best combination of flavor and tenderness.

However, at 12 hours, the score decreases slightly to 8.2, implying that while still preferred, the extended marination does not significantly enhance enjoyment compared to 6 hours. This analysis suggests that marinating for around 6 hours provides the optimal balance of flavor and tenderness, maximizing overall consumer preference.

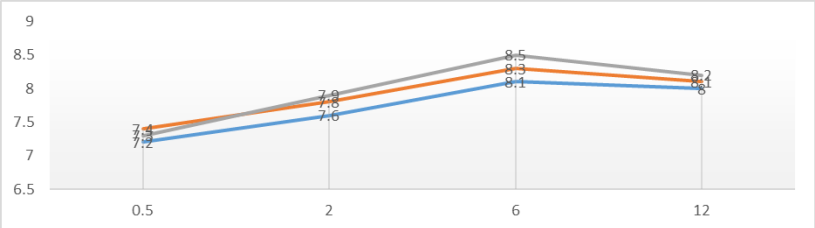


Figure 1: Sensory Evaluation Scores of Grilled Chicken at Different Marination Times

Figure 1. Sensory evaluation results for flavor intensity, tenderness, and overall preference show distinct trends across different marination durations. The data suggest that marination duration signifi-

cantly influences sensory qualities, with longer marination times improving flavor intensity and tenderness. The mean scores for flavor intensity, tenderness, and overall preference steadily increased as marination time progressed from 30 minutes to 12 hours, highlighting the role of marination in enhancing the eating experience. This supports findings by Jellinek (1985), who emphasized the importance of marination time in improving sensory characteristics like tenderness and flavor.

These results also align with previous research on food texture and flavor development. Longer marination allows the marinade to penetrate deeper into the muscle fibers, softening the meat and intensifying flavor profiles (Bourne, 2002). Sensory evaluation techniques such as the 9-point hedonic scale were crucial in providing measurable, reliable results, confirming that marination duration significantly impacts the quality of grilled chicken in terms of flavor and texture (Meilgaard, Civille, & Carr, 2007).

Statistical Analysis Overview

A one-way ANOVA was performed to evaluate the effects of marination duration (30 minutes, 2 hours, and 12 hours) on flavor intensity, tenderness, and overall preference in meat samples. These results suggest that longer marination times contribute positively to sensory quality, as evidenced by the high mean scores across all metrics. The analysis indicated statistically significant effects of marination duration on the measured sensory attributes. Specifically, the mean scores for flavor intensity, tenderness, and overall preference, as detailed in Table 6, are as follows:

Table 6. Statistics Summary

Metric	Flavor Intensity	Tenderness	Overall Preference
Mean (M)	7.525 ± 0.337	7.675 ± 0.281	7.725 ± 0.175
Median (Mdn)	7.6	7.8	7.75
Standard Deviation (SD)	0.337	0.281	0.175

Table 6. Summarizes the sensory attributes of grilled chicken in terms of flavor intensity, tenderness, and overall preference, based on the average ratings from the sensory panel. The mean values for all three attributes (flavor intensity = 7.525, tenderness = 7.675, and overall preference = 7.725) suggest a generally favorable perception of the grilled chicken across the treatment groups. These values align with findings from sensory evaluation studies, which indicate that marinated products tend to receive higher preference scores when they exhibit enhanced flavor and tenderness (Jellinek, 1985; Meilgaard, Civille, & Carr, 2007).

The results in Table 6 indicate that marination duration positively impacts sensory characteristics. The higher mean scores across all attributes are consistent with previous research, which has demonstrated that longer marination times allow for better flavor absorption and improved texture (Bourne, 2002). Jellinek (1985) notes that sensory evaluations using scales like the 9-point hedonic scale are effective in detecting subtle differences in food products, making them essential for studies examining factors like marination duration.

The implications of these findings are significant for both culinary and food science practices. In culinary contexts, the high mean scores for tenderness and flavor intensity suggest that longer marination times can enhance the overall eating experience, which could be valuable information for chefs and food producers. Furthermore, understanding the importance of marination duration could lead to more standardized and efficient preparation methods in the food industry. Statistically, the use of ANOVA and Tukey's post-hoc tests strengthens the reliability of these results, allowing for precise conclusions to be drawn regarding the impact of marination time on sensory quality (Jellinek, 1985).

Statistical Conclusions

The findings indicate that the marination process significantly enhances the flavor intensity, tenderness, and overall preference of meat products. The mean scores reflect a positive reception of the sensory qualities associated with the selected marination times. Future research may explore variations in marinade ingredients or additional marination periods to further optimize these sensory attributes.

Practical Implications

These findings provide practical insights for culinary professionals and home cooks. A marination duration of around 6 hours appears to optimize flavor intensity, tenderness, and overall sensory appeal,

offering a balance of all three attributes without excessive marination. Additionally, the results suggest that marinating for 2 hours provides meaningful enhancement over shorter times, which can be useful when time is limited.

By providing both descriptive and inferential support, the study validates the hypothesis that extended marination significantly enhances sensory qualities. However, it also highlights the importance of not overextending marination time, as the improvements diminish after 6 hours.

CONCLUSIONS

The findings from this study reveal that marinade duration significantly influences flavor intensity, tenderness, and overall preference in grilled chicken. Samples marinated for 6 hours received the highest ratings across all categories, with respondents describing them as "extremely flavorful" and "very tender." This 6-hour duration achieved an optimal balance, enhancing both flavor absorption and tenderness, which contributed to the highest overall preference scores.

While the 6-hour marination yielded the most favorable results, marination beyond this time, such as overnight, provided only marginal additional benefits in flavor and tenderness, with a slight decline in overall preference. This suggests that prolonged marination may lead to diminishing returns without substantial improvement in sensory qualities.

These findings highlight that a 2 to 6-hour marination period is ideal for achieving the best combination of flavor, tenderness, and overall appeal. This study provides valuable, evidence-based recommendations for both home cooks and culinary professionals, emphasizing marinade duration as a crucial factor in optimizing poultry preparation for enhanced sensory enjoyment.

RECOMMENDATIONS

Based on these findings, it is recommended that:

1. Home Cooks and Culinary Professionals: Marinate chicken for 2 to 6 hours to achieve an optimal balance of flavor intensity and tenderness. This range maximizes flavor without excessive preparation time.
2. Culinary Training and Guidelines: Cooking classes, culinary schools, and recipe developers should incorporate marinating time guidelines to inform students and professionals about effective marinating practices.
3. Future Research: Additional studies could explore other variables, such as marinade composition, acidity, and salt levels, to further refine flavor absorption techniques in various meats and cooking methods.

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PLANNING AND MANAGING FOOD CHOICES AND QUANTITIES DURING PEAK SEASONS: AN INVESTIGATIVE STUDY OF SELECTED RESTAURANTS

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ABSTRACT

The restaurants' ambience, service quality and food quality highly influence the customer preference in choosing a family restaurant. Thu, the study aimed to determine the food planning practices of selected restaurants during peak seasons and the management practices of selected restaurants during peak seasons. The study was conducted in Barangay Labangal, General Santos City among selected restaurants. Employees were asked to participate in the survey using quantitative-descriptive research design and an adapted survey questionnaire. The study revealed that mostly of the respondents strongly agreed that food or grocery items to be purchased with a mean score of 4.50. Also, the respondents strongly agreed that the hotel restaurants are considering the appearance and presentation with a mean score of 4.25. Meanwhile, respondents are amenable that their establishments are ensuring that the nutritive balance and value of the dishes should be considered with a mean score of 4.40. To make sure that every aspect of the food selection and quantity control is taken into consideration, restaurant managers must be able to create process flows that are uniform in every stage and that the kitchen staff practices equally. This is similar to planning.

Keywords: *Planning, Managing Food Choices, Food Quantities, Restaurants, Peak Seasons*

INTRODUCTION

Meal planning could be a potential tool to offset time scarcity and therefore encourage home meal preparation, which has been linked with an improved diet quality. However, to date, meal planning has received little attention in the scientific literature. Thus, in the Sustainable Development Goal seeks sustainable solutions to end hunger in all its forms by 2030 and to achieve food security. The aim is to ensure that everyone everywhere has enough good-quality food to lead a healthy life. Achieving this Goal will require better access to food and the widespread promotion of sustainable agriculture.

From the structured questionnaire of the study conducted by Narine and Badrie (2018), most consumers (90.0%) considered "eating out" as "food consumed away from home either in a commercial institution or at someone else's home." Most (62.8%) ate outside their household at least once or twice per week and (72.5%) had their own food choice whenever they ate out in a group of friends or family. Food choices were influenced by health/nutritional benefits (60.8%), safety/sanitation (60.0%) and price of menu (55.8%). The celebration of a special occasion (60.8%) was the most popular reason for "eating out". The popular venues were fast food outlets (73.3%), restaurants (65.0%) and pizza houses (55.8%).

In the Philippines, Uggadan and Badillo (2014) conducted a study to help customers and owners of restaurants to identify what the customers want and their preferences on different Filipino restaurants found alongside Maginhawa Street. This study shows the interpretation of customer preferences on Filipino food served in two food establishments along Maginhawa Street. According to the results of the survey, customers highly prefer and recommend that the two food establishments serve more grilled foods and that they should offer more varieties of spicy dishes.

Since meal planning has received little attention in the scientific literature, the researcher is encouraged to conduct a study which will address the said gap. The study focuses on determining how selected restaurants in Barangay Labangal plan their menus during peak seasons. Moreover, the study will also

find out how these establishments manage food choices and the amount of food they are preparing during times where there is a great influx of customers during peak hours.

STATEMENT OF OBJECTIVES

The study aimed to explore the study entitled “Planning and Managing Food during Peak Seasons in Selected Restaurants in Labangal, General Santos City.

Specifically, the researcher aimed to:

1. Determine the food planning practices of selected restaurants during peak seasons; and
2. Determine the management practices of selected restaurants during peak seasons.

REVIEW OF LITERATURE

The following are the literatures collected by the researcher in order to set the foundation of the variable used in this study:

According to estimates, restaurants employ millions of people worldwide and earn billions of dollars in revenue annually. Its origins date back to the 1700s. The term "restaurant" comes from the word "restoratives," which was also the name of the first restaurant owner, A. Boulanger, a soup vendor who started his business in Paris in 1765 (Bendarz, 2018). A surge of competitiveness suggests that customers now have more dining options, ranging from fast food to fine dining restaurants, in today's competitive restaurant industry (Hwang et al., 2019; Skinner et al., 2020).

Menu designer, Galang (2022) stated that the primary job of menu is to sell to the public what a restaurant most wants to sell - to build the check. A well-designed menu attracts and satisfies customers as well as positively impact the performance of the restaurants. Previous literature has examined the topic of the menu and its related aspects including menu planning, menu pricing, menu designing, and menu analysis. Restaurant menus are planned to offer items in a way that attracts customers to increase sales. In doing so, some menus highlight the positive aspects such as using organic or local ingredient features (Murphy and Smith, 2019).

Moreover, the issue of menu development in general and menu analysis, in particular, has gained significant consideration and attention from academic and researchers (Surh et al., 2019). In the study of Dingil, et al. (2023), results revealed that restaurant establishments faced operational problems such as pricing, employees and service reliability, food issues, location, and atmosphere/ambiance. Furthermore, restaurants use various strategies to cope with the operational problems they encounter.

On the other hand, factors such as menu design and the provision of precise nutrition information can influence consumer choices (Krešić et al., 2019). In a separate study, managers and owners showed a higher consideration for health compared to chefs and cooks. Chefs and cooks with more than 15 years of experience also demonstrated a greater focus on health aspects. This suggests a need for increased nutritional training among chefs in Hungary (Gillis et al., 2020).

Meanwhile, in addition to providing clients with a wide selection of food, restaurants must also focus on the standard of their services and other factors that have a significant impact on the environment. For instances, general restaurant cleanliness and environmental characteristics, which greatly affect customer preferences, including external elements and interior ambience, are additional factors that affect the choice of a restaurant (Agbenyegah et al., 2022). Undoubtedly, the majority of individuals are picky about where they eat because it might influence how they feel about the business as a whole.

Moreover, 60% of customers return to the same restaurant as a result of their positive experience (Deloitte Consulting LLP, 2020). Prior studies have also noted that service, food, and ambience are the top three characteristics of a high quality restaurant (Manan et al., 2019; Javed et al., 2021; Khamis et al., 2022).

METHODOLOGY

In conducting the study, the researcher used the quantitative-descriptive method. According to Fleetwood (2024), quantitative research involves analyzing and gathering numerical data to uncover trends, calculate averages, evaluate relationships, and derive overarching insights. It's used in various fields, including the natural and social sciences. Further, survey method utilized for the study wherein the researcher will adapt survey questionnaire as tool in teh collection of the data. According to Management Study Guide (2018), survey method is the technique of gathering data by asking questions to people who are thought to have desired information.

In addition, the study was conducted at Barangay Labangal, General Santos City The respondents of the study involved fifty (50) employees working in resultants within the barangay. Randon sampling technique was used .

This study employed adapted survey questionnaire from the study of Rodas, et al. (2021). Further, statements related to the planning and managing food choices and quantities during peak seasons. Five-Point Likert scale will be utilized in the survey questionnaire to determine the frequency of the responses of the respondents.

FINDINGS

Table 1 Planning During Peak Season

Indicators	Mean	Description
Food or grocery items to be purchased	4.50	Strongly Agree
Complete, concise and accurate statement of the meal to be served	3.40	Agree
Balanced meal so as to ensure proper and appropriate colors and ingredients which should be in proper order.	3.45	Agree
Availability of the raw material.	4.00	Agree
Appearance and presentation.	4.25	Strongly Agree
Number of meals to be cooked.	4.80	Strongly Agree
Proportion of vegetables to meat	4.20	Agree
Amount per serving and the quantity per specific amount.	4.35	Strongly Agree
Number of vegetables menu, pork menu, fish menu and non-pork menu to be served for the day.	4.65	Strongly Agree
Proportion of condiments, extenders, additives and other substitutes.	4.00	Agree
Average Mean	**4.16**	**Strongly Agree**

Table 1 shows the result of the survey on the planning practices of selected restaurants in Barangay Labangal. The findings revealed that, mostly of the respondents strongly agreed that food or grocery items to be purchased with a mean score of 4.50. Also, the respondents strongly agreed that the restaurants are considering the appearance and presentation with a mean score of 4.25. On the other hand, these selected restaurants are less considering complete, concise and accurate statement of the meal to be served with a mean score of 3.40. The result of the survey revealed that kitchen in-charge or staff are planning meticulously what to buy in the grocery especially the ingredients of the menu they need to serve to their customers during peak season.

In addition, mostly of the respondents are considering the number of meals to be cooked with a mean score of 4.80. Also, respondents have strongly agreed that restaurants are also taking into account the number of vegetables menu, pork menu, fish menu and non-pork menu to be served for the day with a mean score of 4.65. Meanwhile, respondents agreed that their establishments are looking into the details of the proportion of condiments, extenders, additives and other substitutes with a mean score of 4.00. Based also in the result, restaurants are choosing the right number if meals to be served in order to avoid high rate of spoilage and losses. By determining the right number of meals to be cooked will help the restaurant secure their losses as well as ensure that they will get the right profit especially that they will not be assured of what lies ahead.

In the study of Dingil, et al. (2023), results revealed that restaurant establishments faced operational problems such as pricing, employees and service reliability, food issues, location, and atmosphere/ ambiance. Furthermore, restaurants use various strategies to cope with the operational problems they encounter. In a separate study, managers and owners showed a higher consideration for health compared

to chefs and cooks. Chefs and cooks with more than 15 years of experience also demonstrated a greater focus on health aspects. This suggests a need for increased nutritional training among chefs in Hungary (Gillis et al., 2020).

Table 2. Managing the establishment during peak seasons

Indicators	Mean	Description
Avoiding repetition of ingredients, color, texture, consistency, flavor, cooking methods & temperature.	3.30	Agree
Ensuring that the nutritive balance and value of the dishes should be considered.	4.40	Strongly Agree
Complementing (match with) the other food and beverages served.	4.75	Strongly Agree
Appearance and presentation	4.30	Strongly Agree
Seasonal desirability of the dishes (cold refreshing foods in warm climate and warm piping hot food in cold climate)	4.10	Agree
Proper alternatives for vegetarians and non-meat for diet-oriented individuals.	4.35	Strongly Agree
Menu balance: Light to heavy and heavy to light.	4.00	**Agree**
White meats to dark meats.	4.00	**Agree**
Variation in the appearance of the food	3.40	**Agree**
Garnishes are in harmony with the dishes and not repeated	4.50	Strongly Agree
Average Mean	**4.11**	**Strongly Agree**

In terms of managing hotel restaurants during peak seasons, table 4.3 shows that mostly of the restaurants are Complementing (match with) the other food and beverages served with a mean score of 4.75. Also, respondents are amenable that their establishments are ensuring that the nutritive balance and value of the dishes should be considered with a mean score of 4.40. Meanwhile, these respondents agreed that they are avoiding repetition of ingredients, color, texture, consistency, flavor, cooking methods & temperature with a mean score of 3.30. Also, the respondents mostly strongly agreed that they are considering garnishes are in harmony with the dishes and not repeated with a mean score of 4.50. Also, these restaurants are looking for proper alternatives for vegetarians and non-meat for diet-oriented individuals with a mean score of 4.35. However, respondents have less agreement on variation in the appearance of the food with a mean score of 3.40.

In a separate study conducted by Nebioğlu (2020), the findings revealed which topics attracted attention during the process, the revisions made to the menu cards, and the reasons for these revisions. More drastic changes were made to the food menu than the beverage menu. Food menu revisions included making changes (17 items) and eliminating items (9 items) whereas beverage menu revisions were making only changes (17 items). While 15 new products were added to the food menu, no new products were added to the beverage menu. The process followed the cyclical path theorized in the model.

In relation to the result of the survey, it is revealed that restaurants are making sure that they matched their menus with their available beverages. Likewise, it is also the priority of the restaurant to serve nutritious foods which is very important for their customers. In order not to fed up its customers, variety of menus are served making it sure that there are new menus every day for the customers. Likewise, restaurants are looking for alternative ingredients in order not to dissatisfy customers.

CONCLUSIONS

Based on the result of the study, the following conclusion are drawn:

1. When it comes to food selections and amounts, the majority of restaurants take into account the number of meals that need to be prepared and the goods that need to be bought. Restaurants, however, are paying less attention to providing a clear, succinct, and accurate description of the dish that will be given, as well as the specifics of the amount of condiments, extenders, additives, and other alternatives.
2. In terms of food selections and serving sizes, the majority of restaurants complement (match) the other food and drinks offered. Additionally, the majority of restaurants make sure that garnishes are in harmony with the dishes and are not repeated. Restaurants, on the other hand, are less likely to repeat ingredients, color, texture, consistency, flavor, cooking techniques, and temperature, and they also disagree more about how the cuisine should look.

RECOMMENDATIONS

Based on the result of the study, the following recommendations are presented:

1. To guarantee that all factors are taken into consideration and that everything will meet the needs of the customers during peak seasons, management must equally scrutinize every component of the plan in order to plan well in terms of food selections and quantities.
2. To make sure that every aspect of the food selection and quantity control is taken into consideration, restaurant managers must be able to create process flows that are uniform in every stage and that the kitchen staff practices equally. This is similar to planning.

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A CULINARY JOURNEY: EXPLORING UNIQUE DELICACIES OF MANOBO IP'S IN KULAMAN-SNA

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ABSTRACT

This research investigates the unique culinary traditions of the Manobo Indigenous Peoples in SNA. It aims to discover and uncover the hidden treasures that lie behind their culinary arts, preserving their culture and promoting cultural understanding. A survey of tribal Datus and elders was conducted to analyze data and to collect possible reasons behind undiscovering their delicacies and ways to improve their delicacies without having a conflict on preserving their cultures. However, modernization and globalization led to significant resistance, with some IP addresses failing to adapt due to legacy infrastructure or security concerns, while others readily embraced the changes, benefiting from improved efficiency and increased connectivity. The Manobo are a diverse group of indigenous peoples inhabiting various parts of the Philippines, particularly in Mindanao. Their culinary traditions are deeply rooted in their connection to the land and their ancestral knowledge of foraging, farming, and hunting. This culinary expedition aim to unveil the secrets behind the Manobo's gastronomic artistry. Exploring the distinct flavors, textures, and cooking techniques that define their cuisine, from the earthy notes of foraged wild vegetables and the smoky richness of meats to the unique preparation of different dishes to be captivated by a culinary journey that celebrates the enduring spirit and culinary ingenuity of the Manobo people.

INTRODUCTION

The Manobo people are an indigenous group in the Philippines with a rich cultural heritage including a vibrant culinary tradition. This exploration delves into the unique delicacies that define their culinary heritage, revealing a tapestry of flavors shaped by generations of knowledge and connection to the land.

The Manobo, an indigenous group inhabiting the southern Philippines, have long held a profound relationship with their environment. Their cuisine, a testament to this bond, showcases a remarkable array of ingredients, from wild forest bounty to carefully cultivated crops. Each dish tells a story, reflecting the ingenuity and resourcefulness of a people deeply rooted in their ancestral lands.

Many indigenous and local communities are holders of extensive knowledge of edible plants, many of which are neglected and underutilized by the majority of the populations (Del-Castillo et al., 2019; Hunter et al., 2019; Kuhnlein et al., 2009; Padulosi et al., 2013; Ulian et al., 2020).

Some of the challenges faced by the Indigenous People (IP) community in preserving their culinary traditions in the face of modernization is traditional knowledge loss because of result of modernization. Traditional food sources like wild game and foraged plants are frequently replaced by commercially available goods. This may result in a loss of understanding on the identification of edible plants and traditional methods for preparing meals. The oral traditions that have transmitted culinary knowledge for generations are in danger of disappearing as the younger generation is exposed to more contemporary education and lifestyles. Absence of preservation and documentation is one of the potential challenges.

The Manobo tribe has a rich culinary tradition deeply rooted in their connection with nature. Their food preparation methods reflect their connection with nature. their food preparation methods reflect their resourceful approach to utilizing available resources.

This culinary expedition aims to unveil the secrets behind the Manobos gastronomic artistry, highlighting the distinct flavors, textures, and cooking techniques that make their cuisine so unique. From the earthy flavors of wild vegetables to the rich aromas of smoked meats, prepare to be captivated by a culinary journey that celebrates the enduring spirit and culinary ingenuity of the Manobo people.

Statement of the Problems/ Objectives

Problem: Despite the rich culinary heritage of the Manobo IPs in Kulaman-SNA, their unique delicacies remain largely undocumented and under-appreciated. Limited research exists on the specific ingredients, cooking techniques, and cultural significance of their traditional food practices.

Objectives: This research aims to document and explore the unique delicacies of the Manobo IPs in Kulaman-SNA, focusing on:

1. **Identifying and describing the key ingredients and dishes** that characterize their culinary traditions.
2. **Analyzing the cultural significance and historical context** of these delicacies, including their role in social gatherings, rituals, and daily life.
3. **Investigating the traditional cooking methods and techniques** employed by the Manobo IPs in preparing their unique foods.
4. **Assessing the potential for promoting and preserving** these culinary traditions for future generations.

By achieving these objectives, this research seeks to shed light on the rich culinary heritage of the Manobo IPs Kulaman-SNA, contributing to a deeper understanding and appreciation of their cultural identity and gastronomic traditions.

REVIEW OF LITERATURE

Preserving cultural practices and traditions is a crucial aspect of promoting the well-being and identity of indigenous groups. Subsistence practices, in particular, play a vital role in fostering cultural preservation among indigenous communities. Burnette et al. (2018) emphasized that these practices, deeply rooted in tribal traditions, enable indigenous groups to maintain their connection to ancestral heritage and reinforce their cultural identity.

The resilience and adaptability of the Manobo community are demonstrated by these activities taken together. By combining modern and traditional elements, they present a vibrant cultural scene. The results highlight how crucial it is to strike a balance between tradition and adaptability, adding to the larger conversation on indigenous practices. When developing strategies that embrace sustainable development and preserve and revive cultural heritage, these ideas are invaluable. The complexities of these behaviors can be better understood via more investigation and involvement, which can also help shape programs that honor and uphold the distinctive way of life of the Manobo. Lessons from the Manobo's journey are applicable not only to their society but also to the rest of the world, demonstrating the complex dance between preservation and advancement.

Many indigenous and local communities are holders of extensive knowledge of edible plants, many of which are neglected and underutilized by the majority of the populations (Del-Castillo et al., 2019; Hunter et al., 2019; Kuhnlein et al., 2009; Padulosi et al., 2013; Ulian et al., 2020). Indeed, exploring alternative food sources is not the sole global issue as the Food and Agriculture Organization (FAO) changed the language of food security to ‘‘food and nutrition security,” indicating the pressing concern on micronutrient deficiencies (Blesh et al., 2019). According to FAO, food and nutrition security means that all people at all times have physical, social, and economic access to food of sufficient quantity and quality in terms of variety, diversity, nutrient content, and safety to meet their dietary needs and food preferences (FAO et al., 2020). Indigenous peoples also maintain their traditional food system to be food secure and resilient independent from the market system (Budowle et al., 2019; Cuevas et al., 2015; Gayao et al., 2018; Meldrum et al., 2020). Indigenous food systems may be described as those foods that indigenous peoples have local access to, without having to purchase them, and within traditional

knowledge and the natural environment from farming or wild harvesting (Kuhnlein et al., 2009). This is in contrast to “market foods” or those foods that must be purchased by the community (i.e., packed instant noodles, cooking oil, canned goods, powdered milk, etc.), except for the traditional foods that are locally purchased from other community members such as meat and vegetables.

"Young village members who show promise can be chosen and trained to be chiefs, gradually earning the status of datu bai (female datu) as they prove their ability to settle' disputes, which involves three factors: speaking, negotiating a settlement, and providing the settlement themselves." (Gatmaytan 1994).

The wealth of indigenous knowledge on agrobiodiversity offers an untapped resource to address malnutrition and food insecurity - the key goals of SDG 2 (Buenavista, 2021; Buenavista et al., 2022). This strategy is particularly promising in a biodiverse yet food-insecure country like the Philippines. With over 10, 000 species of plants (Pelser et al., 2011) and 110 groups of indigenous peoples (Buenavista et al., 2018), the Philippines may be considered one of the most important sites for ethnobotanical research in the Asian region. Moreover, some edible plant species remain unappreciated and undervalued yet, they significantly contribute to the resilience of indigenous communities (Buenavista et al., 2021).

Unfortunately, the encroachment and expansion of agricultural plantations continue to threaten the biocultural landscape owned and/or managed by indigenous peoples, particularly in Mindanao (Huesca, 2016). This rapidly disappearing biocultural landscape harbor a rich biodiversity of cultural and spiritual significance. Yet, the indigenous knowledge system and food ethnobotany of many indigenous peoples are still undocumented despite the pressing concern on food security and the imminent threat of loss of biocultural heritage.

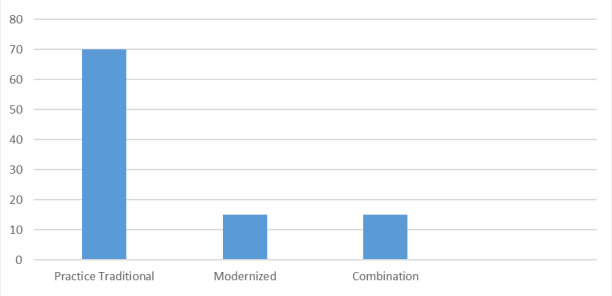
METHODOLOGY

This research employs a descriptive research design, utilizing data collection methods through questionnaire and survey methods. The quantitative and qualitative design of research was also utilized to make the research design great. The study was conducted at Purok Maligaya, Kulaman, Senator Ninoy Aquino, Sultan Kudarat. The said area is also known as ‘Village’ because majority of the residents are Manobo tribe. It is located beside the Kulaman river.

This research employed a convenience sampling method with mixed-methods approach, utilizing both survey questionnaires and checklists to gather data. 30 tribal elders and Datus were interviewed who were readily available in the area. These individuals were chosen as respondents due to their knowledge of traditional food gathering practices in the mountains and forests. Descriptive analysis was then conducted to interpret the collected information, providing a comprehensive understanding of the data and enabling the researchers to achieve the research objectives.

FINDINGS

Out of 30 respondents in this survey, 70 percent were still pushing or practicing their unique and traditional delicacies. However, modernization and globalization led to significant resistance, with some IP addresses failing to adapt due to legacy infrastructure or security concerns, while others deadily embraced the changes, benefiting from improved efficiency and increased connectivity as shown in the bar graph below:



Nomadic Lifestyle

The Manobo tribe doesn't have a permanent dwelling, instead, they move from place to place to find food. This nomadic lifestyle is directly linked to their forest and mountain environment.

Traditions

Betel quid consumption

When food is scarce, The Manobo tribe chews betel quid, known as "ma-mah", which stains their teeth red. This practice suggests a cultural adaptation to periods of food scarcity and highlights the importance of betel quid within their culture.

When they do not have food, they sit beside the bone fire to keep themselves warm and to entertain themselves in order not to feel hunger.

Traditional Food Preparation

In the past, the Manobo tribe cooked their meals by wrapping food like rice, vegetables, and root crops in green leaves. They primarily used taro leaves for this purpose. These food bundles were then cooked in bamboo tubes with a small amount of water. The Manobo tribe did not use salt or other seasonings due to their remoteness. Instead, they used pink-colored plants and they called it "SILOK" to add aroma and a sour taste to their food.

Modern Food Preparation

While traditional methods are still practiced by many Manobo, globalization has introduced new cooking techniques. younger generations have adapted to modern methods like sauteing, but they still hold on to their traditional culinary heritage.

Delicacies and Food Preservation

The Manobo tribe' diet is unique, incorporating plants and animals that are often overlooked by other ethnic groups. Some of their delicacies include:

- **Ubod ng Uway**: The heart of rattan, known for its tenderness, low fiber content, and delicate flavor.
- **Abalong**: Taro Sprouts
- **Unti-Unti**: The edible sprout of the black nightshade plant.
- **Farm Rats**: These rodents, which feed exclusively on plants, are considered a delicacy and are often roasted.

Manobo tribe also practices food preservation methods like smoking meat. When they hunt wild animals like wild boar, they slice and smoke the meat to extend its shelf life.

Methods of Food Preparation

The primary methods of food preparation among the Manobo tribe are:

- **Roasting**: This is the most common method due to its convenience.
- **Soup**: Soups are another popular dish.
- **Steaming**: Steaming is also used, particularly for vegetables and root crops.

When they have grains of rice gain from the harvested area, they mill it by hand using wooden mortar and pestle and clean it using square woven bamboo as shown in the picture below:

Emphasis on Freshness and Natural Ingredients

The Manobo tribe depend their food to what nature gives. They use fresh and healthy foods from nature and with the absence of any preservatives. This suggests a focus on natural, unprocessed ingredients.

Social Gatherings and Food

During social gatherings like weddings, the Manobo tribe hunts wild animals like pigs and roast them. This demonstrates the importance of food in theri social events and highlights their hunting skills.

Discussion

The Manobo tribe's food preparation practices offer a fascinating glimpse into their cultural identity and resourcefulness. their traditional methods, deeply rooted in their connection with nature, highlight their ability to utilize readily available resources sustainability.

The use of wrapping food and bamboo tubes for cooking showcases their ingenuity and reliance on natural materials. The absence of salt and the use of "SILOK" to add flavor emphasizes their adaptation to their environment and their unique culinary preferences.

The Manobo tribe's diet is a testament to their resourcefulness and their willingness to explore unconventional food sources. their inclusion of plants like 'Ubod ng Uway' and 'Unti-Unti' often overlooked by other ethnic groups, demonstrates their deep understanding of their surroundings. the practice of smoking meat for preservation further highlights their practical approach to food management.

The influence of globalization on the Manobo tribe's culinary practices is evident in the adoption of modern cooking methods like sauteing, particularly among younger generations. However, the continued adherence to traditional dishes and preservation techniques indicates a strong sense of cultural identity and a desire to preserve their culinary heritage.

The Manobo tribe's food practices represent a harmonious blend of tradition and adaptation. They serve as a reminder of the importance of respecting cultural diversity and appreciating the unique ways in which different communities interact with their environment.

Manobo cuisine is characterized by its use of fresh, locally sourced ingredients and traditional cooking methods. It will become a good product in society, especially that their food is good in the diet.

When it is given emphasis by the authorities, it can be good in promoting the economy and health of everyone.

Based on the survey, we've also found that one of the hindrances in promoting their unique delicacies is that they are lacking knowledge where the majority are not educated.

It's possible that the Manobo Indigenous People community won't have the resources to record and maintain their culinary customs. This can make it challenging to ensure the survival of cultural practices and to transmit information to future generations because of limited resources.

The Manobo Indigenous People community can investigate tactics like these to deal with these issues like gathering oral histories, collecting recipes, and producing educational materials are some ways to document and preserve traditional foods.

CONCLUSION

The culinary traditions of the Manobo Ips in Kulaman represent a rich and vibrant aspect of their cultural heritage. While further research is needed to fully understand their unique delicacies, we can appreciate the importance of food in their lives and the connection it fosters to their ancestral knowledge and cultural identity.

The Manobo tribe's food preparation practices are a testament to their resourceful nature and their deep connection with their environment. Their diverse diet and unique delicacies demonstrate their adaptability and resilience in the face of both traditional and modern influences.

This descriptive research study will provide valuable insights into a unique delicacy of the Manobo people in Kulaman, Senator Ninoy Aquino, Sultan Kudarat. By documenting their culinary traditions, the study aims to contribute to the preservation and promotion of their cultural heritage. The findings will be disseminated to the community, academic audiences, and the wider public to raise awareness and

appreciation for the Manobo foodways.

RECOMMENDATIONS

The Manobo Indigenous Peoples (IPs) possess a rich and healthy culinary tradition that deserves recognition and preservation. Documenting and uncovering their unique delicacies requires a collaborative, respectful, and sustainable approach. By working closely with Manobo communities, preserving traditional techniques and ingredients, and promoting their cuisine, we can ensure that this valuable cultural heritage is celebrated, preserved, and passed down to future generations.

Encouraging traditional food festivals and events is one of the strategies to inspire younger generations to take part in cooking and consuming traditional foods while also increasing awareness of their culinary history. Creating sustainable food and agriculture systems will promote the economic well-being of the community and guarantee the supply of traditional ingredients.

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HARAM CONCEPT: A STORYLINE IN MIXING ALCOHOLIC DRINKS IN FOOD SERVICE MANAGEMENT AMONG MUSLIM STUDENTS

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ABSTRACT

Sultan Kudarat State University -Isulan Campus, College of Industrial Technology offered a course entitled Bachelor in Technical Vocational Teacher Education major in Food Service Management (BTVTE-FSM). This course is open for all learners from diverse religions, cultures and traditions. The main purpose of this study is to provide insights into the interplay between religious values and academic requirements, with the goal of promoting inclusive and culturally sensitive practices in technical-vocational education. This study utilizes qualitative research design open ended questions and interview as survey method used in collection of data through interview with the participants via google meet and messenger. The study involved three (3) Muslim students enrolled in food service management programs. Participants were selected using purposive and convenience sampling from the locale population of Sultan Kudarat State University-Isulan Campus, Isulan Sultan Kudarat. The statistical tools used in this study was narrative analysis. The significance of the study on the concept of haram (forbidden in Islam) in relation to mixing alcoholic drinks in food service management among Muslim students is multifaceted. This research is important for understanding the intersections of cultural, religious, and ethical considerations in food service practices, particularly in the context of Muslim students who adhere to Islamic dietary laws. Based on the results, the study shows that most of the respondents choose BTVTE-Food Service Management as their profession because it is a great help for seeking job opportunities in teaching, food manufacturing corporation, hotel and restaurant, among the respondents anticipated the inclusion of haram foods and drinks in their actual performance but ensured of following their religious beliefs while taking practical activities, also tend raising their religious concerned to the facilitator and found respondents answered positively against their facilitator towards understanding among Muslim student religious beliefs and most of the respondents felt guilt during the task. However, all of them have the same intention that it was for their learnings and complying their requirements within those practical activities.

Keywords: *Muslim students, alcoholic drinks mixing, BTVTE-Food Service Management, belongness and religious beliefs*

INTRODUCTION

Food and beverage services covers the knowledge and skills necessary for those studying and/ or working at a variety of levels in food and beverage service. Foodservice operations are continuing to improve and develop, together with advances in quality. The demand for food and beverages away from the home has increased and, with a broader spectrum of the population eating out, customer needs are continuing to diversify Cousins, J., Lillicrap, D., & Weekes, S. (2014). Theoretically substantiates and experimentally verified modern pedagogical technologies and their application in the work of teachers of professional (vocational and technical) education institutions. It has been proven that the focus of attention of the pedagogical community is on vocational education institutions, which are designed to provide the labor market with qualified workers who are able to successfully work with the most modern production technologies Maksiutov, A. (2024). According to Ojimba (2012), vocational and technical education is a form of education whose primary aim is to prepare persons for employment in recognized

occupation and this encompasses field of study (agricultural education, fine and applied arts education, business education and vocational trades in soap making, hairdressing, computer training among others). Uwaifo (2009) posits that technical education is the training of technically oriented personnel who are to be initiators, facilitators, and implementers of technological literacy that would lead to self-reliance and sustainability. One of the prominent ways of diversifying an economy is by preparing young people for the jobs of the future and vocational and technical education have important roles to play in this process. However, vocational and technical education programmes in Nigerian institutions of learning seem not to be enjoying the attention they deserve due to lack of modern laboratories Odia, J. (2024).

The Commission on Higher Education (CHED) is the governing body that facilitates program offerings in the Philippines. CHED Memorandum Order (CMO) No. 56 series of 2007 pertains to the Policies, Standards, and Guidelines for the Ladderized Bachelor of Technical Teacher Education (BTTE). It is intended to rationalize undergraduate teacher education to keep up with global competitiveness demands [1]. In 2018, tertiary education curricula were adjusted and modified for alignment due to the advent of the Enhanced Basic Education Curriculum, popularly known as the K to 12 Program under RA 10533 [2]. The BTTE program was shifted to BTVTEd or the Bachelor of Technical-Vocational Teacher Education under CMO No. 79 series of 2017 [3]. The shift in the name has a significant change in the curriculum and its whole approach. In terms of education, Food & Beverage Services subject is one of the subjects in Hotel & Restaurant Management curriculum which can be considered as the most difficult to take because a student cannot pass the subject without acquiring first the skills and mastering the knowledge on Food & Beverage Services operation. (Salvador, R. R. E., n.d.). Studying the food and beverage business can lead to a variety of job options in the hospitality sector. I can get the knowledge and abilities necessary for jobs like restaurant manager, food and beverage director, sommelier, catering manager, or even for beginning my own food-related business. Giving students practical experience in the food and beverage service industry is one of the main objectives of an internship. This might involve gaining knowledge of numerous facets of the sector, including menu design, table service, bar management, client interactions, and problem-solving in authentic settings. Halim, Md. (2023).

The study seeks to address the problem among Muslim students enrolled in BTVTE-Food Service Management on choosing their college course, challenges during mixing alcoholic drinks, students approach to the facilitator during the activities and being able to know if the student's guilt against their religious belief during actual performance. Practices of Islam are the series of religious rituals and observances that Muslims undertake as a demonstration of their allegiance to Islam. The aim of these practices is to help strengthen communication with Allah Subhanahu Wa Ta'ala (SWT) and lead one on the spiritual path. Some mandatory Islamic customs are generally performed, according to the culture and region, but the likelihood of those operations may vary. Islamic practices include Salah (prayer), Sawm (fasting), Zakat (charity), Hajj (pilgrimage), Reading of the Quran, Dhikr (reminiscence of Allah), Sadaqa (optional charity), and Islamic Festival (Eid). The relationship between Islamic practices and academic performance needs to be understood because it has a significance for creating inclusive and supportive learning environments especially for Muslim students. The educators and policymakers who are allowed to develop strategies to cater the needs and requirements of these students, to ensure the holistic development and academic success (Khan & Khan, 2018).

The impact of the study to the community among others were promoted ethical awareness and educators. Encouraged the development of moral reasoning skills that align with both professional standards and personal values. Improved cross-cultural understanding within academic institutions and the workforce. Strengthened the ability of institutions and industries to attract and retain diverse talent by fostering an inclusive environment. Created a bridge between religious beliefs and professional education, encouraging both groups to coexist harmoniously. Shaped future curriculum development that is more aligned with diverse cultural and religious needs. Supported the mental and emotional well-being of Muslim students. The community, including educational institutions, the food service industry, and the Muslim student body, stands to benefit from the insights generated by this research.

The importance of this study was highlighting the need for religious accommodation in vocational education. Encourages educators and institutions to respect diverse cultural and religious practices. Advocates for flexible teaching strategies that consider students' religious beliefs. Encourages reforms in technical and vocational education to ensure diversity and inclusivity. Raises awareness about the impact of religious conflicts on students' mental health. Encourages institutions to provide emotional and

counseling support. Highlights the need for culturally sensitive practices in the workplace. Encourages employers to offer alternative roles or accommodations for Muslim employees.

Lastly, this study benefits for Musim students wherein it provides a platform for their voices to be heard and understood. Offers strategies for navigating ethical dilemmas in educational and professional settings. Encourages the development of self-confidence and moral integrity in upholding their beliefs. While for educators, it informs educators about the unique challenges faced by Muslim students. Encourages the adoption of alternative assessments or tasks that respect religious beliefs. Enhances educators' cultural competence and ability to accommodate diverse student needs. And for educational institutions, it provides a framework for curriculum reforms to ensure inclusivity and diversity. Improves the institution's reputation as a place that respects religious and cultural diversity and strengthens student retention and satisfaction by addressing conflicts that may affect academic performance.

Statement of the Problem/Purpose of the study

The present study does not intend to provide a comprehensive revision of historical accounts about Islam in the Philippines; instead, it proposes an alternative approach in writing a history of Muslim education by embracing the universal principles that shape human culture and civilization Gamon, A., & Tagoranao, M. (2022). Tolerance and Inter-religious Dialogue: Multicultural education in the Islamic context promotes inter-religious tolerance and inter-religious dialog Lestari, A., Salminawati, & Usiono. (2023). This includes a better understanding of other religions and respect for their religious beliefs andpractices. Inclusive Learning: An inclusive and welcoming learning environment for all students (Abdullah, 2020)

The study, Haram Concept: A Storyline in Mixing Alcoholic Drinks in Food Service Management Among Muslim Students, aims to explore the challenges and experiences of Muslim students enrolled in the Bachelor of Technical-Vocational Teacher Education (BTVTE) – Food Service Management program at SKSU (Isulan Campus). Specifically, the study seeks to address the following problems:

As a Muslim student, why you choose BTVTE-Food Service Management as your profession?

As a Muslim student of Food Service Management, did you forecast some of your performance tasks may include haram foods and drinks? If yes, how you handle this kind of challenges during your performance task?

As a Muslim student, did you try raising your religious concerns to your facilitator regarding mixing of alcoholic drinks in your practical activities? If yes, how you approach your facilitator? If no, did you accept the task for the sake of grades and learning outcomes?).

As a Muslim student, if incase that you perform the mixing of alcoholic drinks as a requirement in your course syllabus. Do you feel any guilt within yourself?

This study aims to provide insights into the interplay between religious values and academic requirements, with the goal of promoting inclusive and culturally sensitive practices in technical-vocational education.

Theoretical Framework

Maslow's Hierarchy of Needs Applied to Humanistic Education

Maslow's Hierarchy of Needs: One of the foundational principles of humanistic education is based on Abraham Maslow's theory of human motivation. According to Maslow, individuals have a hierarchy of needs that must be met to attain their full potential. These needs include bodily necessities (such as food, shelter, and water), safety needs (such as security and stability), belongingness and love need (such as social relationships), esteem needs (such as recognition and self-worth), and self-actualization needs (the desire for personal growth and fulfilment).

Humanistic education fosters holistic development by addressing academic knowledge, emotional intelligence, social skills, creativity, and physical well-being. It acknowledges that education should go beyond acquiring facts and abilities to encompass personal growth and character development. This approach aims to cultivate well-rounded individuals capable of making meaningful societal contributions.

Astin's Student Involvement Framework

Alexander Astin's 1985 Theory of Student Involvement explains how desirable outcome for institutions of higher education are viewed in relation to how students change and develop in result to being

involved co-curricularly. The core concepts of the theory are composed of three elements: student's "inputs" such as their demographics, their background, and any previous experiences; student's "environment", which accounts for all the experiences a student would have; and there are "outcomes" which cover a student's characteristics, knowledge, attitudes, beliefs, and values that exist after a student has graduated college.

RELEVANT LITERATURE

Integration of Islamic Principles in Curriculum Development

Islamic teachings and values into secular curricula can promote a more inclusive, comprehensive, and culturally sensitive educational experience. It also emphasizes the dual goals of fostering religious identity and critical thinking skills while accommodating diverse perspectives in education. As stated in the study of Balah, Khadigui (2023) Curriculum Development emphasizes the value of incorporating Islamic teachings and principles within the secular curriculum. Educators should consider integrating relevant Islamic content, perspectives, and values into various subjects to promote a comprehensive and balanced education. This approach can enhance students' understanding of their religious identity while fostering critical thinking skills and promoting cultural diversity. Svinicki (2004) offers an intriguing model that amalgamates some of the prevailing theories of motivation in learning. She suggests that motivation is a factor of the perceived value of the learning, along with students' belief in their own self-efficacy, or their belief in their ability to achieve the goal. As Svinicki explains, "motivation involves a constant balancing of these two factors of value and expectations for success" (2004, p. 146).

The Role of Religious Knowledge and Personality in Promoting Inter-Ethnic and Interfaith Tolerance Among Students"

The significance of religious knowledge and personality in fostering inter-ethnic and interfaith tolerance in multicultural and multi-religious environments. It also explores manifestations of tolerance among students, emphasizing shared activities and mutual respect as essential practices for harmonious coexistence. As sited in the study of Sabdin, M., & Izzat, M. (2023), stated that the result shows a positive significant relationship between religious knowledge, religious personality and inter-ethnic tolerance among Malaysian undergraduate students. His study indicate that the role of religious knowledge and religious personality could lead students to achieve ethnic tolerance in a multi-racial and multi-religious country like Malaysia. According to the study of Marpuah, S., Wei, C., Anwar, H., Kholis, N., Akhyak, A., & Farhana, I. (2021). Their study revealed that one of the manifestations of tolerance among students of all religions is to discuss together, donate regardless of religion, visit a sick friend, eat together, play sports together, and so on. The study's findings also revealed that 95 percent of respondents agreed that religious tolerance among university students of various religions is important.

METHODOLOGY

Research Design

This study utilizes qualitative research design, according to Scharp and Sanders (2019), the goal of qualitative research is to gain a better understanding of the social reality. The ever-changing and evolving nature of our world constantly puts researchers in a race to seek to understand how humans and phenomena interact with each other. Flick (2009) affirms researchers' use of qualitative methods to observe events or situations that affect people. Qualitative research approaches take many social sciences' cues, especially anthropology. This study method is being investigated to respect people's subjective experiences and meaning-making processes. Open-Ended was utilized as the research instrument to require the respondent elaborate on their points.

Respondents of the Study

This study consists of three (3) respondents. The respondents were selected from the graduates of Food Service Management of Sultan Kudarat State University (SKSU)-Isulan Campus.

Statistical Analysis

The statistical tools used in this study is narrative analysis to effectively analyze qualitative interview data and gain deeper insights into the experiences of the participants. The researcher used narrative analysis wherein it's all about listening to people stories and analyzing what it means Jansen, D. (2024, August 13). Interviews are particularly useful for uncovering the story behind a participant's experiences and pursuing in-depth information around a topic. Interviews may be useful to follow-up with individual respondents after questionnaires, e.g., to further investigate their responses. (McNamara, 1999). In qualitative research specifically, interviews are used to pursue the meanings of central themes in the world of their subjects. The main task in interviewing is to understand the meaning of what the interviewees say (McNamara, 2009). A code precedes each quotation in the research. The code represents the number of respondents, such as R1, R2, etc.

Data Gathering Procedures

The researcher collected the data through purposive sampling and convenience sampling. Purposive sampling has its own advantages of getting data from the sample you are sure of to provide the best experiences since you know its characteristics. The beauty with this sampling type is that the participants are handpicked by the researcher due to the relevant knowledge and experience the researcher has on the sample and topic Nyimbili, Friday & Nyimbili, Leah. (2024). Patton (2001) and Patton (2002) describe a wide array of purposive sampling methods. This technique is used because it effectively accommodates a small number of respondents (Marshall, 1996).

The researcher requests a permission individually to the participants through their social media account based on their availability and willingness. The researcher used online platform to reach out respondents such as google meet and messenger due to the distance, time and access. Researchers conducted in-depth interview by speaking with participants in a one-on-one setting through Google Meet and messenger.

The collective database of social media platforms offers a potential alternative for researchers who face difficulties in accessing their field of study. When the subject matter is challenging, individuals find it easier to express themselves through different social network applications. Even older and illiterate individuals make use of these applications due to their simple mode of operation, which includes audio-visual and written interactions. Creating parallel social programs specifically for researchers allows them to interact with individuals through these social networks, thereby overcoming problems related to accessing their field Lakhlij, Hicham (2024). The data was gathered from the prepared open-ended questioners to secure appropriateness and authenticity of data collected.

RESULTS AND DISCUSSION

1. Based on the first question, (As a Muslim student, why you choose BTVTE-Food Service Management as your profession?). The responses of the selected research participants are as follows: R1 said that "As a Muslim Student, I choose BTVTE-Food Service Management as my profession because I realized that it will be a great help to me as I can use it as my business in the future." While R2 said that "As a Muslim student, I choose BTVTE-Food Service Management as my profession because it's my dream being able to explore teaching as well as learning food services. I also appreciated this course because of its scope and it has opportunities both teaching and non-teaching areas. For example, job opportunities in food manufacturing corporation, hotel and restaurant, business opportunities and the like." The two (2) respondents out of 3, has a quiet similar answer about their job opportunities once the program is completed. According to the results of the study stated by Grushetskaya, Irina & Shcherbinina, Olga & Nemchenko, Sofya (2024) the main motives for choosing a profession were an interest in this profession and correspondence of the profession with skills and abilities.

While R3 answered this statement "I choose this course because it influences me by my sister sharing her positive feedback in this field of specialization." According to Balyer, Aydin & Özcan, Kenan (2014), stated that many studies reveal that while some students choose their profession with altruistic-intrinsic and extrinsic reasons, some others choose it under the influence of others. In addition to the study of Hasiara, La & Rahman, Fatahul & Hamdayani, Sri (2023) stated that family culture can influ-

ence accounting students to work as accountants. In Indonesia, the culture or habit of a strong bond with family and children is relatively high in choosing a career as an accountant profession. His study proves that family has a significant influence on the selection of students for the accounting profession. Moreover, Oweini, Ahmad (2024) stated in their study that family influence was also connected to career-related decisions, career satisfaction, and motivation.

The results imply the need for a balanced approach to career guidance within the university that accounts for both personal aspirations and family or cultural factors, as well as the importance of aligning education programs with the evolving demands of the food service industry.

2. The second question is (As a Muslim student of Food Service Management, did you forecast some of your performance tasks may include haram foods and drinks? If yes, how you handle this kind of challenges during your performance task?). Stated here are the responses of the selected research participants: R1 said that "Yes. We can't avoid it especially if one of the subjects is about Bartending wherein Alcohol is Haram in our religion. During our Performance Task, we mix cocktails, but we make sure we won't drink it and since it's a group task, we Muslim in every group will just observe and familiarize only the process." While R3 said that "As a Muslim student of food service management, I do anticipate that I will encounter activities that haram foods and beverages are involved. For Muslims, dealing with such issues can be a test of faith and self-control. It is essential learning about nutritional laws and overcoming temptation. It is imperative that we address these issues with empathy and understanding." The respondent 1&3 are both anticipated the inclusion of haram foods and drinks in their actual performance. However, they ensure of following their religious beliefs while taking such practical activities. In accordance to the verses in the Qura'an stated that "O you who have believed, indeed, intoxicants, gambling, [sacrificing on] stone alters [to other than Allah], and divining arrows are but defilement from the work of Satan, so avoid it that you may be successful (Surah Al-Ma'idah Ayat 90). Indeed, Satan desires to incurenmity and hatred between you through wine and gambling, and he desires to prevent you from God's remembrance and prayer, yet will you, then give [them] up Surah Al-Ma'idah Ayah 91).

While the R2 answered this statement "During enrollment, I didn't forecast that it may take some areas of the subject that may include haram meal and drink courses. But gradually I understand that possible that it could come up to that situations since we are in a diverse and multicultural classroom environment." The respondent number 2 is of understanding diverse and multicultural classroom environment. Cappoza (2000) defined variety as a mixture of individuals within the same social system who belong to different groups. The ideas behind diversity are explained by several theoretical frameworks. The Social Identity Theory (SIT) and Embedded Inter-Group Relations theory are covered in this essay. Among the well-known inter-group theories that help us understand group identities in organizations is the social identity theory. According to Gibson (1998) reports in her article "The Status of Multicultural Education in Michigan," that the state board of education issued its position on multicultural education. She quotes: All efforts shall be made to recognize and appreciate that ours is a radically and ethnically diverse society, consisting of men, women, and children whose ancestral cultures, values, and beliefs are unique aspects of our nation's democracy. It is the policy of the State Board of Education to ensure equality of educational opportunity to all students regardless of race, gender, age, religion, language, socioeconomic status, ethnicity, national origin, background, physical and mental condition, or marital status. (p. 18)

The results imply in supporting Muslim students in food service management programs particularly in respecting religious beliefs and providing accommodation, building a diverse, inclusive, and culturally competent environment, ethical education and institutional policies.

3. The third question is (As a Muslim student, did you try raising your religious concerns to your facilitator regarding mixing of alcoholic drinks in your practical activities? If yes, how you approach your facilitator? If no, did you accept the task for the sake of grades and learning outcomes?). Stated here are the responses of the selected research participants: R1 said that "Yes, and we are thankful that our facilitator is very considerate to us. And on our final showcase, instead of requiring us to mix cocktail drinks, she gave us the chance to create a non-alcoholic beverage." While R2 said that "In our batch, we have a small circle of Muslim group. During our bartending class, we tried to raise our concerns re-

garding this matter to our facilitator. Our facilitator allows us to mix alcoholic drinks to explore the practical activities only with the conditions of not drinking on it after mixing." While R3 said that "I do address my concerns as a Muslim student about the mixing of alcoholic beverages during practical exercises. I inform my facilitator that I can mix the alcoholic beverages if I will not consume it, since this is strictly forbidden in Islam and the facilitator also gives it some consideration."

In this question all the participants answered positively against their facilitator towards understanding among Muslim student religious beliefs. Under Roger's Humanist Theory, Rogers' views the teacher as a facilitator to learning rather than just a conveyor of knowledge. The success of the teacher is in their ability to build positive relationships with students. A teacher should care about their students and accept their feelings, regardless of whether they assist or detract from learning. Through these characteristics, deeper trust and respect is built Rogers, Carl R, (1967). Rudolf Dreikur in his Dreikur's Classroom Management Theory stated that "Students have an innate desire to feel like an accepted member of a group and to feel like they have value and confidence to contribute to that group. Dreikur called this desire to belong, the "genuine goal of social behavior".

The results imply educational institutions responsibility to encourage open communication between students and facilitator, provide flexible assessments, training for faculty in cultural and religious competence, and develop institutional policies that support religious accommodations and promote an inclusive learning environment where all students can thrive.

4. For the last question, as a Muslim student, if incase that you perform the mixing of alcoholic drinks as a requirement in your course syllabus. Do you feel any guilt within yourself? Here is the statement answered by the respondents. R1 said that "I am a bit guilty because we know its Haram and yet we are learning it". While R2 said that "As a Muslim, literally I have felt guilty because in the first place I knew that it was haram. However, I only take it as our requirements and just ensure not drink it. While R3 said that "In my opinion, I do not feel guilty for performing the task, given that I had to do it due to the requirements of the school for me to fulfill as a student. What is important for me is what was my real intention for doing the task which is to comply with the school and not for bad purposes or by simply mixing alcohol and consume it."

The respondents 1&2 are felt guilt during the task while respondents' number 3 did not felt guilt during their practicum. However, all of them have the same intention that it was for their learnings and complying their requirements within those practical activities. As stated in hadith (sunnah of Prophet Muhammad SAW) "Actions are judged by intentions, and every person will be rewarded according to their intention. Thus, whoever migrates for the sake of Allah and His Messenger, then his migration is for the sake of Allah and His Messenger; and whoever migrates for worldly gain or to marry a woman, then his migration is for what he migrated for." (Reported by Bukhari and Muslim).

The results imply educational system to adopt more inclusive practices to respect religious diversity, ensuring that students are not placed in morally conflicting situations. Moreover, application of Educational Institution's Responsibility for Muslim students' activities involving haram practices can be replaced with alternatives that achieve the same learning outcomes without compromising religious principles.

SUMMARY OF FINDINGS

1. Among Muslim student from the three (3) respondents found that they choose BTVTE-Food Service Management as their profession with several reasons such as aside from teaching it is also a great help for seeking job opportunities in food manufacturing corporation, hotel and restaurant and business opportunities. One of them also found that it is influence by her family member.
2. As a Muslim student of Food Service Management 2 out 3 respondents found are both anticipated the inclusion of haram foods and drinks in their actual performance. However, they ensure of following their religious beliefs while taking such practical activities. Meanwhile, the respondent number 2 did not anticipate the inclusion of haram drinks but gradually understand that it could come up to that situations since they are in a diverse and multicultural classroom environment.
3. As a Muslim student of Food Service Management tend raising their religious concerns to the facilitator regarding mixing of alcoholic drinks in their practical activities and found that all the respond-

ents answered positively against their facilitator towards understanding among Muslim student religious beliefs.

4. The two (2) out of three (3) respondents are felt guilt during the task. However, all of them have the same intention that it was for their learnings and complying their requirements within those practical activities.

CONCLUSION

Based on the above findings, the researcher concluded that among Muslim student of BTVTE-Food Service Management of Sultan Kudarat State University (Isulan Campus) most of the respondents found that:

- They choose BTVTE-Food Service Management as their profession stated that aside from teaching it is a great help for seeking job opportunities in food manufacturing corporation, hotel and restaurant, and business opportunities.
- Among Muslim students anticipated the inclusion of haram foods and drinks in their actual performance. However, they ensured of following their religious beliefs while taking such practical activities.
- The participants also tend raising their religious concerned to the facilitator regarding mixing of alcoholic drinks in their practical activities and found that all the respondents answered positively against their facilitator towards understanding among Muslim student religious beliefs.
- Lastly, most of the respondents felt guilt during the task. However, all of them have the same intention that it was for their learnings and complying their requirements within those practical activities.

RECOMMENDATIONS

From the above findings, the study recommends that:

1. The researchers recommend equal learning opportunities among Muslim students from the program that offers learning activities that are sensitive against their religious beliefs.
2. For the facilitators, it is highly recommended to have a proper awareness on a diverse student against its races, culture, tradition, and religious beliefs.

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PROMOTING VERTICAL GARDENING IN TEACHING AGRICULTURE AND FISHERY ARTS IN PUBLIC ELEMENTARY SCHOOLS

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ABSTRACT

This study aimed to promote vertical gardening in teaching Agriculture and Fishery Arts in public elementary schools. The study used a descriptive research design, involving 230 school heads and 230 Grade 4 EPP teachers from public elementary schools in Batangas Province. The study found that the school heads and Grade 4 EPP teachers moderately agreed on the status of teaching agriculture and fishery arts in public schools, with respect to facilities and resources, performance tasks, and gardening practices. The application of vertical gardening in teaching Agri-fishery arts into the integration of the curriculum content as assessed by the teachers is to a great extent, while the assessment of the school heads is to a moderate extent. Meanwhile, the respondents assessed the application of vertical gardening as an alternative gardening activity and hands-on activities to a moderate extent. Furthermore, the problems and challenges in teaching Agri-fishery arts include the background and experience of the teachers, limited agricultural space, insufficient and old agricultural books and gardening tools, climate change, and pest management. Meanwhile, the application of vertical gardening to teaching Agri-fishery arts was proposed in public elementary schools through instructional materials. It was recommended that a similar study on the promotion of vertical gardening be conducted in another province using different variables.

Keywords: *Vertical Garden, Agriculture and Fishery Arts, Agriculture Education, Agriculture, Elementary*

INTRODUCTION

The Philippines is one of the agriculture countries in the world. Most Filipinos reside in rural areas and rely on agriculture to survive. According to the Statista Research Department, about 25 percent of the Filipino population works in the agricultural sector. The sub-sector includes farming, fisheries, livestock, and Department reported that the gross value added in the agricultural sector was PHP 1.78 trillion. The GVA is equivalent to 8.9% of the country's GDP.

The economy of the Philippines depends mainly on agriculture, which also includes Agri- fishery that feeds individuals from different regions. With fertile soils and preserved marine life, most farmers nourish the country and export it to the world. With the challenges brought by climate change and poor access to modern farming technology, the government still values the activities to make sure the sector progresses for the better. In the Philippines, Agri-fishery is a part of the arts, which include crop production, livestock, and fish farming and fishing. The activities are essential for both urban and rural people's livelihoods.

To improve the agricultural sector in the Philippines, the Department of Education (DepEd) offered Edukasyong Pantahanan at Pangkabuhayan (EPP) for Grade 4 students at the elementary level. This will help Grade 4 students develop technical skills relevant to tertiary education, middle-level skill development, employment, and entrepreneurship. The subject covered topics like entrepreneurship, information and communication technology, agriculture, home economics, and industrial arts. In agriculture, students learned about crop production, which serves as the foundation of the country's food supply.

Through learning crop production techniques, every individual can ensure a consistent and sufficient food supply that will meet the needs of a growing global population (He, J. 2015).

Moreover, DepEd values "Makakalikasan," which instills environmental care in learners. It integrates environmental education into elementary curricula through programs like School Inside a Garden (SIGA) and Gulayan sa Paaralan (GPP). Both the SIGA and GPP programs supported the overarching Executive Order No. 193, Expanding the Coverage of the National Greening Program, which extended the National Greening Program from 2016 to 2028 (Llego, 2018). These programs also focused on transforming school campuses throughout the country into green and colorful places by planting trees and flowering plants. The Agriculture and Fisheries Association (AFA) supports such efforts.

Agri-fishery arts is one of the EPP curriculum's components for elementary students. It is designed for hands-on learning and real-life applications that relate to agriculture and aquaculture, such as crop production and fishing. It is also an art and science that helps students learn and grow a variety of crops and ornamental plants.

Hence, students actively participating in growing crops become aware of environmental impacts and resource consumption. School gardens help boost morale by reinforcing the importance of a healthy diet, encouraging outdoor activities, and promoting character-building initiatives. It also provides significant advantages, all while engaging in straightforward, rewarding tasks.

Nevertheless, teachers know the significance of teaching Agri-fishery arts to the students. They value how agriculture especially crop production contributes to the school garden and other programs. Agri -fishery arts not only teach valuable skills to students but it helps them to appreciate the source of their foods. However, due to the rapidly growing population in the Philippines and an increasing number of students in public elementary schools, the land that was once used for farming was being converted to commercial buildings. Without enough space for agriculture, schools will face difficulty in finding fresh, locally grown food for the meals of the students. This emphasizes the importance of balancing the need for educational space and maintaining agricultural areas on school premises.

Meanwhile, students learned best by doing. They love experiencing things to learn. The unavailability of agricultural space on school premises means that students will never experience practical activity, which is an important part of their learning process. Lessons in agriculture will become purely theoretical rather than practical. It will also limit their engagement with nature. Aside from this, insufficient agricultural space can also impact the implementation of school feeding programs. When there is no available agricultural space, schools cannot grow their produce and have to rely on imported food for students' meals. This also cannot guarantee the quality of meals or limit the exposure of the students to fresh, locally grown produce.

Insufficient agricultural space also impedes the learning experience of Grade 4 students. According to Kabugi (2023), school farms lack essential agricultural tools and dedicated classes. Their study highlights that the scarcity of teaching and learning resources in elementary schools presents a significant challenge to the effective instruction of Agri- fishery arts. This shortage prevents students from engaging in practical tasks crucial for their learning and skill development.

As school agricultural land continues to become scarce, the use of vertical space for gardening is important. Adopting vertical gardening in public elementary school tackles space issues and enhances environmental awareness and sustainability education, which is important in teaching students about the role of plants in mitigating climate change, improving air quality, and creating habitats for biodiversity (Chatterjee A., Debnath S., & Pal H. 2020).

According to Khan et al. (2020), vertical gardening is a unique form of urban gardening ideal for small spaces. It maximizes the use of vertical areas, such as walls or fences in schools. Selecting the appropriate plants for vertical gardening is crucial. While many plants can be trained to grow vertically, not all are suitable. Khan also noted that plants can grow and thrive by either climbing upwards or hanging downwards.

Schools with vertical gardens offer various benefits. Walls in schools can serve as practical classrooms for Grade 4 students who are learning about crop production. This vertical garden can give students firsthand knowledge about plant growth, the operations of gardens, and the requirements for plant survival. This will also help in enhancing the quality of the air, making it healthier for learners and educators as it eliminates harmful pollutants. Aside from this, a vertical garden can also enhance the school's appearance aesthetically, presenting calming and stress-relieving effects that contribute to the

overall well-being of students.

Additionally, Grade 4 students can make integrative connections between subjects through vertical gardens. They can explore various subjects such as Mathematics, Science and Arts. This vertical garden can also be integrated into STEM (Science, Technology, Engineering and Mathematics) education allowing students to conduct experiments, collect data and analyze results (Reyes, Bayten & Mercado, 2021).

According to Lack et. al. (2015), several educational institutions have successfully implemented vertical gardens. For instance, a school in California incorporated a vertical garden into their science curriculum. Other schools have used vertical gardens to grow various vegetables for their cafeterias, enhancing their farm-to-table practices and promoting healthy eating habits.

Meanwhile, recent research highlights the effectiveness of vertical gardens as educational tools. Numerous studies have shown that vertical gardens enhance student engagement, improve academic performance, and increase environmental awareness. However, they also present challenges such as limited space, a lack of funding, and maintenance requirements. Some may question the long-term sustainability of vertical gardens in education, but research suggests these challenges can be addressed through creative solutions like modular vertical garden systems, community partnerships, and grant opportunities.

Thus, the researcher integrates vertical gardening as a hands-on practical performance in the context of "Pamamaraan ng Pag-aalaga ng Halaman" in public elementary schools. In doing so, the research recognizes the importance of practical application in teaching Agri-fishery art to Grade 4 students.

OBJECTIVES

This study aimed to promote vertical gardening in teaching agriculture and fishery arts in public elementary schools. Specifically, this study sought to attain the following objectives:

1. Determine the status of teaching agriculture and fishery arts in public schools as assessed by the school heads and teachers themselves in terms of;
   1.1 Facilities and Resources;
   1.2 Performance tasks
   1.3 Gardening Practices
2. Find out the differences on the responses of the two groups of respondents.
3. Ascertain the application of vertical gardening in teaching agriculture and fishery arts relative to the following:
   3.1 integration in the curriculum content
   3.2 as alternative gardening activities
   3.3 hands-on activities
4. Identify problems and challenges in teaching agriculture and fishery arts.
5. Proposed instructional materials in teaching agriculture and fishery arts.

METHODOLOGY

The researcher employed the descriptive method of research to gather information concerning the integration of vertical gardening as a hands-on practical training in teaching Agri- fishery arts in public elementary schools. For the study's respondents, the researchers used cluster sampling and categorized the schools per area. The total population of the school heads as respondents is 570 same as the teachers. Meanwhile, eight (8) participants from different public elementary schools participated in the unstructured interview. The researcher used a research-made questionnaire to collect data for this study. Items were derived from selected related literature and studies promoting vertical gardening. The questionnaire has been improved through feedback, recommendations, and suggestions from the internal and external validators. After approval, the questionnaires are distributed to the respondents using Google Forms. The data were tallied, tabulated, evaluated, and interpreted following the items after responses were received. Responses were given equivalent weights and interpretation as follows:

RESULTS AND DISCUSSIONS

After tabulation, statistical tests, analysis, and interpretation of the collected data, the study yielded the following findings:

1. Status of Teaching Agriculture and Fishery Arts in Public Elementary Schools

1.1 Facilities and Resources. The Grade 4 EPP teachers moderately agreed on the use of educational videos in teaching agriculture but noted that the school garden had a limited space of 40 square meters per pupil. School heads strongly agreed on having designated spaces for practical activities like composting but also highlighted the limited garden space. Generally, respondents moderately agreed that facilities and resources for teaching Agri-fishery arts were adequate.

Table 1: Status of Teaching Agri-fishery Arts in Terms of Facilities and Resources

Items	Teachers		School Heads	
	WM	VI	WM	VI
1. The school garden has 40 sqm of space per pupil.	1.98	DA	1.59	DA
2. The school has designated space for practical activities like composting.	3.21	A	3.50	SA
3. The school has available seeds and plants	3.32	A	3.37	A
4. The school garden has a plant nursery provided with seed boxes, pots, cans, etc.	3.14	A	3.21	A
5. The school has available farm tools such as a sprayer, trowel, hand cultivator, etc.	3.25	A	3.14	A
6. The school has available agricultural books.	3.03	A	3.08	A
7. The classroom for teaching agriculture has desks, chairs, whiteboards, and multimedia equipment such as projectors and TV.	3.18	A	3.12	A
8. The teachers who teach Agri-fishery arts have training and background in agriculture.	2.64	A	2.91	A
9. The teacher uses educational videos in teaching agriculture.	3.41	A	3.14	A
10. The school garden has a shaded classroom for outdoor lessons and workshops.	2.95	A	3.00	A
Composite Mean	**3.01**	**A**	**3.01**	**A**

***Legend**: **WM** = Weighted Mean; **VI** =Verbal Interpretation*
***SA** = Strongly Agree; **A** = Agree; **DA** = Disagree*

1.2 Performance Tasks. The Grade 4 EPP teachers and school heads strongly agreed that students watering plants every day was the most consistently performed task, while tasks like transplanting crops and removing weeds had the lowest weighted means. In general, respondents moderately agreed that performance tasks in teaching Agri-fishery arts were adequately addressed in public elementary schools, as indicated by the composite mean.

Table 2: Status of Teaching Agri-fishery Arts in Terms of Performance Tasks

Items	Teachers		School Heads	
	WM	VI	WM	VI
1.Make a garden plan	3.22	A	2.82	A
2.Prepare the soil by mixing compost and natural fertilizers	3.24	A	3.02	A
3.Plant seeds of different crops such as tomatoes, lettuce, cucumbers, etc. in empty cans	3.18	A	3.00	A
4.Transplant crops and fruit tree seedlings in the schoolyard	3.12	A	2.94	A
5.Plant crops 2 – 4 cm away from each other	3.13	A	3.41	A
6.Bring natural fertilizer such as compost or dried animal manure	3.25	A	3.14	A
7.Water plants every day	3.66	SA	3.81	SA
8.Remove weeds	3.40	A	2.62	A
9.Make organic sprays and solutions for insects and fungi of plants	3.15	A	2.92	A
10.Put a fence around the plants	3.43	A	3.63	SA
Composite Mean	**3.25**	**A**	**3.13**	**A**

1.3 Gardening Practices. The Grade 4 EPP teachers moderately agreed that students making a compost pit was the most common gardening practice, while mulching had the lowest agreement. School heads strongly agreed that students conserving water through various methods was the top gardening practice, with weed removal receiving the lowest agreement. In general, respondents moderately agreed that gardening practices in teaching Agri-fishery arts were adequately addressed.

Table 3: Status of Teaching Agri-fishery Arts in Terms of Gardening Practices

Items	Teachers		School Heads	
	WM	VI	WM	VI
1.Build raised beds for gardens	3.07	A	3.56	SA
2.Plant easy-to-grow plants like lettuce, radish, green beans, and tomatoes.	3.17	A	2.98	A
3.Make a compost pit	3.29	A	3.08	A
4.Use natural fertilizers such as compost, earthworm, and organic mulch around plants	3.17	A	3.10	A
5.Conserve water by collecting rainwater, sprinkler methods, rain catchment systems, etc.	3.26	A	3.67	SA
6.Use mulching where you cover the soil with leaves and other organic materials	3.02	A	2.85	A
7.Conduct crop rotation	3.07	A	2.84	A
8.Do companion planting	3.04	A	2.88	A
9.Practice container gardening	3.17	A	2.96	A
10.Save seeds from dead fruits and flowers	3.11	A	3.02	A
Composite Mean	**3.15**	A	**3.09**	A

2. Differences in the Responses of the Two Groups of Respondents

There was no significant difference in the responses of the two groups regarding facilities and resources and gardening practices. However, there was a significant difference in their responses concerning performance tasks.

Table 4: Difference in the Responses of the Two Group of Respondents

	Mean	SD	t-value	p-value	Decision on Ho	Interpretation
Facilities and Resources						
Teachers	3.01	0.598	0.069	0.472	Failed to Reject	Not Significant
School Heads	3.01	0.424				
Performance tasks						
Teachers	3.25	0.565	2.757	0.003	Reject	Significant
School Heads	3.13	0.383				
Gardening Practices						
Teachers	3.15	0.621	1.068	0.143	Failed to Reject	Not Significant
School Heads	3.09	0.162				

3. Application of Vertical Gardening in Teaching Agriculture and Fishery Arts

3.1 Integration in the Curriculum Content. Teachers moderately integrated vertical gardening into the Agri-fishery arts curriculum by educating students about considerations like sunlight, wind exposure, and space constraints but less frequently discussed hydroponics, aeroponics, and aquaponics systems. School heads also moderately agreed that teachers explained the concept and benefits of vertical gardening, although they placed less emphasis on teaching the characteristics of plants suitable for vertical gardening. In general, teachers were seen to integrate vertical gardening to a great extent, while school heads viewed this integration as moderate.

Table 5: Application of Vertical Gardening Relative to the Integration in the Curriculum Content

Items	Teachers		School Heads	
	WM	VI	WM	VI
1.Explain the concept and benefits of vertical gardening	2.52	GE	2.41	ME
2.Teach vertical gardening structures such as trellises, hanging planters, vertical towers, and living walls	2.40	ME	2.22	ME
3.Discuss suitable plants for vertical gardening such as tomatoes, cucumbers, bitter gourd, squash, beans, etc	2.44	ME	2.01	ME
4.Introduce different materials and tools used in vertical gardening such as a trowel, pruning shears, and gardening gloves	2.61	GE	1.81	ME
5.Conduct hands-on activities where students can construct a simple vertical garden	2.46	ME	1.71	ME
6.Teach students the characteristics of plants needed for vertical gardening such as shallow roots and maturity size of plants	2.48	ME	1.68	ME
7.Educate students about the different considerations needed for vertical gardening such as sunlight, wind exposure, and space constraints	2.62	GE	1.86	ME
8.Discuss hydroponics, aeroponics, and aquaponics systems as a form of vertical gardening	2.34	ME	1.74	ME
9.Explain the different planting techniques used in vertical gardening such as pocket planting, tower planters, living walls, and modular planting systems	2.39	ME	1.82	ME
10.Use vertical gardening as a practical activity in teaching Agriculture	2.41	ME	1.76	ME
Composite Mean	**2.53**	**GE**	**1.90**	**ME**

***Legend**: **WM** = Weighted Mean; **SD** = Standard Deviation; **VI** =Verbal Interpretation*
***GE** = Great Extent; **ME** = Moderately Extent*

3.2 As Alternative Gardening Activities. Teachers moderately applied vertical gardening in teaching Agri-fishery arts by having students use fertilizers or organic amendments, but less frequently involved them in installing vertical structures like trellises and arbors. School heads also moderately agreed that teachers had students install vertical structures, though they placed less emphasis on activities like placing or transplanting seedlings within vertical setups. In general, vertical gardening as an alternative gardening activity was applied to a moderate extent.

Table 6: Application of Vertical Gardening as Alternative Gardening Activities

Items	Teachers		School Heads	
	WM	VI	WM	VI
1.Install vertical structures such as trellises, arbors and vertical gardens to support climbing plants or containers	2.39	ME	1.98	ME
2.Choose plants that are well-suited for vertical growth such as vining plants like bitter cord, squash, cucumber, etc.	2.43	ME	1.78	ME
3.Select containers or growing pockets for vertical gardens including hanging baskets, planters and modular systems designed for vertical planting	2.39	ME	1.69	ME
4.Place seedlings or transplants into designated growing spaces within vertical structure, ensuring proper spacing and support for each plant	2.43	ME	1.68	ME
5.Guide the growth of plants along vertical surfaces using techniques such as tying, pruning or attaching to supports, to encourage upward growth and prevent overcrowding	2.43	ME	1.75	ME
6.Provide plants with water through drip watering system, soaker hoses or watering wands, ensuring adequate moisture without water runoff	2.44	ME	1.74	ME
7.Apply fertilizers or organic amendments to promote healthy plant growth	2.54	GE	1.77	ME
8.Trimming back excess growth, deadheading flowers and removing damaged foliage regularly to maintain plant health and appearance in vertical garden	2.47	ME	1.75	ME
9.Harvest fruits, vegetables, herbs or flowers from plants growing vertically, using appropriate tools and techniques to prevent damage to the plants or structure	2.46	ME	1.77	ME
10.Perform seasonal tasks such as winterizing the vertical garden, preparing for new plantings or refreshing the structure with new plants	2.45	ME	1.78	ME
Composite Mean	**2.40**	**ME**	**1.77**	**ME**

3.3 Hands-on Activities. Teachers and school heads moderately agreed on applying vertical gardening in teaching Agri-fishery arts, with the most emphasis on students decorating walls with ornamental plants and the least on making pipe vertical gardens and hanging gutter gardens. Overall, vertical gardening was used as a hands-on activity to a moderate extent, with a significant difference in responses regarding its integration into the curriculum, alternative activities, and hands-on tasks.

Table 7: Application of Vertical Gardening as Hands-on Activities

Items	Teachers		School Heads	
	WM	VI	WM	VI
1.Decorate the walls using ornamental plants through vertical gardening	2.39	ME	1.98	ME
2.Make a container system for climbing plants	2.43	ME	1.78	ME
3.Make an herb wall garden inside the classroom	2.39	ME	1.69	ME
4.Plant vegetables, herbs, and edible flowers in a pocket planter	2.43	ME	1.68	ME
5.Put planters on a wall or fence or use stenciled vertical garden	2.43	ME	1.75	ME
6.Plant crops or ornamentals in a hanging basket or hanging pots	2.44	ME	1.74	ME
7.Make an upcycled vertical garden using plastic bottles or cans	2.54	GE	1.77	ME
8.Do vertical hanging gutter garden	2.47	ME	1.75	ME
9.Make pipe vertical garden	2.46	ME	1.77	ME
10.Use wall planting system using pallets	2.45	ME	1.78	ME
Composite Mean	**2.40**	**ME**	**1.77**	**ME**

4. Problems and Challenges in Teaching Agriculture and Fishery Arts

Based on unstructured interviews, school heads, and Grade 4 EPP teachers in selected public elementary schools reported challenges such as a lack of teacher background and experience in Agri-fishery arts, limited space, insufficient agricultural books, and old gardening tools. They also mentioned limited space for performance tasks and climate change and pest management issues as significant challenges in gardening practices.

5. Proposed Instructional Materials

Based on the results, the respondents revealed that public elementary schools have been using simple vertical gardening in their school gardens. Thus, the researchers proposed instructional material with the primary goal of improving the existing vertical gardens in different public elementary schools.

CONCLUSION

Based on the findings the following conclusions are drawn:

1. The respondents were in moderate agreement that there were facilities and resources, performance tasks, and gardening practices used in teaching Agri-fishery arts in public elementary schools.
2. There was no significant difference between the responses of the two groups of respondents in terms of facilities, resources, and gardening practices. Meanwhile, there was a significant difference in performance tasks.
3. The application of vertical gardening in teaching Agri-fishery arts into the curriculum content was to a great extent, while as an alternative gardening activity and hands-on activities, it was to a moderate extent.
4. The problems and challenges in teaching Agri- fishery arts included the background and experience of the teachers, limited agricultural space, insufficient and old agricultural books and gardening tools, climate change, and pest management.
5. The application of vertical gardening in teaching Agri-fishery arts was proposed in public elementary schools through instructional materials.

RECOMMENDATIONS

Based on the conclusions drawn from the collected data, the researchers recommended the following:

The proposed instructional materials may be recommended for evaluation by the Department of Education personnel. A wider information dissemination campaign may be administered to increase the level of awareness and acceptance of the concerned stakeholders. A similar study may be conducted in another province using different variables.

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PRODUCT DEVELOPMENT OF FROG MEAT AND MALUNGGAY LEAVES IN MAKING BURGER PATTY

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ABSTRACT

The product development of frog meat and malunggay leaves in burger patties combines the high-protein, lean quality of frog meat with the nutrient-rich benefits of malunggay, creating a healthy and sustainable alternative to traditional patties. This innovative blend offers a unique flavor profile while promoting eco-friendly and nutritious food choices. This study aims the acceptability of burger patty made from rice field frog (Fejervarya limnocharis) meat and malunggay leaves in terms of aroma, texture, color, and taste, General Acceptability, Determine the Significant difference among treatment, Determined the Shelf life of the most acceptable treatment, Determine the standardized recipe of the most acceptable treatment for product costing, Determine the nutrient content of the most acceptable treatment, Determine the cost and return analysis. This study consists of 60 respondents selected randomly from the faculty and students of SKSU Isulan. The research methodology involves formulating different ratios of frog meat and malunggay leaves to determine the optimal combination for texture, taste, and nutritional content. Sensory evaluations are conducted to assess consumer preferences, while nutritional analysis verifies the product's benefits compared to conventional meat-based patties. Preliminary findings suggest that frog meat, combined with malunggay leaves, produces a patty that is not only nutritionally superior but also appealing in terms of flavor and texture and can be commercially sold with substantial capital.

INTRODUCTION

Bush meats are meat of any wild animals hunted for food and it is not necessarily from an endangered species. Bush meat constitute of vast array of species ranging from grass cutter, snakes, duikers, bush pig, snail, guinea fowl, hare, brush tailed porcupine, giant rat, edible frogs etc (Abulude 2014). Amphibians are a very diverse group of vertebrates; however, in general their feeding is opportunistic with food up to gape width being ingested amphibians such as frogs and toads only target moving prey and prefer elongated prey such as crickets or insect larvae that move across their field of vision. (Hutton, 2008).

Amphibians also act as biomonitors for wildlife and human health. Some farmers in Laguna reported displeasure related to population declines in numbers of amphibians. This local-level observation mirrors the declines amphibians encounter across the globe (Stuart et al. 2004, Alroy 2015). The causes of these declines are complex and probably integrated, but include exposure to pesticides, pathogens, and habitat destruction along with issues associated with climate change. In rice fields, cropping practices such as transplanting and pesticide application can affect population numbers of amphibian species.

Malunggay (*Moringa oleifera*) is a popularly known for its high nutritional value and its medicinal properties. Malunggay is not only used as a cooking ingredient but also as a herbal medicine for number of illnesses such as stomach pain, gastric ulcers from hundreds of years in different cultures.

The product development is to explore altenative, nutritious, and sustainable food sources. Specifically, this develop unique burger patties that incorporate unconventional ingredients to create a product that stands out in the market. Combine frog meat, known for its high protein content and low fat, with malunggay leaves, which are rich in vitamins, minerals, and antioxidants, to produce a healthier alternative to traditional burger patties. Introduce frog meat as a more sustainable protein option compared to

traditional livestock, which can reduce environmental impact. This assess the taste, texture, and overall appeal of the frog meat and malunggay leaf burger patties to determine their viability for market introduction. This also support local farmers and communities by using locally available ingredients, thereby promoting economic growth and sustainability. This study could lead to innovative solutions for healthier diets and sustainable food production practices.

The introduction of a new food product that combines frog meat and malunggay leaves can provide a nutrient-dense option for the community. This can help address issues of malnutrition by offering a protein-rich food with essential vitamins and minerals. The study can promote local businesses and livelihoods by creating a demand for frog farming and malunggay cultivation. This can support farmers, small-scale producers, and local entrepreneurs by providing new avenues for income. By incorporating frog meat, which has a lower environmental impact compared to conventional livestock, the community can benefit from more sustainable food production practices. Additionally, malunggay is easy to grow and requires minimal resources, making it an environmentally friendly ingredient. The development of alternative protein sources can contribute to food security in the community by diversifying available food options. This is especially beneficial in areas where access to traditional meat products may be limited or costly. The study encourages the community to explore and accept innovative food products that utilize locally available resources. This can promote food culture diversity and foster a willingness to try new and beneficial dietary practices. The combination of frog meat and malunggay leaves can lead to healthier food choices within the community. Malunggay is known for its anti-inflammatory and antioxidant properties, which can contribute to better overall health outcomes when incorporated into regular diets. Overall, this study has the potential to create positive economic, nutritional, and environmental impacts, fostering a more sustainable and health-conscious community.

The product development of frog meat and malunggay (Moringa) leaves in making burger patties is important for several reasons. First, it offers significant nutritional benefits by combining two highly nutritious ingredients: frog meat, known for its high protein content and low fat, and malunggay leaves, which are rich in vitamins, minerals, and antioxidants. This combination results in a healthier alternative to traditional burger patties. Additionally, the use of frog meat supports sustainable food production, as it has a lower environmental impact compared to conventional livestock, requiring fewer resources and producing fewer greenhouse gas emissions. This makes the product eco-friendly and aligns with global sustainability goals. The development also encourages innovation by introducing a unique food item that caters to health-conscious consumers seeking new options. Moreover, it promotes local economies by creating demand for frog farming and malunggay cultivation, providing opportunities for farmers and producers to benefit from new markets. This product can also enhance food security by offering an alternative protein source that is more accessible and affordable, particularly in regions where traditional meat may be scarce or expensive. Lastly, incorporating frog meat and malunggay, both of which are familiar in many culinary traditions, helps bridge traditional and modern food practices, ensuring cultural acceptance and encouraging healthier eating habits.

One of the main advantages is the creation of a nutritious and health-enhancing food product. Frog meat is a lean protein source that is low in fat, while malunggay leaves are rich in vitamins, minerals, and antioxidants. Together, they form a burger patty that offers a balanced and nutrient-dense alternative to traditional meat products, contributing to healthier dietary choices. This development also supports sustainability, as frog meat has a smaller environmental footprint compared to conventional livestock, using fewer resources and producing less pollution. Economically, this innovation can benefit local farmers and communities by increasing the demand for frog farming and malunggay cultivation, creating new opportunities and income streams. Additionally, the product can enhance food security by diversifying protein sources, especially in areas where conventional meat is limited or expensive. By using familiar local ingredients in a modern format, this product can also foster greater cultural acceptance and encourage communities to adopt more diverse and nutritious eating habits.

METHODOLOGY

This chapter describe the details on how the study was conducted. It presents the research design, locale of study, respondent of the study and the instrument of study.

Research Design/Treatment	
The design was done through an experimental method. This will be conducted using the variance of Completely Randomized Design (CRD) with four treatments.	
Treatment 1	1 kilo rice field frog meat (palakang bukid) +2 cup malungay leaves +1tbsp. salt + 1 tbsp. black pepper + 1 large egg + ½ cup all-purpose flour
Treatment 2	¾ kilo rice field frog meat (palakang bukid) +1 ¾ cup malungay leaves+ 1 tbsp. salt + 1 tbsp. black pepper + 1 large egg + ½ cup all-purpose flour
Treatment 3	½ kilo rice field frog meat (palakang bukid) + 1½ cup malungay leaves + 1 tbsp. salt + 1 tbsp. black pepper + 1 large egg + ½ cup all-purpose flour
Treatment 4	Control

Materials and Ingredients				
The materials and utensils used in processing frog meat (Fejervarya limnocharis) and malunggay leaves patty are the following:				
Mixing Bowl	**Baking Pan**	**Knife**	**Chopping Board**	**Measuring Cups**
Spoons	**Ladle**	**Blender**	**Oven**	

All materials and utensils use for the study are wash and dried carefully. They were place on the table ready for use in making frog meat (*Fejervarya limnocharis*) and malungay leaves patty.

The ingredients of frog meat (Fejervarya limnocharis) and malungay leaves patty are the following:		
Field Frog Meat (Palakang Bukid)	**Salt**	**Black Pepper**
Egg	**All-Purpose Flour**	**Malungay Leaves**

PREPARATION AND PROCESSING	
PREPARATION OF FROG MEAT	Prepare the frog meat and washed one by one, after washed the frog boil it to 15-20 minutes, debone the frog or separate the meat into the bone of frog.
PREPARATION OF MALUNGAY LEAVES	Separate the leaves from stalks and stem. Wash the malungay leaves, removing the dead and yellow leaves. Shake the excess water off the leaves.
PREPARATION OF FROG MEAT AND MALUNGAY LEAVES	In making the frog meat and malungay leaves patty, are the following: Prepare ground frog meat, malungay leaves, salt, black pepper, egg, all-purpose flour. In a mixing bowl combine the ground frog meat and malungay leaves, salt, black pepper, egg, all-purpose flour. Mix all together. Form into 3-inch-wide, ½ inch-thick patty and keep refrigerated for 20 minutes to 1 hour. Pan fry of grill patty for about 5 to seven minutes or until cook through.

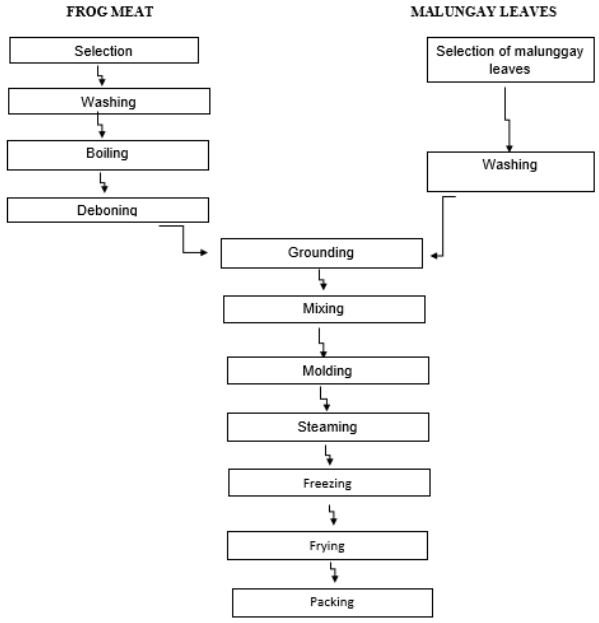

Figure1. Flow Chart Preparation of Frog Meat and Malunggay Leaves Patty

Respondent of the Study

The 60 respondents of the was randomly selected from Faculty and students of Sultan Kudarat State University who then compose the panel of evaluators or respondent.

A sample of each treatment, will be lace and serve in plates for sensory evaluations in terms of taste, aroma, color and texture

Research Locale

The experimental study was conducted at Cooking Laboratory of Sultan Kudarat State University Isulan Campus

Data Gathering Procedure

The researcher sought permission from the Dean of Sultan Kudarat State University and the Department Chairman to conduct the study. Upon approval, a date will be set to conduct a study.

The product of the researcher was presented for tasting. The researcher will distribute the evaluation sheet to the respondents before the actual tasting of the product and collected same after for tabulation. The data collected then tabulated and analyzed. During the evaluation of frog meat (Fejervarya limnocharis) and malunggay leaves patty, the researcher will instruct the respondents to taste every treatment.

Data Gathering Instrument

This study was an evaluation form questionnaire designed explicitly for the respondents. This consists of the information about the respondents, which was optional and sensory evaluation using the different parameters according to taste, aroma, color and texture.

Statistical Analysis

This study's data was statistically examined. Descriptive statistics were used to examine the sensory characteristics, particular sensory attributes, and packaging tests. While ANOVA was utilized to determine the significant difference in treatment in terms of sensory characteristics and particular sensory attributes

Table 1. Rating Scale Used in the Conduct of the Sensory Evaluation for Aroma

Rating	Mean Interval	Description	Interpretation
5	4.20-5.00	Very much pleasant	Very much acceptable
4	3.40-4.19	Slightly pleasant	Slightly acceptable
3	2:60-3.39	Just about right	Acceptable
2	1.80-2.59	Slightly not pleasant	Slightly not acceptable
1	1.00-1.79	Very much not pleasant	Very much not acceptable

Table 2. Rating Scale Used in the Conduct of the Sensory Evaluation for Color

Rating	Mean Interval	Description	Interpretation
5	4.20-5.00	Very much appealing	Very much acceptable
4	3.40-4.19	Slightly appealing	Slightly acceptable
3	2:60-3.39	Just about right	Acceptable
2	1.80-2.59	Slightly not appealing	Slightly not acceptable
1	1.00-1.79	Very much not appealing	Very much not appealing

Table 3. Rating Scale Used in the Conduct of the Sensory Evaluation for Taste

Rating	Mean Interval	Description	Interpretation
5	4.20-5.00	Very much palatable	Very much Acceptable
4	3.40-4.19	Slightly palatable	Slightly acceptable
3	2:60-3.39	Just about right	Acceptable
2	1.80-2.59	Slightly not palatable	Slightly not acceptable
1	1.00-1.79	Very much not palatable	Very much not palatable

Table 4. Rating Scale Used in the Conduct of the Sensory Evaluation for Texture

Rating	Mean Interval	Description	Interpretation
5	4.20-5.00	Very much smooth	Very much acceptable
4	3.40-4.19	Slightly smooth	Slightly acceptable
3	2:60-3.39	Just about right	Acceptable
2	1.80-2.59	Slightly not smooth	Slightly not Acceptable
1	1.00-1.79	Very much not smooth	Very much not acceptable

FINDINGS

Based on the results, the major findings of the study are summarized as follows:
Sensory qualities of Frog Meat and Malunggay Leaves in making Burger Patty:

- **Product Development of Frog Meat "fejervaryalimnocharis" and Malungay Leaves "moringaolifera" in making burger patty in terms of Aroma.**

Treatment	Mean	Description	Interpretation
T1	3.58	Slightly Pleasant	Slightly Acceptable
T2	3.45	Slightly Pleasant	Slightly Acceptable
T3	3.85	Slightly Pleasant	Slightly Acceptable
T4	3.90	Just about right	Acceptable
Section Mean	**3.70**	**Slightly Pleasant**	**Slightly Acceptable**

In terms of aroma, Treatment 4 got the highest mean of 3.9 described as "Just about right" and interpreted as "Acceptable".

- **Product Development of Frog Meat "fejervaryalimnocharis" and Malungay Leaves " moringaolifera" in making burger patty in terms of Color.**

Treatment	Mean	Description	Interpretation
T1	3.36	Slightly Appealing	Slightly Acceptable
T2	3.46	Slightly Appealing	Slightly Acceptable
T3	3.73	Slightly Appealing	Slightly Acceptable
T4	4.21	Very much Appealing	Very much Acceptable
Section Mean	**3.69**	**Slightly Appealing**	**Slightly Acceptable**

In terms of color, Treatment 4 got the highest mean of 4.21 described as "Very much appealing" and interpreted as "very much acceptable".

- **Product Development of Frog Meat "fejervaryalimnocharis" and Malungay Leaves " moringa olifera" in making burger patty in terms of Taste.**

Treatment	Mean	Description	Interpretation
T1	3.71	Slightly Palatable	Slightly Acceptable
T2	3.60	Slightly Palatable	Slightly Acceptable
T3	3.93	Slightly Palatable	Slightly Acceptable
T4	3.91	Slightly Palatable	Slightly Acceptable
Section Mean	**3.78**	**Slightly Palatable**	**Slightly Acceptable**

In terms of taste, Treatment 3 got the highest mean of 3.93 described as "Slightly Palatable" and interpreted as "Slightly Acceptable".

- **Product Development of Frog Meat " fejervaryalimnocharis" and Malungay Leaves " moringa olifera" in making burger patty in terms of Texture.**

Treatment	Mean	Description	Interpretation
T1	3.50	Slightly Smooth	Slightly Acceptable
T2	3.50	Slightly Smooth	Slightly Acceptable
T3	3.75	Slightly Smooth	Slightly Acceptable
T4	4.01	Slightly Smooth	Slightly Acceptable
Section Mean	**3.70**	**Slightly Smooth**	**Slightly Acceptable**

In terms of texture, Treatment 4 got the highest mean of 4.01 described as "Slightly smooth" and interpreted as "Slightly Acceptable".

- The ANOVA revealed that in terms of all sensory qualities, frog meat and malunggay leaves in making burger patty had no significant difference among treatments regarding taste, aroma, color and texture. Treatment 3 is determined the highly acceptable treatment.
- Results of the standardized recipe for product costing revealed that the treatment 3 is the best treatment with the product cost of 123.43.
- The shelf life of the best treatment (treatment 4) lasted 2weeks at room temperature.
- Based on the nutrient analysis show the Crude fat is the highest percentage composition of the mixture with 36.53 follow by the Moisture with rate of 32.97. Analysis nutrient show that Frog Meat and Malungay Leaves patty burger has the highest content of can substitute as snacks.
- After the evaluation, the researcher concluded that treatment 4 is the acceptable and suitable mixture for making frog meat and malunggay leaves in making a burger patty, especially in taste, aroma, color and texture. It is proven that frog meat and malunggay leaves can be an alternative ingredient in making burger patty and can be commercially sold with substantial capital.

RECOMMENDATION

Based on the results of the study, the researcher recommends the following:

- Another snack or appetizer product must be conducted using frog meat and malunggay leaves as ingredients.
- Further studies should be conducted to produce other variations of burger patty using other meat and vegetables abundant in the locality.

DISCUSSION

Theme Discussion IRRs

This study presents a unique opportunity to create innovative food sources that could provide significant nutritional benefits. Frog meat is a rich source of protein, low in fat, and could serve as an alternative protein source in regions where meat is scarce or expensive. Malungay leaves, on the other hand, are known for their high vitamin, mineral, and antioxidant content, making them a valuable addition to diets, especially for addressing malnutrition. Combining these two ingredients could result in a nutritionally dense product that supports both health and food security, particularly in areas where traditional food sources are lacking.

However, the development of such products must be approached with caution, particularly regarding sustainability and ethical considerations. The sourcing of frog meat requires careful attention to ensure it is harvested in a manner that does not threaten local wildlife populations or ecosystems. Overharvesting could lead to ecological imbalance, so sustainable practices such as controlled farming or responsible wild harvesting are necessary. Similarly, while malungay is generally seen as a sustainable crop, its cultivation should be done in ways that prevent environmental degradation, such as soil depletion or water overuse. Implementing eco-friendly agricultural practices and responsible harvesting methods is crucial for minimizing environmental impacts.

From a market perspective, consumer acceptance and awareness are key factors that will determine the success of these products. In many cultures, the idea of consuming frog meat may face resistance due to taste preferences or cultural taboos, so education and transparent marketing will play a significant role in overcoming these barriers. Additionally, making the product affordable and accessible, particularly in low-income areas, can help ensure its widespread adoption. With the right balance of innovation, sustainability, and cultural sensitivity, the development of frog meat and malungay-based products could offer valuable solutions to global challenges related to nutrition, food security, and environmental sustainability.

Implication of the result

This could provide a significant nutritional boost, offering an alternative protein source through frog meat and a rich supply of vitamins, minerals, and antioxidants from malungay leaves. This combination

could be especially beneficial in regions facing food insecurity and malnutrition, improving overall public health by diversifying diets with nutrient-dense options.

Economically, such products could stimulate local economies by creating jobs in frog farming, sustainable harvesting, and malungay cultivation. It could also promote small-scale farming and agro-based industries, benefiting local communities through income generation and enhanced food systems. However, balancing sustainable practices with demand will be essential to ensure the long-term viability of these industries.

On the environmental front, if developed responsibly, the production of frog meat and malungay leaves could promote biodiversity conservation and sustainable agriculture. Careful management of frog populations and eco-friendly farming methods for malungay could minimize negative ecological impacts. However, challenges such as ensuring sustainable sourcing and addressing potential cultural resistance to frog consumption will need to be carefully managed to ensure the product's success and acceptance.

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BLENDED LEARNING MODALITY: EXTENT OF IMPLEMENTATION AND INDUSTRIAL TECHNOLOGY STUDENTS LEVEL OF SATISFACTION

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ABSTRACT

The situation the world had faced in the previous years due to the pandemic transformed the education system globally and a modality called Blended Learning was utilized. However, the lack of studies concerning the efficacy of this modality that has been completely quantitatively evaluated in the field of industrial technology education drives to conduct a quantitative study with the intent to determine the extent of implementation (policies and guidelines, delivery of synchronous and asynchronous learning, and readiness of the school environment) and the student's level of satisfaction (teaching methods and accessibility of instructional materials). This study employed a descriptive-correlational design. Survey questionnaires were administered to a total of thirty (30) third year and fourth-year industrial technology students of Sultan Kudarat State University-Isulan campus. The quantitative results were treated and analyzed using descriptive and inferential statistics; frequency, percentage, mean, and Pearson Product -Moment Correlation. The findings of the study revealed that the blended learning modality was highly implemented in the university and the students were highly satisfied with the learning modality. Hence, this put forward a significant relationship between the extent of implementation and the level of satisfaction but, the relationship was weak. It is concluded that the blended learning modality's implementation has a significant influence on the students' satisfaction which implies that good implementation of the learning modality tends to attain a higher level of students' satisfaction. The result of this study is useful for school administrators, coordinators, teachers, and students, in strengthening the implementation of the modality to continue providing learners with quality education amidst certain circumstances.

Keywords: *Blended Learning Modality, Extent of Implementation, Level of Satisfaction, Industrial Technology, Sultan Kudarat State University, Pandemic*

INTRODUCTION

It was the year 2019 when the dreadful Corona Virus-19 (COVID-19) epidemic struck the world with the World Health Organization (WHO) defined it as a pandemic on March 11, 2020. It has brought undeniable adverse impacts to all sectors around the globe, including the education sector. According to the United Nations (UN) report as cited in the study of Zheng et al. (2021), by the time of mid-April 2020, 94% of learners in more than 200 countries around the world had been affected and 1.5 billion students from pre-school to higher education had their education disrupted by the global pandemic. UNESCO (2021) then announced the temporary closure of educational institutions to curb the spread of the virus. With the situation our country had faced in the previous years due to the pandemic, the education system has been altered and a new phase called "Blended Learning Modality" was utilized (Kalaichelvi & Sankar, 2022).

Blended Learning or the integration of face-to-face and online instruction is widely adopted across higher education (Graham, 2013, as cited in Dziuban et al., 2018). It combines the best characteristics of classroom learning (face-to-face) and the best features of online learning to increase independent learning by students and reduce the amount of face-to-face time (Husama, 2014, as cited in Perianto & Syahdan, 2021).

In the Philippine context, the Commission on Higher Education (CHED) advised the Higher Education Institutions (HEIs) to start adopting flexible learning modalities (Abisado et al., 2020). They have promulgated guidelines to be implemented by private and public Higher Education Institutions (HEIs) beginning in the school year 2020-2021 and thereafter in response to the need to continue education while considering the safety of Filipino learners and teaching personnel against being infected with the virus. As blended learning has grown rapidly to be commonly used in education (Vallée et al. 2020), for higher education institutions, the transition from face-to-face to online learning as a result of the COVID -19 pandemic has been a difficult task (Santiago et al. 2021).

In light of the abovementioned scenarios brought about by the global pandemic on the past years, Sultan Kudarat State University strived to provide hands-on learning experiences to address the learner's needs amid the pandemic by implementing a blended mode of learning by the CHED memorandum order (CMO) no. 04 series of 2020. A limited face-to-face in all courses from first year to fourth year with laboratory, major subjects, and mathematics/statistics was observed following the university health protocol last year. Meanwhile, an online/virtual class was utilized for general education courses.

There are several studies regarding the implementation of blended learning modality but, little is known and evaluated when it comes to its efficacy, particularly in courses where technical knowledge and skills are much needed like in industrial technology education that requires real-life application of skills and knowledge using specific tools, equipment, and machinery. The researcher, as an industrial technology student herself, had experienced significant challenges in hands-on practical learning using available tools which was quite challenging considering that it was a new learning approach. Moreover, the lack of studies regarding the efficacy of blended learning modality that has been completely quantitatively evaluated in the field of industrial technology education drives the researcher to conduct this study. Furthermore, the researcher wanted to determine the efficacy of blended learning in terms of the extent of its implementation and the student's level of satisfaction.

STATEMENT OF THE PROBLEM

This study generally aims to determine the extent of implementation and level of satisfaction of Industrial Technology students on Blended Learning Modality. Specifically, this study aimed to answer the following questions:

1. What is the profile of the students in terms of; age, gender, program, and concentration?
2. What is the extent of implementation of Blended Learning Modality as perceived by the Industrial Technology students in terms of; policies and guidelines, delivery of synchronous and asynchronous learning, and readiness of the school environment?
3. What is the level of satisfaction of Industrial Technology students on blended learning Modality in terms of; accessibility of Instructional Materials and teaching methods?
4. Is there a significant relationship between the extent of implementation and the level of satisfaction with blended learning modality as perceived by Industrial Technology students?

REVIEW OF RELATED LITERATURE

The research has already been done on the extent of implementation and students' satisfaction with blended learning modality, to gain a comprehensive understanding concerning the objectives, nature, structure, presentation, and efficacy. To intensify the knowledge and clarify the perception of the problem, a number of related literatures were read to gather insights which were used by the researcher in conceptualizing this study. Those which have been found relevant are hereby presented.

According to Watson (2008), blended learning is a major segment of a continuum between fully online and traditional face-to-face settings. They also described the blended learning continuum as comprised of the following categories; first, fully online curriculum with all learning done online and at a distance and no face-to-face component, second, fully online curriculum with options for face-to-face instruction, but not required, third, mostly or fully online curriculum with select days required in classroom or computer lab, fourth, mostly or fully online curriculum in computer lab or classroom where stu-

dents meet every day, fifth, classroom instruction with significant, required online components that extend learning beyond the classroom and beyond the school day, sixth, classroom instruction integrating online resources, but limited or no requirements for students to be online, and lastly, seventh, traditional face-to-face setting with few or no online resources or communication.

Also, Graham (2006) defines blended learning as follows: "Blended learning systems combine face-to-face instruction with computer-mediated instruction". On the other hand, Garrison and Kanuka (2004) defined blended learning as "the thoughtful integration of classroom face-to-face learning experiences with online learning experiences". It is concluded that there is general agreement that the key ingredients of blended learning are face-to-face and online instruction or learning. Bosch & Laubscher (2019) states that, the curriculum design of blended learning include face-to-face communication and discussion between teachers and students in the classroom in a way that guides learning. Outside of the classroom, students can access more curriculum resources and complete homework through the Internet platform. Similarly, teachers can also provide more curriculum resources and check students' homework through the platform.The use of the term blended learning is relatively new. Before the term became widely used, the term hybrid learning was used quite often. These days the terms blended learning and hybrid learning are used interchangeably (Graham 2009; Watson 2008). Similarly to the reviewed blended learning definitions, a hybrid learning environment has been described as combining face-to-face education with access to online learning tools (Hall and Davison 2007). In fact, Olapiriyakul and Scher (2006) state the following: "These two terms (hybrid learning and blended learning) are used alternatively, but refer to the same concept." (p. 288). The term hybrid learning might have been more widely adopted in practice than in research, as there are quite few highly cited papers on hybrid learning, as compared with blended learning research. From the study conducted by (Giannousi et al., 2009), it was found out that students' satisfaction had been acknowledged as an important factor in order to estimate the effectiveness of a learning modality, especially a blended learning modality. Although students' satisfaction hadn't necessarily been associated with achievement, satisfied students are motivating and are more likely to accomplish their cognitive goals. Data analysis revealed that perceived e-learner satisfaction was higher than the average indicating students' high satisfaction with the overall learning experience. Students seemed satisfied from the way the course's context was delivered to them.In the study of Joaquin et al. as cited in the study of Santiago et al. (2020), synchronous and asynchronous are two types of online learning that made its popularity during the online learning utilization. Online learning in terms of Synchronous, real-time lectures and time-based outcome assessments or asynchronous, delayed-time activities like pre-recorded video lectures and time-independent assessments has been adopted by the universities and higher education institutions during the pandemic.

Hrastinski (2019) stated as well that the synchronous conceptualization of blended learning emphasizes teaching and learning that occur in real-time and include both campus and online learners. He defined Blended synchronous learning has been defined as follows: "Learning and teaching where remote students participate in face-to-face classes by means of rich-media synchronous technologies such as video conferencing, web conferencing, or virtual worlds". It is characterized by using different technologies to support synchronous class discussion, problem solving and collaboration, and student interaction. This conceptualization includes varying degrees of technological complexity, ranging from inviting online students to participate in scheduled campus classes via Skype on iPads and laptops to collaborative learning across physical and virtual worlds.

METHODOLOGY

Research Design

This study employed a quantitative method specifically, descriptive-correlational design. Quaranta (2017) states that descriptive-correlational is a study in which researchers are primarily interested in describing relationships among variables without seeking to establish a causal connection. This is the appropriate research design for this study because the researcher wanted to find out the relationship between the extent of implementation and the level of satisfaction with the blended learning modality as perceived by the Industrial Technology students. The study was basically quantitative in design using a survey tool to gather of data. The main instrument utilized was the research survey questionnaire which

was designed for the students. The quantitative result was treated and analyzed using descriptive and inferential statistics such as frequency, percentage, mean, and Pearson Product-Moment Correlation.

Locale of the study

This study was conducted at the lone State University in the province of Sultan Kudarat, Sultan Kudarat State University, particularly in the college of Industrial Technology situated in one of its campuses- Isulan campus. The College of Industrial Technology offers two programs: Bachelor of Science in Industrial Technology (BSIT) and Bachelor of Technical-Vocational Teacher Education (BTVTE). There are six concentrations offered under the BSIT and BTVTEd programs namely the following: BSIT/BTVTE-Food Service Management (FSM), BSIT/BTVTE-Electrical Technology (ET), BSIT/ BTVTE-Electronics (ELX), BSIT/BTVTE-Drafting Technology (DT), and BSIT/BTVTE-Automotive Technology (AT), and BSIT/BTVTE-Civil Technology (CT). The College of Industrial Technology got the highest accreditation level (Level IV) among all the colleges of the university given by the higher education accrediting body, the Accrediting Agency of Chartered Colleges and Universities in the Philippines (AACCUP).

Respondents

The respondents of this study were the selected fifteen (15) third year and fifteen (15) fourth-year Industrial Technology students enrolled in the academic year 2022-2023 at Sultan Kudarat State University-Isulan campus. They were identified as the best source of information for this study since they are students who need hands-on learning experiences which have been limited during the implementation of the blended learning in the university. Their responses contributed to the reliability and the focus of the study.

Sampling Technique

The researcher used the convenience sampling technique in selecting the respondents of the study. Convenience sampling is a technique where the researcher selects a sufficient number of people as a sample from among existing individuals and situations (Sedwick 2013). Considering the few numbers of third years and fourth-years industrial technology students coming back to school during the conduct of this study since they were on their pre-service teaching and On-the-Job training already outside the university, the researcher used this technique to distribute the survey questionnaires physically to the respondents because of their accessibility and availability and to collect the data needed in a short period.

Research Instrument

The study was quantitative in design using survey questionnaires to gather data. Part I contained the profile of the respondents as to their age, gender, and program. Part II consisted of 5 – items questions in every variable of the study regarding the extent of implementation of blended learning. Part III determined the student's level of satisfaction with the blended learning modality that contained 5-item questions per variable of the study. Moreover, the research instrument was reproduced and distributed physically to the respondents.

Data Gathering Procedure

Upon approval of the letter to conduct the study, the researcher then formulated the survey questionnaires and proceeded to its validation. After this, the researcher distributed the validated research survey questionnaires to the respondents of the study. The retrieval of the questionnaires was done after giving the respondents ample time to answer. The data gathered was then tabulated, analyzed, and interpreted for the completion of the study.

Ethical Considerations

Ethical guidelines for this study were put into place for the research period. The researcher informed the student respondents beforehand about the purpose of the study before they agreed or decline to answer the survey. The anonymity, confidentiality, and well-being of the respondents were protected and the research data remained confidential throughout the study. The researcher ensured that no one was harmed during the conduct of the study to an absolute minimum. Their responses were kept confidential

based on the Data Privacy Act no. 10173 series of 2012. The data gathered was solely intended for study purposes only.

Data Analysis and Interpretation

The items in the survey questionnaires contains five-point rating scale which was adapted from Likert Scale wherein 1 is the lowest and 5 is the highest. The complete description is presented in the succeeding table below.

Table 1. Interpretation of Weighted Mean for Extent of Implementation

Scale of Mean	*Range*	*Interpretation*	*Qualitative Description*
5	4.21-5.00	Strongly Agree	The learning modality was greatly implemented
4	3.61-4.20	Agree	The learning modality was highly implemented
3	2.61-3.60	Neither Agree nor Disagree	The learning modality was moderately implemented
2	1.81-2.60	Disagree	The learning modality was slightly implemented
1	1.00-1.80	Strongly Disagree	The learning modality was not implemented

Table 1 shows the five-point rating scale adopted from the Likert scale to interpret the weighted mean for the extent of implementation of the blended learning modality. The weighted mean was calculated using the Likert scale that ranges from 1 as the lowest, interpreted as strongly disagree (1.00-1.80), to 5 as the highest, interpreted as strongly agree (4.21-5.00), respectively. Furthermore, the qualitative description of each mean varies from "the learning modality was not implemented" as the lowest, to "the learning modality was greatly implemented" as the highest.A Likert scale is a rating scale used to measure opinions, attitudes, or behavior. Likert scales are great for capturing the level of agreement, satisfaction, quality, importance and etc. They are most useful when a researcher tends to measure characteristics that have no concrete objective measurements like attitudes, feelings, and opinions (Bhandari & Nikolopoulou, 2020).

FINDINGS

The results of the data gathered during the conduct of the study. This reveals the extent of implementation and industrial technology students' level of satisfaction on the Blended Learning Modality. It also presents the significant relationship between the extent of implementation and the level of satisfaction of students with the Blended Learning Modality. The succeeding table below presents the profile of the respondents as to their age, gender, program, and concentrations.

Table 2. The Profile of the Respondents as to Age:

Age	**No.**	**Total**	**Percentage**
19-22	17	17	56.66%
22-25	13	13	43.33%
Overall Total	**30**	**30**	**100%**

Table 2 presents the profile of the respondents as to their age. The data gathered shows seventeen (56.66%) out of thirty (30) respondents' age ranges from 19 years old to 22 years old. Moreover, thirteen of the respondents ages 23 years old to 25 years old or 43.33% of the total number of respondents. The result implies that majority of the respondents who answered the survey were ages nineteen (19) to twenty-two (22) years old or 56.66% of the total number of respondents.

Table 3: The Profile of the Respondents as to Gender:

No.	**3rd year students**	**4th year students**	**Total**	**Percentage**
Male	9	7	16	53.33%
Female	6	8	14	46.66%
Total	**15**	15	**30**	**100%**

Table 3 shows the profile of the respondents as to their gender. The data gathered shows that out of thirty (30) respondents, sixteen (53.33%) were men while fourteen (46.66%) others were women.

This implies that the majority of the study's respondents were male. The findings also conform to the study of Sira et al. (2022) who stated that the Industrial Technology course is male-dominated since

most of them are interested in using tools, equipment, and types of machinery compared to women.

Table 4: the Profile of the Respondents as to their Program and concentrations

Concentrations/major	BTVTE	BSIT	Total	Percentage
Automotive Technology (AT)	2	4	6	20%
Electronics (ELX)	3	2	5	16.66%
Electrical Technology (ET)	2	2	4	13.33%
Civil Technology (CT)	0	0	0	
Drafting Technology (DT)	1	1	2	6.66%
Food Service Management (FSM)	9	4	13	43.33%
Total	**17**	**13**	**30**	**100%**

Table 4 shows the profile of the respondents as to their programs and majors. The data revealed that out of thirty (30) respondents, seventeen (17) were BTVTE students while thirteen (13) others were BSIT. Moreover, six (20%) of the respondents were Automotive Technology majors, 5 (16.66%) were majoring in electronics, and 4 (13.33%) were majoring in electrical technology. Furthermore, 2 (6.66%) of the respondents were majored in drafting technology and 13 (43.33%) others were food service management majors. The data denotes that the majority of the respondents were Food Service Management (FSM) majors with 43.33% total number of respondents followed by 16.66 % of Electronics Technology (ET) major students. In the enrollment summary released by the campus registrar for the academic year 2022-2023 second semester, the majority of the third year and fourth-year enrollees were Food Service Management (FSM) majors from two programs with 136 total numbers of enrolled students and also followed by 65 third year and fourth-year majors in Electrical technology (ET) students.

The succeeding table below presents and interprets the extent of implementation on the blended learning modality.

Table 5: Policies and Guidelines

Indicators	Mean	Interpretation	Qualitative Description
The university only allows vaccinated students who are currently in their third year and fourth year under board courses and those students who have laboratory and physical education classes for their return demonstration.	4.20	Agree	The learning modality was highly implemented
All the general education (GE) subjects are handled on an online modality.	3.37	Neither Agree nor Disagree	The learning modality was moderately implemented
Only fully vaccinated students (graduate and undergraduates) located in areas under alert levels 1, 2 and 3 are allowed to join limited face-to-face classes.	3.90	Agree	The learning modality was highly implemented
The university established a cyclical student shifting system: a two-week cyclical students shifting system.	4.23	Strongly agree	The learning modality was greatly implemented
In line with the chosen cyclical student shifting, each campus adopt measures to ensure that students only be in the campus during their class schedules.	4.23	Strongly agree	The learning modality was greatly implemented
Grand Mean	**3.98**	**Agree**	**The learning modality was highly implemented**

Table 5 reveals the extent of implementation of blended learning modality as to the policies and guidelines. Based on the result, statement, all the general education (GE) subjects are handled on an online modality obtained the lowest weighted mean average of 3.37 and interpreted as neither agree nor disagree with a qualitative description of the learning modality was moderately implemented. Overall, the grand mean for the extent of implementation as to the policies and guideline is 3.98 and interpreted as agree. The result implies that the blended learning modality was highly implemented in terms of the policies and guidelines. It further suggests that the College of Industrial Technology has followed the policies and guidelines of the university during the implementation of blended learning modality. Pursuant to CMO No.4 s.2020, the Sultan Kudarat State University had implemented blended learning modality during the first semester of 2022-2023. A limited face-to-face in all courses from 1st year to 4th year with laboratory, major subjects, and mathematics/statistics was observed following the university health protocol and for general education courses, an online/virtual class was utilized.

Table 6. Delivery of Synchronous and Asynchronous Learning

Indicators	Mean	Interpretation	Qualitative Description
Students attended their class based on their class schedules through online platform.	3.87	Agree	Blended learning modality was highly implemented
Students attended their class with same group of classmates in one course through online platform.	3.67	Agree	Blended learning modality was highly implemented
Students attended their class virtually according to their session each week through online platform.	3.87	Agree	Blended learning modality was highly implemented
Students attended their class with the assigned instructors for the course through online platform.	3.87	Agree	Blended learning modality was highly implemented
Students attended their class using different platforms such as Google meet, zoom app, Microsoft teams, and Fb live.	4.37	Strongly agree	Blended learning modality was greatly implemented
Grand Mean	**3.97**	**Agree**	**The learning modality was highly implemented**

Table 6 reveals the extent of implementation of blended learning modality as to the delivery of synchronous and asynchronous learning. Based on the result, the statement, students who attended their class using different platforms such as Google Meet, zoom app, Microsoft Teams, and Fb live obtained the highest weighted mean average of 4.37 which indicates that the blended learning modality was greatly implemented. On the other hand, the rest of the indicators have approximately equal mean averages ranging from 3.61-4.20 respectively which are all interpreted as agree and has a qualitative description of the blended learning modality was highly implemented. Overall, the grand mean for the delivery of synchronous and asynchronous learning is 3.97 and interpreted as agree.

The result implies that the majority of the respondents agreed that the College of Industrial Technology utilized synchronous and asynchronous learning during the implementation of blended learning modality and further revealed that it was highly implemented. According to the findings of the study carried out by Fernandez et al. (2022) regarding the students' perspectives on synchronous and asynchronous learning, it was revealed that the combination of synchronous and asynchronous learning during the COVID-19 pandemic has led to a balanced education. The findings further imply that asynchronous learning can be demanding and places responsibility for students because of increased screen time meanwhile, asynchronous learning allows the students to self-explore and research topics assigned to them.

Table 7. Readiness of the School Environment

Indicators	Mean	Interpretation	Qualitative Description
The school campus has strong internet connection	2.87	Neither Agree nor disagree	Blended learning modality was moderately implemented
The school campus has sufficient E-learning resources	3.30	Neither Agree nor disagree	Blended learning modality was moderately implemented
The school campus has ready and equipped classrooms for the synchronous and asynchronous classes.	3.53	Agree	Blended learning modality was highly implemented
The school campus has followed the health and safety protocol implemented by the IATF for synchronous and asynchronous classes.	4.10	Agree	Blended learning modality was highly implemented
The school campus has visible signage during the implementation of blended learning modality.	4.13	Agree	Blended learning modality was highly implemented
Grand Mean	**3.59**	**Agree**	**Blended learning modality was highly implemented**

Table 7 reveals the extent of implementation of Blended Learning as to the readiness of the school environment. Based on the result, statements, the school campus has strong internet infrastructure and the school campus has sufficient E-learning resources obtained the lowest mean averages ranging from 2.61-3.60 respectively, and interpreted as neither agree nor disagree with a qualitative description of the blended learning modality was moderately implemented. On the other hand, the rest of the statements for the readiness of the school environment have approximately equal mean averages ranging from 3.61-4.20 respectively, and are interpreted as agreeing with a qualitative description of the blended learning modality was highly implemented. Overall, the extent of implementation as to the readiness of the school environment has a grand mean of 3.59 and is interpreted as agree. The result implies that the blended learning modality was highly implemented in terms of the readiness of the school environment. Furthermore, it implies that the majority of the students agreed that the campus, particularly the industrial technology department, was ready during the implementation of the blended learning modality. The

result is further supported by the study of Absolor et al. (2022) on the preparedness of Philippine Higher Education Institutions for the implementation of flexible learning, wherein they have concluded that colleges are at their average level of preparedness for blended learning. Resources, modes of delivering instructions, policies, couriers, and electronic libraries were identified as the constraints that need to be improved. The succeeding table below presents and interprets the students' level of satisfaction with the blended learning modality.

Table 8. Accessibility of Instructional Materials

Indicators	Mean	Interpretation	Qualitative Description
The school campus has sufficient number of instructional materials.	3.27	Neither Agree nor Disagree	The students are moderately satisfied of the learning modality
The school campus has current learning instructional materials.	3.63	Agree	The students are highly satisfied of the learning modality
The school campus has implemented E-learning website for both learners and teaching personnel.	4.03	Agree	The students are highly satisfied of the learning modality
The school campus has accessible instructional materials for field of specialization.	3.73	Agree	The students are highly satisfied of the learning modality
The school campus established digital platform used during the implementation of Blended Learning Modality like the E-Leads.	4.40	Strongly Agree	The students are greatly satisfied of the learning modality
Grand Mean	**3.81**	**Agree**	**The students are highly satisfied of the learning modality**

Table 8 reveals the students' level of satisfaction on blended learning modality as to the accessibility of instructional materials. Based on the result, statement, the school campus established digital platform used during the implementation of Blended Learning Modality like the E-Leads got the highest weighted mean average of 4.40 and interpreted as strongly agree with a qualitative description of the students are greatly satisfied of the learning modality. Overall, the grand mean for the level of satisfaction in terms of the accessibility of instructional materials is 3.81 that is interpreted as agree.

The result implies that the industrial technology students were greatly satisfied of the accessibility of instructional materials during the implementation of blended learning modality. Moreover, majority of the students agreed that the college of Industrial technology has accessible instructional materials such as the E-learning websites and other learning resources during the blended learning implementation in the university.

As supported by the study of Santiago et al. (2021), the mixed online and face-to-face learning became the new landscape in education since the pandemic occurred. Educational tools used by the teaching personnel and students must be accessible, equitable, communicative, well-monitored and sustainable for it will assure the student's satisfaction and engagement in learning process.

Table 9. Teaching Methods

Indicators	Mean	Interpretation	Qualitative Description
Students and teaching personnel were stress-free.	2.50	Disagree	The students and slightly satisfied of the learning modality
Students and teaching personnel were eager to attend and conduct class.	2.57	Disagree	The students are slightly satisfied of the learning modality
Students and teaching personnel both equipped with 21st century skills.	4.20	Agree	The students are highly satisfied of the learning modality
Teaching personnel utilized the available learning materials via long-distance platform.	4.13	Agree	The students are highly satisfied of the learning modality
Teaching personnel used or utilized both authentic and traditional assessment method of evaluation.	4.07	Agree	The students are highly satisfied of the learning modality
Grand Mean	**3.49**	**Agree**	**The students are highly satisfied of the learning modality**

Table 9 reveals the level of students' satisfaction on the blended learning modality in terms of the teaching methods. Based on the result, statements, students and teaching personnel were stress-free, and students and teaching personnel were eager to attend and conduct classes obtained the lowest weighted mean averages ranging from 1.81-2.60 respectively and interpreted as disagree with a qualitative description of the students are slightly satisfied with the learning modality. On average, the level of satisfaction with the blended learning modality in terms of the teaching methods as perceived by the Industrial Technology students has a grand mean of 3.49 which is interpreted as agreement. The result implies

that the students of the College of Industrial Technology were highly satisfied with the teaching methods used during the implementation of the blended learning modality in the university. Furthermore, this implies that the majority of the students agreed that teachers had utilized different teaching methods that equipped them with 21st-century skills during the blended learning modality.In the study conducted by Ivić, Sonja (2017) on teaching strategies and students' satisfaction with the teaching process, it was revealed that the student's satisfaction with the teaching process is related to student's preferences regarding the specific teaching methods. Furthermore, the study of Awamleh (2020) indicates that students were satisfied with blended learning with a satisfaction rate of 84.3% wherein the quality of teaching gained the highest satisfaction level. The results also showed that BL rotation (students rotate between online and traditional content on a fixed schedule) significantly affects learning satisfaction.

Table 10: Correlation Analysis between Extent of Implementation and Level of satisfaction on Blended Learning Modality

Variables	N	N	Computed r	P value	Remarks
Level of Satisfaction **Extent of Implementation**	3.65 3.84	30	0.356	0.053	There is a significant relationship, but the relationship is weak

Table 10 presents the computed Pearson product-moment correlation coefficient to assess the relationship between the extent of implementation and level of satisfaction of Industrial Technology students on Blended Learning Modality. The result indicates that significant relationship was found between the two variables, $r\ (30) = .356$, $p < .053$. Overall, there was a significant relationship found between extent of implementation and level of satisfaction but, the relationship is weak. The result implies that the extent of implementation of Blended Learning Modality has a weak significant influence to the level of satisfaction of Industrial Technology students. The data further suggests that good implementation of the learning modality tends to achieve a higher level of student satisfaction.In the study of Corro (2021) on the Implementation of blended learning modality and the performance of the students in the Technical-Vocational Track, it was revealed that blended learning modality has a very strong positive relationship with the task performances of the students so as to their learning satisfaction. It was also stated that the results implied that the extent of the implementation of the blended learning modality is significantly effective in improving the performances of the students and their satisfaction with the learning modality.

CONCLUSIONS

Based on the major findings, the following conclusions are hereby formulated; the blended learning modality was highly implemented as perceived by the Industrial Technology students of Sultan Kudarat State University-Isulan Campus.

1. The students are highly satisfied with the Blended Learning modality.
2. Blended learning modality implementations have a significant influence to the student's satisfaction, which implies that good implementation of the learning modality, tends to achieve a higher level of satisfaction to the students.

RECOMMENDATIONS

In light of the findings and conclusions derived from this study, the following recommendations are presented:

1. Since the Blended Learning Modality was highly implemented in terms of the policies and guidelines as perceived by the Industrial Technology students, then, the college faculties together with the students may continue to strengthen and sustain the implementation of the learning modality particularly if sudden shift in the education system may occur.

2. As the delivery of synchronous and asynchronous learning was highly implemented as perceived by the industrial technology students, teaching personnel and students may work together for better utilization of blended learning and for attaining better learning outcomes.
3. Since the result for the extent of implementation as to the readiness of the school environment was highly implemented, the school campus may strive to build strong internet infrastructure and provide sufficient E-learning resources to encourage and support the teachers and students in the teaching and learning process.
4. Since the level of satisfaction of students as to the accessibility of instructional materials was high, then, the institution, the college heads and teachers, may continue to strive to provide the students with sufficient learning materials, especially for each field of specialization.
5. As the level of satisfaction of students on teaching methods during blended learning modality was high, teachers may continue to teach, support, guide, and enhance their teaching styles during the implementation of blended learning modality especially in delivering the teaching and learning process to encourage students to engage themselves and participate to attain higher level of satisfaction.
6. School administrators may use the result of this study to enhance and strengthen the areas that lack support and that need necessary interventions during unexpected phenomena that may result in sudden shifting of the education landscape.
7. Future researchers may use the result of this study as a reference for their future studies.
8. Further studies may be conducted in evaluating the efficacy of Blended Learning Modality using other variables, respondents, or areas that call for evaluations and in-depth studies.

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