POTATO AND MALUNGGAY AS ALTERNATIVE INGREDIENTS FOR PIE CRUST

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Abstract

This study aimed to evaluate the acceptability of potato and malunggay as alternative ingredients for pie crust. The descriptive type of research was utilized in this study. One hundred ten (110) Third Year and Fourth Year BSHM students of Baliuag University enrolled during the Second Semester of School Year 2017-2018 were chosen as the participants of the study. Acceptability of the product was tested with interview and product evaluation as research instruments. The results of the study showed that potato and malunggay are acceptable ingredients for pie crust considering the following factors: appearance, taste, texture and aroma. The respondents also considered potato and malunggay as alternative ingredients to pie crust as nutritious and innovative. The study recommends that a flavoring ingredient can still be added to the pie crust to further improve its flavor and increase its marketability.

Keywords: acceptability, alternative, crust, malunggay, potato, product development

Consumers are sometimes bored with food products with the same flavour and appearance (Hoyer and MacInnis, 2016). They want to try something new that will satisfy their palate and some preferred nutritious yet affordable one. Consumers today are better informed about their health and nutrition than ever before. Thus, food companies develop and modify their products that will meet the changing demands of the market. They are continuously making their way up by developing new and unique food products. As the market becomes more meticulous and health conscious, companies use vegetables and fruits as main ingredients of their product offerings (Gomez and Martinez, 2017). Initiatives and innovations of food companies make bread, burgers, pasta, chips, pie, and others became more enjoyable and exciting. The researchers conducted this study to create another healthy and delicious food pie crust using potato and malunggay as alternative ingredients of pie crust.

Product development has been a major activity for over 40 years but only gradually has it developed as a strategic business area and also as advanced technology. As the technology develops the way or the procedure to develop, products changed to and it is for the better. (Gilpin, 2014).

Food product development is a process of coming up an idea with a new concept, new type, or a new flavor of an existing food, and brings it to the market. It starts in being creative on making ideas that will help one to create a great product. Companies go through product development, depending on how the consumers will react on the product that they are consuming. It may include purchasing of the equipment to be used for the product. Product needs to pass on food safety laws. It should be tested such as food quality test, food safety test, chemical use and

many tests (Nielsen, 2015).

According to Small Business Encyclopedia (2015), developing new product is a complex process - requiring knowledge of ingredients, processing techniques, packaging materials, legislation and consumer demands and preferences. It is difficult to develop new products especially food because it requires accurate decision that it may help us come up with a great invention. Initial feedbacks make the product much better.

Technology helps to discover modern food possible. It enhances the modern foods through the use of experimentations and through development of every food that is already existing (Gilpin, 2014).

Pie is a word whose meaning has evolved in the course of many centuries and which varies to some extent according to the country or even to region. The derivation of the word may be from magpie, shortened to pie. The magpie collects a variety of things, and it was an essential feature of early pies that they contained a variety of ingredients. Food historians confirm ancient people made pastry. Recipes, cooking techniques, meal presence and presentations vary according to culture and cuisine. In the cradles of civilization, the primary fat was olive oil and when combined with ground grains, it produced a type of pastry. The idea of enclosing meat inside a sort of pastry made from flour and oil originated in ancient Rome, but it was the northern European use of lard and butter to make a pastry shell that could be rolled out and molded that led to the introduction of true pie (Davidson, 2006).

According to the Oxford English Dictionary (2012), the

concept of pie becomes popular in 1303. People describe pie as a pastry that has filling. It can be closed, or open-faced, and the filling could be sweet or savory. The first pies were the savory one and had meat and cheese filings.

There were a lot of variations of pie. People discovered a pie where in the crust was flaky and the filling was a fruit. Then, followed the discovery of the empanadas and turnovers. It was from the Northern European, that the idea of enclosing a pastry and the use of meat as a filling started (Katz, 2003).

Pie dough is classified by the kind, amount and method of the fat's incorporation into the dough. Success or failure depends on keeping the ingredients cold, how the mixing methods are used to incorporate the fat, and how the gluten in the wheat flour is developed. Their resulting textures are meant to be flaky and light or compact and crumbly (mealy), and always tender, with a golden brown color and a flavor good enough to eat by itself (Phillips, 2000).

According to the book of Foods: Experimental Perspectives (1993), the ingredients used in pie may cause the variations of a pie crust. Like in using oil, it has the ability to enhance gluten development. It can also enhance the tenderness of the crust, by adding water. Resting the dough can have a chance to lessen the tenderness if the dough is rolled immediately. Also, the air incorporated can affect the development of the texture of the crust.

Pie has many good effects in our body. One (1) slice of pie supplies nine (9) percent of daily recommendation for phosphorous and seven (7) percent for calcium and iron. Benefits

of these minerals include bone, tooth, neurological, cellular and metabolic health. It also aids in muscle contraction, blood clotting and blood oxygenation. Pie could be made of potatoes and, the largest health benefit offered by potatoes is they can help with digestion due to their high fiber content (Phillips, 2000).

Potatoes were introduced to Europe in the second half of the 16th century by the Spaniards, and have become an integral part of much of the world's food supply. It is considered as the third most important food crop in the world after rice and wheat in terms of human consumption and the world's fourth-largest food crop. Potato contains vitamins and minerals, as well as an assortment of phytochemicals, such as carotenoids and natural phenols. The potato is best known for its carbohydrate content (approximately 26 grams in a medium potato). The predominant form of this carbohydrate is starch. This resistant starch is considered to have similar physiological effects and health benefits as fiber. It provides bulk, offers protection against colon cancer, improves glucose tolerance and insulin sensitivity, lowers plasma cholesterol and triglyceride concentrations, increases satiety, and possibly even reduces fat storage (Ayto, 2000).

Malunggay or scientifically known as Moringa oleifera is the most widely cultivated species of a monogeneric family. The moringa is native to the sub-Himalayan tracts of India, Pakistan, Bangladesh and Afghanistan. In recent times, the tree has been advocated as an outstanding indigenous source of highly digestible protein, calcium, iron, Vitamin C and carotenoids suitable for utilization in many of the so called developing regions of the world where undernourishment is a major concern. According to Duenas (2013), malunggay can help boost one's immune system

about 10 times more than those commercially-made vitamins and other health supplements. It also has three (3) times more potassium, than banana. It also possesses anti-cancer compounds such as phytochemicals, to slowly stop the multiplicity of those deadly cancer cells. Since malunggay has high nutritional value, it is now being used as an ingredient for different food products.

Increasing consumer awareness and concern over what the food is made up, and the demands for greater nutritional values of products have inspired the researchers to think on how a popular food product will create a new variation that may be profitable in the market. The researchers have done product testing and sampling during the preparation of pie crust using potato and malunggay.

Given the abovementioned information, this study sought to determine the acceptability of creating a pie crust using potato and malunggay as alternative ingredients. Lastly, this study determined its palatability among consumers.

Specifically, the researchers sought to answer the following sub-problems:

1. How may the acceptability of potato and malunggay pie crust be assessed in terms of:
    1.1 taste,
    1.2 appearance,
    1.3 aroma,
    1.4 texture?
2. What are the perceptions of the respondents regarding the use of potato and malunggay as alternative ingredients for pie crust?

3. As suggested by the respondents, how may the potato and malunggay pie crust be further improved?

Through this study, the students will appreciate the use of local vegetables such as potato and malunggay as substitute ingredients in developing new variations of food products like pie crust. It could also provide further awareness on the health benefits of the said ingredients. To the future researchers, this study will serve as a tool and reference in conducting similar studies. To the community, this may open a new market for such products, which may provide them additional business opportunities.

This study covers the acceptability and palatability of potato and malunggay as alternative ingredients for pie crust in terms of taste, appearance, aroma and texture. Sales and marketability of the food product was not part of this study.

Model of the Study

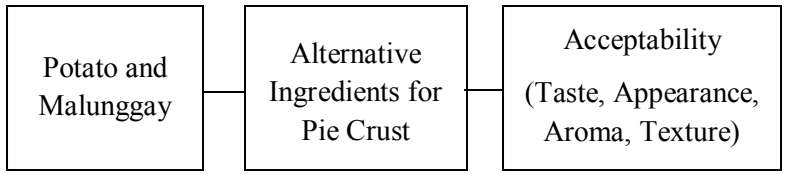

Figure 1. shows the product evaluation made by the participants concerning the use of potato and malunggay as alternative ingredients for pie crust.

Method

Descriptive type of research was utilized in this study. An instrument (evaluation form) was designed by the researchers to gather the perceptions, views and other information related to the study of the acceptability of potato and malunggay as alternative ingredients for pie crust. The first part of the instrument included items about the profile of the respondents, while the second part were evaluation questions which identified the acceptability factors of potato and malunggay considering the following criteria: (1) Taste, (No Burnt Taste, Delicate Flavor, No Overwhelming Flavor), (2) Appearance (Shape, Size, Color), (3) Aroma (Delicate, Sweet), (4) Texture (Soft, Crusty, Chewy).

The participants consisted of one hundred ten (110) Third Year and Fourth Year BSHM students of Baliuag University enrolled during the Second Semester of School Year 2017-2018

Sample product was given to the participants. They rated the product using the Likert scale (5=Excellent, 4=Very Good, 3=Good, 2=Fair, 1=Poor. Unstructured interview was also conducted by the researchers to validate the responses of the participants.

Frequency counts and weighted means were used to describe the acceptability factors of potato and malunggay. The weighted mean was obtained by dividing the total weighted product (WP) by the total frequency (f). The weighted product was obtained by multiplying the total number of responses by the degree of response, which was 1 for Needs Improvement, 2 for Moderately Satisfactory, 3 for Satisfactory, 4 for Very Satisfactory, and 5 for Excellent. The sum total of the weighted

product was divided by the frequency and the result was rounded off to the nearest hundredths. Gathered data were retrieved, tallied, analyzed and interpreted using the following:

4.21	– 5.00	=	Excellent
3.41	– 4.20	=	Very Satisfactory
2.61	– 3.40	=	Satisfactory
1.81	– 2.60	=	Moderately Satisfactory
1.00	– 1.80	=	Needs Improvement.

Results

Step-by-step procedure in making potato and malunggay pie crust

Procedure:

Ingredients:		**Fillings:**	
5	cup mashed potato	800	grams canned tuna
1	cup all purpose flour	1	cup mayo
2	tbsp. sugar	1	tsp. pepper
1	tsp. salt	2	tbsp. onion
2	1 tsp. baking powder		
3	¾ cup butter		
4	2 tsp. finely chopped malunggay		

1. Stir together the potato, butter, sugar and salt.
2. Add in the flour, malunggay and baking powder. Mix well.
3. Rest the dough for 1 hour.
4. Roll out into a thin circle.
5. Pre-heat the crust.
6. Put into it the fillings.
7. Bake for 40 minutes in 350 degrees.

Table 1

Acceptability of the Taste of Potato and Malunggay Pie Crust

Taste	E (5)	VS (4)	S (3)	MS (2)	NI (1)	WM	Inter-pretation	Rank
Delicate Flavor	55	48	7	0	0	4.43	E	1
No Burnt Taste	46	50	14	0	0	4.29	E	2
No Over-whelming Flavor	35	63	12	0	0	4.20	VS	3
Total						4.30	E	

Table 1 shows that the taste of the product got an over-all rating of 4.30, interpreted as Excellent. The respondents perceived delicate flavor as the most acceptable factor in considering the taste of the product, having a weighted average of 4.43.

Table 2

Acceptability of the Appearance of Potato and Malunggay Pie Crust

Appearance	E (5)	VS (4)	S (3)	MS (2)	NI (1)	WM	Inter-pretation	Rank
Even Shape	72	33	5	0	0	4.60	E	1
Golden Brown Color	59	35	15	1	0	4.38	E	2
Total						4.49	E	

As shown in Table 2, the respondents gave an excellent mark to the appearance of the potato and malunggay pie crust. Among the two criteria given, even shape received the highest weighted mean of 4.60.

Table 3

Acceptability of the Aroma of Potato and Malunggay Pie Crust

Aroma	E (5)	VS (4)	S (3)	MS (2)	NI (1)	WM	Inter-pretation	Rank
No Burnt Aroma	45	64	1	0	0	4.40	E	1
No Over-whelming Aroma	31	69	10	0	0	4.19	VS	2
Total						4.29	E	

As reflected in Table 3, the respondents gave the highest rating to no burnt aroma (4.40), interpreted as Excellent to the pie crust; while no overwhelming aroma received a rating of 4.19 interpreted as Very Satisfactory.

Table 4

Acceptability of the Texture of Potato and Malunggay Pie Crust

Texture	E (5)	VS (4)	S (3)	MS (2)	NI (1)	WM	Inter-pretation	Rank
Firm Dough	62	33	14	1	0	4.42	E	1
Soft Dough	45	57	8	0	0	4.33	E	2
Not Chewy	30	71	9	0	0	4.19	VS	3
Total						4. 31	E	

Table 4 illustrates that the respondents gave an excellent mark to the texture of potato and malunggay pie crust. Among the three criteria given, firm dough received the highest weighted mean of 4.42 followed by soft dough (4.33), interpreted as Excellent. Not chewy got the lowest weighted mean (4.19) and interpreted as Very Satisfactory.

Table 5

Suggestions to Further Improve the Product

Suggestions	*f*	%
Add flavor	11	64.7
Make the crust crunchy	3	17.6
Use other fillings	2	11.8
Improve the texture	1	5.9
Total	17	100

Table 5 shows that 11 or 64.7% of the respondents suggested that flavor should be added to the product, followed by make the crust crunchy with three (3) or 17.6% responses and use other fillings with two (2) or 11.8% responses. Only one (1) respondent suggested that the texture of the product should be improved.

Some of the respondents who were interviewed after the evaluation stated that they will try to make potato and malunggay pie crust at home. Others stated that the product was nutritious and innovative.

Conclusions

Based on the analyzed data, the researchers concluded that potato and malunggay pie crust is acceptable among the BS Hospitality Management students who underwent the product evaluation considering the acceptability factors of taste, appearance, aroma and texture of the product

To further improve the product, addition of flavor was the major suggestion of the respondents.

Recommendations

Based on the findings of the study and the conclusions drawn from the results, the researchers recommend the following:

1. A flavouring ingredient can be added to the pie crust to further improve its flavour.
2. Marketability of the pie crust should be considered.

References

Ayto, J. (2000). *An A-Z of Food & Drink*. Retrieved from http://dx.doi.org/10.1093/acref/9780192803511.001.0001

Davidson, A. (2006). *Companion to Food, 2nd edition*. Retrieved from www.oxfordreference.com/view/10.../acref-9780192806819.

Duenas, H. (2013). *Food Technology: invasion of malunggay bread*. Retrieved from https://devcomconvergence. wordpress.com/2013/08/31/food-technnology-invasion-of-malunggay-bread/.

Gilpin, L. (2014). Foods that technology has transformed. Retrieved from https://www.techrepublic.com.

Gomez, M. and Martinez M.(2017). *Fruit and vegetable by-products as novel ingredients to improve the nutritional quality of baked goods*. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/28362109.

Hoyer, W. and MacInnis, D. (2016). *Consumer behavior.* 7th edition, U.S.A.: Cengage Learning. Retrieved from https://books.google.com.ph/

Katz, H (2003). *Different Types of Pies.* Encyclopedia of Food and Culture : 2nd ed. Retrieved from www. world-cat.org/.../encyclopedia-of-food-and-culture.

Nielsen, Lisa.(2015). *Product development diversification strategy*. Retrieved from http://smallbusiness.chron.com/product-development-strategy-definition-5144.html.

McWilliams, M (1993). *Foods: experimental perspectives* 8th edition. U.S.A: McMillan Publishing House. Retrieved from https://www.amazon.com/Foods-Margaret.../013707929X

Philips, S. (2000). *Pie and Tart Pastry Crust Dough.* Crafty Baking. Retrieved from books.google.com.

Pies. Oxford English Dictionary (2012). Retrieved from https://en.oxforddictionaries.com/english.

Product Development (2015). Small Business Encyclopedia. Retrieved from https://www.entrepreneur.com/encyclopedia/product-development.