

Utilization of Discarded Vegetable Peels in Making Kikiam as Quality Street Foods

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ABSTRACT

Kikiam is a sausage-like Chinese dish that Philippines adopted and considered as one of its popular street foods. The version of *kikiam* bought along the streets highly contains flour which diminished the authentic flavor of Chinese *kikiam*. Although the taste and smell are identical to the existing *kikiam* in the market, the healthier version is taken for granted. This study aims to develop a new variety of *kikiam* utilizing the discarded peels of potatoes, carrots, chayote, and malunggay leaves as main ingredients. Dehydration process was applied to dry the vegetable peels, and then finely milled and sifted to make powdered veggie peels mixed on the remaining ingredients. The product was subjected to a pre-cook process of steaming for 30 minutes. Air drying was applied to cool down the product before weighing and packing. Using polyethylene plastic film bag, eighty grams of Veggie Peel *Kikiam* containing five pieces per pack was vacuum sealed to secure and ensure quality and safety of the street food for consumption. The nutritional and proximate analysis of the product results to the following: such as Ash 2.07%, Moisture 48.79%, Potassium 222.33%, Vitamin C 0.054%, Crude Fat 16.74%, Crude Fiber 0.27% and Crude Protein 15.51%. With these traceable nutrients the product is a good source of energy to regulate nervous system of the body. The product was also subjected to microbial analysis resulting to a negative result of Salmonella and has a less than 3 of E. Coli count which ensured that the product is ready and safe for human consumption. For the stability test, product could last for one month only if it is in a -10°C freezing condition. For consumption the product can be fried for two minutes with a temperature of 185°C and suggested to be eaten either hot or warm. Veggie Peel *Kikiam*

was evaluated by 50 respondents composed of 30 students, ten professionals engage from different field of specializations and ten who are food experts. Qualitative scoring was used to determine the general acceptability of the product, with a total mean score of 3.56 with a descriptive evaluation of “Acceptable”. Therefore, the product can be considered as an alternative healthy food, which can be bought in the street.

Introduction

The food and beverages that is ready for consumption and sold by vendors in the street is called street foods. This product is being prepared and sold in public places using portable food booths, food cart, or food truck. Most street foods are considered as finger food since it does not need another process or preparation and culturally accepted, inexpensive and convenient rather than restaurant meals or in fast foods. Street foods are often appealing to both urban and rural population in the developing and developed countries. People seek to purchase street food because of its distinct taste. It has essential ingredients to experience ethnic cuisine and the quintessence of the real local and traditional foods. These qualities supply the demands of customers from lower to higher classes, students, people who work at night and with a busy schedule. The product is a perfect solution to food access, which saves time, and budgetary constraints.

On a survey conducted by Food and Agriculture Organization (FAO, 2001), it was revealed that approximately 2.5 million people consume food in public roads. Street foods are popular because of its convenience, accessibility and a good source of income to many poor people who would otherwise not find employment. Filipinos’ love for eating is the unifying aspect embedded in its culture. People love to eat when happy, sad, bored and

even on rare occasion of hungry. Although the restaurants are available to satisfy their cravings, street foods stalls serve variety of foods that people tend to buy.

Furthermore, the group of Isabela (2016) stated that street foods have nutritional components of an unhealthy diet. In fact, high amount of sodium, cholesterol, carbohydrates, fats and other sources of inadequate nutrients are found. It has an important source of daily calories while eating it on a regular intake. However, it becomes dangerous in one’s health once taken in extreme amount. Apparently, the health risk of eating street foods is not only determined by concentration of various additives and contaminants in the ingredients of food product, but also by the cumulative daily intake of a certain contaminant or additives throughout a consumer’s diet. (Buted, 2014)

Despite the satisfaction that the street food could give to people such as to surpass hunger there is a possibility that street foods may pose significant public health risks. It has a high risk of contamination by physical, chemical, and biological agent that may lead to a serious concern in terms of food safety. Based on the guidelines set in the Codex Alimentarius, microbiological contamination is the most important health hazard associated with street foods, together with the use of unpermitted chemical additives, transmission of parasites and environmental contamination are also considered as other possible health risks. Other factors also considered as responsible for these health problems, such as lack of basic infrastructure and services, lack of factual knowledge on sanitation and hygiene, insufficient resources for inspection and laboratory analysis. Lastly, having a poor knowledge of street vendors on basic food safety measures and inadequate public awareness of hazards supposed to be imposed by authorities to certain street vendors. It is only few to mention that public health take at risks. (Buted, 2014)

Other factor that researchers' trying to present is to maximize the use of a discarded vegetable peel to be a possible source of a new street food. Vegetable peels are always considered as food wastes in restaurant/store or even in households; most of the time it is only use for animal feeds and fertilizer. Thus, the researchers would like to lessen those wastes by utilizing then into a new and innovative product. To modify ordinary *kikiam* into healthy food snack the researcher's opted to use selected vegetable peel namely carrots, potatoes and chayote together with powdered malunggay as the main ingredients. Vegetable peels/cover is used over the fruit or pulp to minimize or at least lessen wastages and produce a healthy street food. The peel of potato, carrots, chayote and malunggay leaves was used together with other ingredients to produce a new product where the nutritional value of the foods is introduced.

Among the existing street foods available in the market, the researchers concentrated to modify *kikiam*. *Kikiam* is a widely popular street food in the country; it is very high in demand especially among students and employees. The growing street food sector in low-income consumers in a daily basis offers easy access to avail inexpensive foods, which many Filipinos still fond of eating *kikiam* because of its unique taste.

In relation to this, the researcher's perceived to develop new variety fortified *kikiam* with essential nutrients. The researchers aimed to produce an affordable street food that can be served as snack as portion of a meal.

Literature Review

Food is essential for human survival and sustenance. It is the foundation of every civilization to sustain their basic needs. It is also polished by technological innovations,

economic development, social dynamics, political conflicts, cultural identities among nations. Through this limitless area of foods, street foods play a big role. Foods usually consist of primary nutrients such as the carbohydrates, protein, minerals, and vitamins that are essential in the human body to perform daily routine and to decrease the risk of diseases (Ryzia de Cassia et al., 2014).

According to the study of Hundayan (2016), Philippine street foods are easy to prepare and eat and consequently have become the staples of street vendors. Some of the foods being sold are already prepared while others are being cooked on the spot.

Street food is often seen as dirty, but this is mainly a problem with those unlicensed vendors. While, most street foods are not particularly nutritious, these food items are convenient and affordable, and require a minimum start-up for investment. Street food business represents a solution to make a living. Despite the emergence of fast food, traditional street food persists worldwide contributing to the preservation of local traditions.

Currently, the challenge of food service industry is to introduce quick service and fast-casual restaurants. Entrepreneurs enter into the food and beverage business due to its income potentials. There are various types of food establishments such as fine dining restaurant, fast-food chain, and/or street food stalls. The Filipino food takes on an obviously evolving nature, from the streets of the Quezon City such as the street food that is more than just a convenience food source in the Philippines, and to the five-star establishments of Makati (Aquino et al., 2015).

The development of a new product by means of food processing provides transformation of the foods from the point of origin to the point of consumption. Likewise, several criteria that determine the stimuli

coming from the food attitudes are attached by the consumer value (Sonia et al., 2017).

Street Foods

Street food is a limitless variety of simple snacks up to elaborate dishes. All street-vended food produce a diverse product out of meat, fish, fruits, vegetables, grains, cereals, frozen products and all sorts of beverages. Aside from provision of ready-made instant meals at relatively inexpensive prices, street foods offer a “zero-food-miles” menu where dishes are made from locally sourced food products that anyone can avail.

Types of Street Foods

The *World Health Organization (WHO)* defined “*street-vended foods*” as foods and beverages prepared and sold by vendors in streets and other public places for immediate consumption or consumption at later time without further processing or preparation.

A ready-to-eat food or drink sold by a hawker, or vendor using a portable food booth, food cart, or food truck and meant for immediate consumption that is visible in a street or other public place, such as at a market or fair. Almost 2.5 billion people eat street food everyday and many regional sourced street foods have spread beyond their region of origin (Hilmi, 2012).

Camote Cue/ Banana Cue

Banana/Camote Cue or also known as deep fried sweet potato is one of the popular street foods in the Philippines. The banana or sweet potato is sliced then coated with caramelized brown sugar and skewered in a bamboo stick. Some offer banana wrapped with a lumpia wrapper and known that as *Turon*. These are mostly prepared late in the afternoon for merienda or snacks.

Fish Balls, Squid Balls, and Chicken Balls

Fish balls are made from finely pulverized cuttlefish meat or Pollock and formed in flat round shape. Other variations may include the squid balls and chicken balls. These are usually deep fried, and people can choose which sauces (sweet and sour, hot and spicy vinegar) satisfy their palate. Using food cart, the product easily sold and found anywhere in the streets.

Quail Eggs, Kwek-Kwek or Tokneneng

Kwek-Kwek is a boiled quail eggs dipped on batter, while *Tokneneng* are chicken or duck boiled eggs. They are deep fried until batter becomes crispy. Like fish balls, squid balls and chicken balls, they can be easily seen in the streets.

Adverse Effect of Street Foods

Based on the study of Nonanto (2016), one of the qualities of the Filipinos is to come up with something new, creative yet cost-sufficient, including food. Others may prefer for dining, Filipinos, on the other hand, race to the streets to satisfy their hunger for favorite Pinoy street foods for a few pesos. These street foods are easy to find outside and offer most exotic delicacies.

It is difficult to avoid street food when visiting a new place. People may often get addicted to street food which looks fresh and healthy but ideally they are not. Teenagers nowadays are fond of trying new dishes, getting involves into different dishes specifically ethnic and exotic cuisine with distinct flavor which more often engage themselves to the risk of food-borne illnesses that are common in place where people consume street food.

Street foods are known because of their affordability and enchanting tastes, but because of unsafe practices such as inadequate storage, reheating of food

before sale, insufficient handwashing, and inappropriate cleaning of cooking utensils, these foods can become hazardous to people's health. Eating street food can cause many problems and some of them are:

Trans-fat: These street foods are fried or cooked in oil, which is used repeatedly over a long period of time. They are cooked in oil with high saturated fat. These can lead to cardiovascular diseases, diabetes and other chronic diseases. In USA, trans-fat foods are banned. Deep fried street foods are not good for the health because of the presence of high saturated fat that can clog arteries.

Sodium Level: To improve the taste and flavor, street foods contain excess salt. Consuming high amount of sodium has many negative health effects, such as increased blood pressure and heart complications. An increase of blood pressure leads to hypertension and heart complications. Too much sodium intake can also result to fluid build-up in people suffering congestive heart failure, cirrhosis or kidney disease. This condition is hard for the kidneys to balance sodium levels.

Stomach Infections: Cross contamination is the indirect transmission of disease that leads to food borne infections. Germs and other pathogenic bacteria lead to the development of gastrointestinal infections. This type of infection may cause diarrhea or vomiting. Young children, the elderly and those with compromised immune systems may face more serious problems once an infection takes place.

Glucose Spiking: Almost all types of street foods have refined flour as one of the main ingredients. Most of the street foods have a high glycemic index, which spikes blood sugar and promotes fat storage. High glycemic index increases the risk of diabetes and heart diseases.

Selection of Vegetables

Selection of discarded vegetable peels was conducted into different public markets. It had undergone pre- treatment process and segregate good quality products. The following are the three main ingredients in making Veggie Peel *Kikiam*.

Carrots

Carrots' having a scientific name *Daucuscarota* is categorized as root vegetable. It is usually orange in color though having a variety of purple, black, red, white and yellow. The plants are native from Europe and Southwestern Asia. Nowadays, the most commonly eaten part of the plant is the taproot, although the greens are sometimes eaten as well. The domestic carrot has been selectively bred for its greatly enlarged and more palatable.

Carrots are one of the most widely used and enjoyed vegetables in the world, partly because it grow easily, and are very versatile in a number of dishes and cultural cuisines. Other benefits of consumption of carrots are reduction cholesterol, prevention of heart attacks, improvement of vision, and reduction of signs of premature aging. It also contains beta-carotene which according to past studies having beta-carotene supplementation may reduce the risk of lung cancer. A meta-analysis was conducted and published in 2008 inform that people with high intake of a variety of carotenoids had a 21 percent lower risk of lung cancer after adjusting for smoking compared with those who did not.

Potatoes

A starchy, tuberous crop from the perennial nightshade *Solanumtuberosum L.*, the word "potato" refers either to the plant itself or to the edible tuber. Potato is the world's fourth-largest food crop, followed by maize, wheat and rice and it is also one of the

world's most versatile vegetables. Potatoes are naturally gluten-free and packed with nutritional benefits needed for a healthy lifestyle. It is the ideal substitute for bread, grains, and pasta-based dishes.

Chayote

Chayote is originally native to Mesoamerica and has been introduced as a crop worldwide. The word "chayote" is a Spanish derivative of the *Nahuatl* word "*chayohtli*". Chayote is a gourd plant eaten in like the squash, cucumbers and melons. The whole plant including the fruit, stem, and leaves contains multiple nutrients and has an anti-inflammatory property that can aid in lowering high blood pressure, kidney stones, and indigestion. It also supports weight loss as it is low in calories and has high water content and fiber to make an individual fuller for a longer time without taking a lot of calories.

Malunggay Leaves

Malunggay or Moringa plant, with a scientific name *Moringa oleifera* is widely known in the country as malunggay vegetable/plant. It has become an important crop in India, Ethiopia, Philippines, Sudan, and now being grown in west, east and south Africa, tropical Asia, Latin America, the Caribbean, Florida and the Pacific Islands. Almost all parts of the malunggay tree are edible and medicinal; it has long been consumed by humans (Fahey, 2005). It has been reported that malunggay trees are used to combat malnutrition, especially among infants and nursing mothers. Since the tree has in recent times been advocated as an outstanding indigenous source of highly digestible protein, calcium, iron, vitamin C, and carotenoids that are suitable for utilization in many developing regions of the world where undernourishment is a major concern. The leaves of malunggay can be cooked, eat fresh or dried in a cool dry place and it can be stored even without

refrigeration. From the report of (Mamaril, 2009), a member of the DA-Bureau of Plant Industry Biotech Core Team, it was clear that dried malunggay leaves has 2.5 to 4 times higher values in most nutritional food content than fresh leaves.

Purposes of the Research

The general objective of the study was to develop a *kikiam* made of vegetable peel composed of potato, carrot, chayote, and malunggay leaves.

Specifically, the study aims to:

1. Develop new variety of *kikiam* out of discarded vegetable peels;
2. Evaluate the Veggie Peel Kikiam in terms of quality attributes and general acceptability through qualitative scoring.

Research Design

This includes product design, product description, product development, testing procedures and evaluation procedure of Veggie Peel Kikiam made from discarded vegetable peels.

Materials and Tools

In order to materialize and meet the specified parameters, availability of the materials and tools are provided.

Table 1*List of Material and Tools*

Knife	Tool with a cutting edge or blade, hand-held or otherwise
Chopping Board/ Cutting Board	A durable board on which to place material for cutting. Other kitchen cutting board is made of leather or plastic
Food Steamer	Used to cook or prepare various foods with steam heat by means of holding the food in a sealed vessel that limits the escape of air.
Frying Pan	A flat-bottomed pan used for frying, seaming and browning foods.
Mixing Bowls	Used to mix ingredients
Digital Weighing Scale	Devices to measure weight or calculate mass
Measuring Cup	A kitchen utensil used primarily to measure the volume of liquid or bulk solid cooking ingredients
Food processor	A kitchen appliance used to facilitate repetitive tasks in the preparation of food

Table 2*Likert Scale*

Numerical Rating	Description
5	Excellent
4	Very Good
3	Good
2	Fair
1	Poor

Research Instruments

Sensory evaluation as defined by the Sensory Evaluation Division of the Institute of Food Technologists is a scientific discipline used to evoke, measure, analyze and interpret reactions to those characteristics of foods and materials as they are perceived by the senses of sight, smell, taste, and touch.

It is a procedure that is used quite often in food science and technology because such sensory characteristics of food product as flavor (odor and taste), and texture are closely involved with consumer appreciation and acceptance.

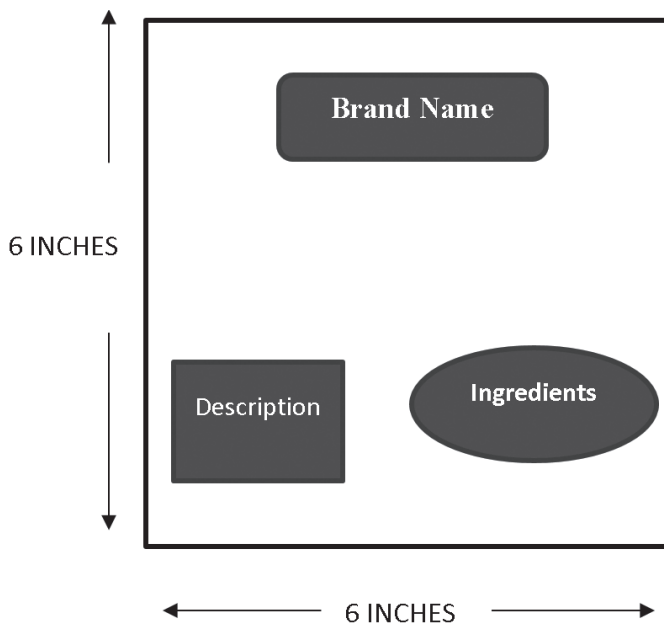
There are different types of test used to evaluate them product's acceptability in the market. Qualitative tests are used to evaluate the product since these tests require the

panelist to rate specific characteristics of the products according to established standards. Quality scoring and ranking are commonly used in qualitative tests.

In Table 2 showed the result of continuous line-scales for example having anchors "Excellent" and "Poor" that is used for data collection, the results can be summarized by calculating statistic thru likert scale. The range of mean value showing 5 is the highest having qualitative interpretation of "Excellent" and 1 as the lowest having a "Poor" qualitative interpretation.

Product Design

Veggie Peel Kikiam is made out of discarded vegetable peels as main ingredients to become quality street foods. In 80 grams serving size, the product could



provide 5 pieces per packed and subject to freezing condition to avoid contamination and prolong its shelf life. Selection of packaging materials is very important because it helps prolonging the shelf life of the product, specifically the first package that holds the product. Polyethylene plastic film bag is used as a primary package and vacuum sealed for the protection against extraneous matters. Outside the packaging are the brand, cooking direction, ingredients, nutrition facts, manufacturing date, expiration date, manufacturer/ distributor, and net content.(Matsumoto)

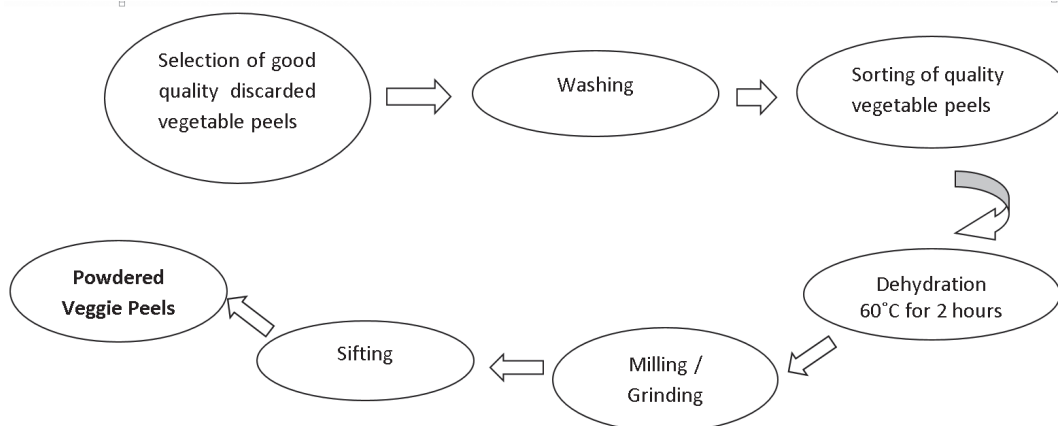
Process Description

The Veggie Peel Kikiam undergoes series of testing and dry run until the parameters meets the desired product specifications. Having a pre-treatment procedure upon selecting good quality raw materials came from discarded vegetable peels up to producing new variety of *kikiam*, the process flow is keenly observed. Dehydration is the major process use to eliminate the moisture content of selected vegetable peels then using food processor, dried vegetable peels subject

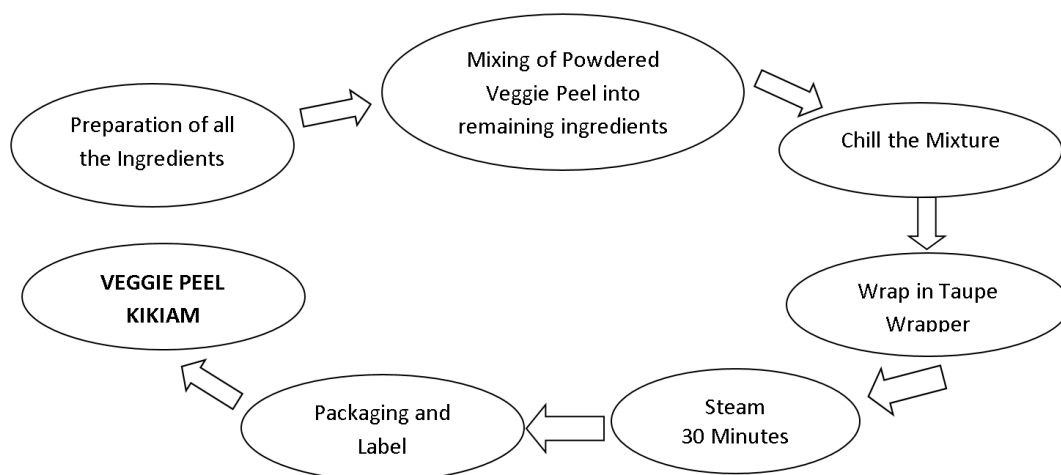


to powderization. All the ingredients mix together, thus, the mixture is chilled and steamed. The Veggie Peel Kikiam is packed using polyethylene plastic film bag and vacuum sealed. The product is stored in a -10°C freezing condition and ready for consumption.

Product Development



Flow Chart in Making Veggie Peel Powder



Flow Chart in Making Veggie Peel Kikiam

Procedure in Making Veggie Peel Powder

The flowchart showed the step by step procedure in making Powdered Veggie Peel. First, select good quality of carrots, chayote, and potatoes peels. Wash thoroughly and dry all the peels including malunggay leaves in a dehydrator for one hour with the temperature of 60° Celsius. Then, grind until it forms into finely powdered mixture. Sift by using a 100 mesh screen to make sure that it is finely pulverized. Store in a cool dry container and ready for use.

Procedure in Making Veggie Peel Kikiam

The preparation of the Veggie Peel Kikiam using discarded vegetable peels. First, measure the pulverized peel of carrots, chayote, and potatoes, and other ingredients. Then combine the dry ingredients and the liquid ingredients to form soft dough to become *kikiam*. Then chill the mixture for 30 minutes to set all the ingredients. Then wrap it in taupe wrapper, and steam for 30 minutes. Afterwards, cool down and packed the product using vacuum sealer. Then Label the product according to the design

Table 3

INGREDIENTS	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
Carrots	125 grams	125 grams	50 grams	19 grams
Potato	125 grams	125 grams	20 grams	8 grams
Chayote	125 grams	125 grams	11 grams	8 grams
Malunggay	NONE	22 grams	6 grams	6 grams
Pork Back Fat	NONE	75 grams	150 grams	150 grams
Water	25 grams	25 grams	25 grams	25 grams
Sugar, Refined	30 grams	NONE	NONE	3 grams
Salt	NONE	5 grams	5 grams	2 grams
Pepper	NONE	5 grams	5 grams	2 grams
Kinchay	NONE	5 grams	NONE	NONE
Egg	1 pc.	1 pc.	1 pc.	2pcs.
Flour	NONE	NONE	15 grams	20 grams
Goyong Powder	3 grams	3 grams	3 grams	3 grams
EVALUATION	Too much sugar is added making it a very sweet taste.	The product is good in terms of taste but need more improvement.	The kikiam is tasteless because it is inadequate in salt and pepper.	The product result is good and acceptable.

parameters then stored in -10 °C freezing point. The product can be stored for 1 month. For consumer's consumption, Veggie Peel Kikiam is fried for two (2) minutes in a 185°C to retain its freshness and wholesomeness consume immediately while hot. It is best accompanied in a sweet and sour sauce.

Product Testing

Table 3 shows the trials of the product from trial 1 to trial 4. The measurements of ingredients used in trial 1 are based on the recipe of an ordinary kikiam that can be tasted in our streets. As the trial conducted, the researchers had some adjustment in quantity and measurement of ingredients for better result. There were four trials done until such time it comes out to its final formulation. The first (1) trial as shown in table 3 contains a lot of sugar in the formulation. On the other hand, trial two (2) was unsuccessful due to the taste, it needs to be improvement. In trial three (3) it was almost successful but still lacking in taste

because the formulation has an inadequate salt and pepper. And lastly, in trial four (4) the product formulation achieved, the product turns out good and acceptable in taste.

Results and Discussion

This section further states and discusses the detailed data and interpretation acquired in analysis and the statistical evaluation of the products' acceptability.

The discarded vegetable peel such as potatoes, chayote, carrots and malunggay leaves utilizes to produce good quality street foods like *kikiam*. All the materials use was locally available in the market. The product is a pre-cooked street foods intended for all type of consumers, specifically the low-medium end-users who's the budgetary aspect are limited. It is economically friendly and worth buying street foods wherein the health would not compromise.

Table 4*Proximate and Nutritional Analysis*

Analytes	Results	Methods
Crude Fat	16.74	Soxhlet
Crude Fiber	0.27	Wendee
Crude Protein	15.51	Kjeldahl
Ash	2.07	Gravimetric
Moisture	48.79	Air-Oven
Potassium	222.33	AAS*
Vitamin C	0.054	UPLC

Tested and certified by Adamson University Technology Research and Development Centre (AUTRDC)

Test Results

Table 4 reveals the nutrient and proximate analysis content of the Veggie Peel Kikiam. For the proximate analysis, the product contains 16.74 percent of crude fat which can supplies energy needed by the body cells. It also helps to maintain body temperature. Having a small amount of crude fiber on the product other nutrients are needed to sustain its function in the digestive system. A 15.51 percent of crude proteins present in the product can supplies amino acids to build and maintain healthy body tissues. The ash content of the product is 2.07 percent which means that the product has a high mineral content. The products have high moisture content with 48.79% the product needs to store in a required temperature. The moisture is an important aspect of different food including dry goods, because excess moisture can promote bacterial growth decay, so the expiration date is strictly observe.

For the nutritional analysis, the recommended intake of Potassium for adolescent and adults is 4700 mg/day. The products have 222.33 milligrams, since Potassium helps to enhance muscle strength, metabolism and water balance the product may include in a daily meal intake. For adults, the recommended daily amount for Vitamin C is 65 to 90 milligrams (mg) a day

Table 5*Microbial Analysis*

Micro Organism	Result
Standard Plate Count	5 x 10
E. coli	< 3
Salmonella	Negative in 25g
Yeast & Molds	-
Initial Result	5 x 10 ²
Final Result	6 x 10 ²

**CFU/g – Colony-forming unit per gram*

**BAM – Bacteriological Analytical Manual*

Tested and certified by Adamson University Technology Research and Development Center (AUTRDC)

and the upper limit is 2,000 mg per day. It found out that the product has low amount of vitamin C with 0.054 percent, it showed that it cannot be a good source of vitamin C. The nutrient found in Veggie Peel Kikiam can produce nutritional intakes needed by an individual daily and yet still suggested to investigate additional food sources. (<https://health.gov/dietaryguidelines/dga2005>, n.d.)

Table 5 shows the safety and quality of Veggie Peel Kikiam thru microbial analysis. The aerobic plate count or also known as standard plate count is a scientific process use to indicate the level of microorganisms present on the sample product. Having a result of 5x10 CFU/gram in the Standard Plate Count, it meets the standard requirements. Absence of E.Coli found in the sample product having a result of less than 3 units it passed the reference criteria. Both the salmonella and yeast/molds have a negative count which means it is safe and ready for consumption.

Product Evaluation Results

During the process of the Development of Veggie Peel Kikiam, all the ingredients used were standardized. Likewise, to determine its acceptability, sensory evaluation was conducted involving 50 respondents: 30 students of the Technological University of the Philippines (TUP) Manila, 10 professional

indifferent fields of specializations, and 10 Food Experts.

Table 6

Quality Attributes of 30 students using Likert Scale

Quality Attributes	Mean of Veggie Peel Kikiam	Descriptive Equivalence of Veggie Peel Kikiam
Color	2.7	Moderately Brown
Texture	3.6	Slightly Smooth
Aroma	3.7	Pronounced of the Kikiam aroma
Flavor	3.9	Slightly pronounced of the Veggie Peel flavour
General Acceptability	3.5	Mostly acceptable

Table 6 reveals the computed mean for the sensory evaluation of the finish product with descriptive equivalent according to the evaluation of randomly selected students from the Technological University of the Philippines. Based on the result of the general acceptability gathered a mean score of 3.5, mostly the students accept the product positively although the result of the color had a 2.7 mean score. It is recommended to attain its golden brown in color to be more appealing and palatable.

Table 7

Results on Quality Attributes for 10 Professionals engage into different field of specializations

Quality Attributes	Mean of Veggie Peel Kikiam	Descriptive Equivalence of Veggie Peel Kikiam
Color	2.6	Moderately brown
Texture	3.0	Porous
Aroma	3.6	Pronounced of the Kikiam aroma
Flavor	3.2	Slightly pronounced of Veggie Peel flavour
General Acceptability	3.1	Mostly acceptable

Table 7 shows the computed mean score of the finish product with the descriptive equivalent for the group of the professionals engage into different field of specializations. Like the observation of the students the color affects its acceptability but nonetheless the product is mostly acceptable since it had a general acceptability of 3.1.

Table 8

Results on Quality Attributes for 10 professionals with knowledge about foods

Quality Attributes	Mean of Veggie Peel Kikiam	Descriptive Equivalence of Veggie Peel Kikiam
Color	2.9	Moderately brown
Texture	4.0	Slightly smooth
Aroma	3.4	Pronounced of the Kikiam aroma
Flavor	4.1	Absence of Veggie Peel flavor
General Acceptability	3.6	Mostly acceptable

Table 8 revealed the mean for the sensory evaluation of the finish product with descriptive equivalent of the professionals knowledgeable in foods. Even though the color of the Veggie Peel Kikiam had a mean score of 2.9 with a descriptive equivalent of “Moderately Brown”, still it did not affect the general acceptability result having a mean score of 3.6 and it is mostly acceptable by the food experts.

Table 9

Summary of the mean scores on the result of evaluation

Quality Attributes	Mean of Veggie Peel Kikiam	Descriptive Equivalence of Veggie Peel Kikiam
Color	2.7	Good
Texture	3.5	Good
Aroma	3.6	Very Good
Flavor	3.7	Very Good

General Acceptability	4.3	Very Good
Mean	3.56	Very Good

Table 9 shows the mean score for the sensory evaluation of the finish product with descriptive equivalent. The color has the mean score of 2.7 which implies that the target light brown in color result to be into brown with the descriptive equivalent of "Good". On texture, the product is slightly smooth that is why the mean score is computed at 3.5 indicating its descriptive result is "Good". In terms of aroma, having a mean score of 3.6 which signified that the product is "Good" where the authentic *kikiam* aroma is pronounced. Regardless on the different perceptions of the evaluators in terms of flavor are subjective, it does not affect the result of the summary of the total mean score. The flavor results to have a mean score of 3.7 which implied that the veggie flavor of the finish product is slightly pronounced with a descriptive equivalence of "Very Good". Finally, the general acceptability of the mean score is computed at 4.3 which revealed that the product is "Very Good" and ready for consumption. The total summary of the mean score of the Veggie Peel Kikiam is 3.56 with a descriptive equivalence of "Very Good". The result only shows that the developed Veggie Peel Kikiam has a potential to be a healthy snack that is available in the street.

Conclusions

The study aimed to develop a new variety of *kikiam* in the market that provide better health benefits. The discarded vegetable peels are subjected to dehydration and successfully turn into powdered form. Several trials were conducted to achieve the desired characteristics of the product.

The product is a pre-cooked street foods intended for all type of consumers,

specifically the low-medium end-users who's the budgetary aspect are limited. It is economically friendly and worth buying street foods wherein the health would not compromise.

The product was tested into different laboratory analysis such as proximate and nutritional, microbial, and its stability test. Based on the result of the test the product had a small amount of nutrient that help to keeps our body healthy once it is consume. It also proves that the product is negative to all possible contaminants; has a low or no level of pathogenic bacteria that would compromise one's health.

Qualitative scoring for sensory evaluation was conducted to evaluate the product; likewise using Likert Scale, the summary of mean score revealed that the product is "Very Good" having a mean score of 3.56.

The utilization of discarded vegetable peels such as potatoes, carrots, chayote with additional malunggay leaves are the only vegetable used in making Veggie Kikiam further studies about other vegetable may substitute. The product is pre-cooked and store in a frozen condition to prolong the shelf life, other food processes may apply. Frying is the only cooking method used. For future usage the consumers or end-users may applies other form of cooking.

Therefore, the Veggie Peel Kikiam is considered a healthy food snack that can be seen in the street. It is affordable, and the health of the consumers will not compromise. Economically friendly since the peels of the vegetables was used as the main ingredients and divert ordinary *kikiam* into more palatable food. The researchers would like to encourage future Food Technologists to continue to do its part in developing appropriate technologies in improving street foods. To create suitable processes that will enable fish, meats, and others by-products

utilization contribute to the country's nutritional and economic objective.

Recommendations

Although, the Veggie Peel Kikiam could be a potential healthy snack in the street. Further research is still needed for refinement of the product such as improvement on color; lessen the amount of malunggay powder; adjust the spices particularly the pepper to limit its strong and powerful odor; enhancement of aroma to have resemblance to the existing *kikiam* and maintain its freshness by keeping the product in a freezing condition and lastly, consume in a given expiry date.

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