RELATIONSHIP BETWEEN PERCEIVED FACTORS AND ACCEPTABILITY OF BSHM GRADUATES IN USING APPLE FRUIT CONCENTRATE AS ALTERNATIVE SWEETENER FOR CAKES AND BREADS

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Abstract

This research study focused on determining the relationship between perceived factors and acceptability of twenty-five BSHM graduates who were bakers in using apple fruit concentrate as an alternative sweetener for cakes and bread. The researchers utilized mixed method research design to provide an opportunity to increase understanding of the developments in the field of food industry and to gain an in-depth understanding on the research topic. Non-probability sampling technique was used to gather the information that may support this research. Results revealed that female is greater than the number of male participants and most of the bakers are under 20-25 years old. Majority of the respondents were baking cakes and bread for about three to four years and they usually bake once a week. It showed that shortened cakes and quick bread are the usual types of cakes and bread that the bakers usually make. Also, the commonly used type of sugar is white granulated sugar. It showed that apple fruit concentrate is free from unacceptable flavours, adds moisture, stabilize, and does not affect the colour of cakes and bread, and concluded that apple fruit concentrate provides essential nutrients to the body. This study concluded that there is a relationship between perceived factors and respondent's acceptability in using apple fruit concentrate in baking cakes and bread.

Keywords: Juice Concentrate, Fruit Extraction, Sweetener, Alternative Sweetener, Cakes, and Bread

Many individuals are fond of eating sweets, desserts and baked products but due to the increasing rate of diseases from this lifestyle, a new trend for a healthier lifestyle is being embraced. People nowadays tend to be more cautious and selective in the ingredients of the food they are consuming. This has led to the use of alternative food ingredients that are healthy and not harmful to the body.

Apple juice concentrate is becoming increasingly prevalent, popular, and common in the industry. It shifted not only popular for juices, but for the healthier and better substitution and alternative of sugar. Concentrated apple juice is less sweet than sugar. According to Dr. Gary Reineccius, a flavor chemist at the University of Minnesota, the undiluted juice contains 33.4 percent sugar. One cup of undiluted juice is around 464 calories; one cup of sugar is 770 calories; one cup of honey is 1,031 calories. This showed that fruit concentrate is sweet but has less sweetness that table sugar with lesser number of calories.

Fruit sweeteners are "natural" alternatives to sugar to both producers and consumers in contrast to sugar and other artificial sweeteners. Sweeteners are placed as concentrated syrups of fruits that are processed to eliminate fruit compounds and to make them an adequate substitute for high-fructose corn syrup with little or no flavor, color or acid. The Tree Top website encourages consumers to use their concentrate of apple juice as a sweetener or to highlight the sweetness in a variety of foods and beverages. Fruit sweeteners perform best in most baked goods, with the exception of chocolate-based desserts.

The pursuit for other sweeteners substantially came about when the natural source for sweetener was distinctly found which basically is sweet in taste. Juices are low in chemicals such as sodium and fat that are considered to have harmful impacts on wellbeing when drunk in large quantities. The word "concentrate" literally means that the water was drained from the fruit. According to Hermann (2020), the

fruit juice concentrate focuses greatly on imitating nutritional sweeteners adding calories and carbohydrates to foods and beverages. It is not only possible to eat the fructose from the entire fruit, but also to add carbohydrate, vitamin, mineral, and phytonutrients to the body that they cannot get in sugar alone.

Many researchers did consider studying fruit concentrate as an alternative sweetener. According to Keating (1990), they tried using fruit concentrate as an alternative sweetener to yogurt foods and the calorie indeed did change and became lower. It is true and proven in some experiments that lowering the intake of processed sugar certainly help in their dietary movement. As an addition, fruit concentrates specifically on apples used in some desserts in other countries, especially in cake products to make it more appealing and edible for adults who want to enjoy sweet products by protecting their health from sugar.

The researchers aims to ascertain alternative sweetener for cakes and breads considering that eating cakes and breads with high sugar content is unavoidable, that is why the researchers ended up in this study. Furthermore, the researchers wanted to know if using fruit concentrate as an alternative sweetener for cakes and breads would be accepted here in the Philippines such as in other countries.

Therefore, this research is conducted to determine if apple fruit concentrate can be an alternative sweetener for cakes and breads as perceived by BS Hospitality Management graduates batch 2017 who are inclined in baking.

This research aimed to determine the perceived factors and the acceptability in using apple fruit concentrate as alternative sweetener for cakes and breads by the BS Hospitality Management graduates of batch 2017 who are inclined in baking.

Specifically, the research study sought answers to the following sub-problems:

1. How may the respondents be described in terms of:
   - 1.1 Age;
   - 1.2 Gender;
   - 1.3 Number of Years into Baking
   - 1.4 Baking Preferences
     - 1.4.1. Frequency of baking;
     - 1.4.2. Type of cakes and breads frequently made; and
     - 1.4.3. Types of sugars used.

2. What are the respondents' perceived factors to consider in using apple fruit concentrate as alternative sweetener for cakes and breads:
   - 2.1 Palatability
   - 2.2 Aesthetic quality
   - 2.3 Nutritional Value
   - 2.4 Availability; and
   - 2.5 Cost

3. What is the respondents' level of acceptability in using apple fruit concentrate as an alternative sweetener for cakes and breads?

4. Is there a significant relationship between the perceived factors considered by the respondents and their acceptability in using apple fruit concentrate as an alternative sweetener for cakes and breads?

This study will provide the information in relation to apple fruit concentrates being an alternative sweetener for cakes and breads. It could also benefit the baking industry to develop and formulate new products which is based from apple fruit concentrate as their sweetener. The entrepreneurs will also benefit from this study for it will give them new knowledge regarding cakes and breads with apple fruit concentrate as an alternative sweetener and offer it to the market. The bakers may use the result in this study to

help them formulate new products and maximize the products that can be potentially saleable in the market. Also, parents are able to gain new knowledge from this study which make them aware and choose healthier and better alternative sweetener ingredients for their family. The students who are studying Hospitality Management and Culinary Course will benefit from this study through the knowledge about the effects of using natural alternative sweeteners rather than artificial sweeteners. They will be aware of the benefits of the natural sweeteners and they will hopefully use and share the knowledge that they have learned from the research.

Model of the Study

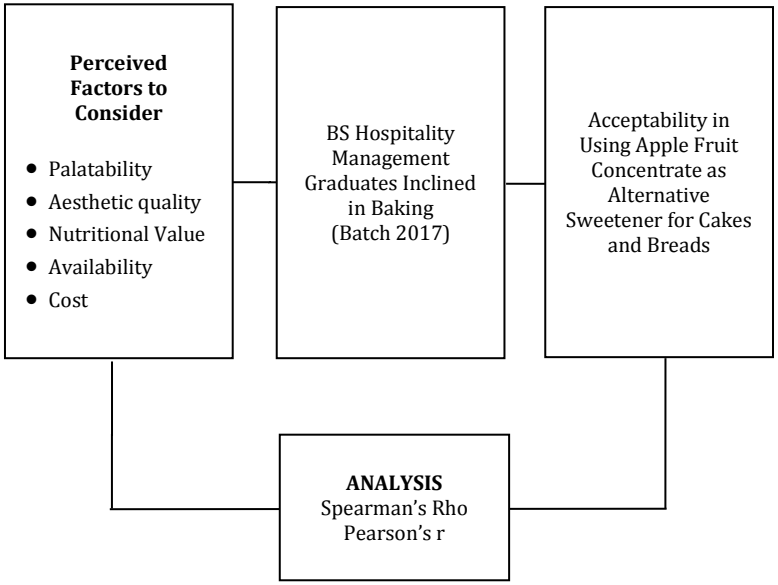

Figure 1. Conceptual Framework

This study shows the factors to consider, as an independent variable with sub-variable of palatability, aesthetic quality, nutritional value, availability, and cost which contributes to the dependent variable which is the acceptability of BS Hospitality Management graduates batch 2017 who are inclined in baking in using apple fruit concentrate as alternative sweetener for cakes and breads. For the data analysis, the researchers used Spearman's Rho and Pearson's r to show the relationship of the aforementioned variables. It will show the organization of concepts and variables in the relation to the research itself.

Method

The researchers utilized the mixed method research design. Descriptive research design was used wherein the questionnaire-checklist was the instrument in gathering the needed data. The researchers chose this method to provide opportunity to increase understanding of the developments in the field of food industry. The researchers conducted an interview through Facebook messenger and was then transcribed. The researchers' reason in choosing this method is to gain an in-depth understanding on the research topic.

The researchers used a self-made questionnaire as instrument in gathering pertinent data needed in the study. It was prepared based on the researchers' readings of some related literature and previous researches. It was transformed into a google form questionnaire. The self-made questionnaire undergone validation by the experts. The first part of the questionnaire consisted of two items which revealed the profile of the respondents and their baking preferences. The second part of the survey questionnaire determined the factors in utilizing apple fruit concentrate as alternative sweetener for cakes and breads such as palatability, aesthetic quality, nutritional value, availability, and cost. The third part measured the acceptability of the respondents in utilizing apple fruit concentrate as alternative sweetener for cakes and breads.

Frequency counts and weighted means were used to the describe the respondents' profile and baking preferences. The responses to every item in the questionnaire were tabulated and entered in separate tables. The data were statistically transmitted into percentages. The percentage of responses to every item was determined by dividing the total number of responses by the total number of respondents. Likert Scaling was used to determine the perceived factors considered by the respondents in utilizing apple fruit concentrate as an alternative sweetener for cakes and breads. The mean responses were tabulated and interpreted using the scale below:

Table 1
Scale for the Interpretation of the Perception of the Respondents

Scale	Interpretation
1.000 – 1.750	Strongly Disagree
1.750 – 2.500	Disagree
2.501 – 3.250	Agree
3.251 – 4.000	Strongly Agree

Table 2
Scale for the Acceptability of the Respondents

Scale	Interpretation
1.000 – 1.750	Very Unacceptable
1.760 - 2.500	Slightly Unacceptable
2.510 - 3.250	Slightly Acceptable
3.260 - 4.000	Very Acceptable

Table 3
Scale for the Interpretation of the Correlation

Correlation Coefficient (r)	Indication
between $\pm.80$ *to* ± 1.00	High correlation
between $\pm.60$ *to* ± 0.79	Moderately high correlation
between $\pm.40$ *to* ± 0.59	Moderate correlation
between $\pm.20$ *to* ± 0.39	Low correlation
between $\pm.01$ *to* ± 0.19	Negligible correlation

Results

Table 1
Perception of the Respondents in Terms of Palatability of Apple Fruit Concentrate

Statements	Weighted Mean	Verbal Interpretation
1. Apple fruit concentrate gives the same sweetness as sugar.	2.92	Agree
2. Apple fruit concentrate adds a fruity flavor that makes the product palatable.	3.28	Agree
3. It is free of unacceptable flavor/s (ex: sour, bitter, or other distinct flavors of fruit).	3.12	Agree
Stat Descriptives	**Mean =3.11** **STD Dev. = 0.356** **Std Error Mean = 0.071**	

The table above shows the responses pertaining to the palatability or the taste perception of the respondents with the apple fruit concentrate. The overall mean of 3.11 indicated that the respondents agree with the idea that apple fruit concentrate gives the same sweetness as the sugar they normally used in baking. Moreover, the fruity flavor also adds

up to the palatability or acceptable taste for cakes and bread sweeteners. Additionally, the standard deviation of 0.356 with the Std. error mean of 0.071 indicates that the responses are close to each other, indicating that most of the respondents are actually in favor of the use of apple fruit concentrate.

The responses of the respondents were based from their experiences and their knowledge on the additive flavors that the apple fruit concentrate can give. The Tree Top website encourages consumers to use their concentrate of apple juice as a sweetener or to highlight the sweetness in a variety of foods and beverages.

Table 2
Perception of the Respondents in Terms of Aesthetic Quality of Apple Fruit Concentrate

Statements	Weighted Mean	Verbal Interpretation
1. Apple fruit concentrate provides additional moisture.	3.00	Agree
2. Apple fruit concentrate helps stabilize the cakes and bread.	3.00	Agree
3. Apple fruit concentrate does not alter/ change the color of cakes and bread.	3.04	Agree
Stat Descriptives	**Mean =3.013** **STD Dev. = 0.446** **Std Error Mean = 0.089**	

The table above indicates the perception of the respondents in terms of the aesthetic quality of the apple fruit concentrate. The overall mean of 3.013 indicated that the aesthetic quality of the fruit concentrate has an impact on the perception of the respondents. They all agree that the apple fruit concentrate provides additional moisture, helps in stabilizing the shape and consistency of their cakes and bread, as well as the idea of not altering the color of cakes and bread when used. However, as compared to the mean

from palatability, the mean for aesthetic quality is somewhat lower with a standard deviation of 0.446 (std. error mean = 0.089). This might indicate that the respondents are more concerned about the taste rather than the aesthetic quality of the fruit concentrate.

Based on the knowledge of some of the respondents who already tried using apple fruit concentrate in baking cakes and breads, it is proven that it can help in the overall appearance of the baked products. According to Harris (2021), concentrate juice will sweeten the cake and bring moisture and flavor to it. It provides moisture, taste and sweetness to the cake.

Table 3

Perception of the Respondents in Terms of Nutritional Value of Apple Fruit Concentrate

Statements	Weighted Mean	Verbal Interpretation
1. Apple fruit concentrate is a healthier substitute sweetener for cakes and bread.	3.52	Strongly Agree
2. Use of apple fruit concentrate reduces the risks of sugar-related diseases.	3.48	Strongly Agree
3. Apple fruit concentrate provides the essential nutrients needed by the body that cannot be acquired in sugar alone.	3.52	Strongly Agree
Stat Descriptives	**Mean =3.507** **STD Dev. = 0.510** **Std Error Mean = 0.102**	

Table 3 shows the respondents' perception on the nutritional value of the apple fruit concentrate. The overall mean of 3.507 is the highest overall mean of all of the factors indicated in this study. This only means that the respondents are more concerned on the health or nutritional value of the ingredients that they used in baking more than the cost, aesthetic value, availability, and palatability. All of the respondents strongly agreed that the use of apple fruit concentrate is healthier than the use of artificial sweeteners

and may also provide essential nutrients needed in the body. According to Hermann (2020), the fruit juice concentrate focuses greatly on imitating nutritional sweeteners adding calories and carbohydrates to foods and beverages. It is not only possible to eat the fructose from the entire fruit, but also to add carbohydrate, vitamin, mineral, and phytonutrients to the body that they cannot get in sugar alone. As mentioned by Varzakas (2012), many studies have shown that fruit concentrate brings many nutritional effects when eating foods. Fruit concentrate is one of the answers in low-calorie food specifically in desserts and sweet products. It reduces the feeling of stress, nausea, constipation, and even diarrhea. Sweeteners are of major interest today due to their extensive help in product development. From a non-biased opinion, they offer a clear taste and different combinations that can help improve the product's quality. They have a lesser calorie than sugar, especially if they use fruit as an alternative sweetener.

Table 4

Perception of the Respondents in Terms of Availability of Apple Fruit Concentrate

Statements	Weighted Mean	Verbal Interpretation
1. Apple fruit concentrate is an alternative sweetener because it is available in the market.	2.92	Agree
2. There is a sufficient supply of apples.	2.88	Agree
3. There is an assurance that the apple produce is fresh year-round.	3.00	Agree
Stat Descriptives	**Mean =2.930** **STD Dev. = 0.518** **Std Error Mean = 0.104**	

Table number 4 indicates the responses about the respondents' perception of the availability of apples as the source of the fruit concentrate. The overall means of 2.93 still indicates that the respondents are concern about the availability of apples for their apple fruit concentrate.

This only means that they are not considering the idea of looking for apple fruit concentrate sources since apples are abundant and are available all year-round. According to Simeon (2017), Over 90% of imported apples come from China, with the rest coming from the United States and New Zealand. Philippines is one of Asia's largest apple importers, and that Philippines consequently import apples for the past few years, and they do not see apples as a native or even seasonal fruit. Apples are not considered as a local or even a seasonal fruit, therefore, the Philippines is importing apples for the past years. Our country is one of the biggest importers of apples in Asia. Last 2018, the Philippines imported a total of 148700 Metric Ton of apples and last 2020, it increased by 4.24% with the total of 155000 Metric Ton of apples.

Table 5

Perception of the Respondents in Terms of Cost of Apple Fruit Concentrate

Statements	Weighted Mean	Verbal Interpretation
1. Apple fruit concentrate is an alternative sweetener because it is budget-friendly.	2.68	Agree
2. Apple fruit concentrate is an alternative sweetener because it is cost-efficient.	2.68	Agree
3. Apple fruit concentrate is less costly than sugar.	2.80	Agree
Stat Descriptives	**Mean =2.720** **STD Dev. = 0.524** **Std Error Mean = 0.105**	

The table above indicates the perception of the respondents in terms of the apple fruit concentrate cost. The overall mean of 2.720 (STD = 0.524, Std error mean = 0.105) indicates that the respondents are also concern about the cost of the apple fruit concentrate. This is considerable since the respondents are using the cost of their ingredients in the computation of the final price of their product. Hence, the

cost of the apple and the apple fruit concentrate affects the decision of the respondents. However, among all of the overall means of the five factors, this factor is the least concern of the respondents.

The responses of the respondents vary on the price of the apple that is available in the respondents' locality. As stated by Francisco (2020), an apple, for instance, is available here for only P10 per piece at the Carbon Public Market. Not bad for anything with many health advantages, including cardiac health improvement and weight loss support.

Conclusion

This quantitative research study was formulated in order to determine the acceptability of the bakers in using apple fruit concentrate. Based on the findings of the study, the following conclusions were drawn:

1. **How may the respondents be described in terms of:**

   1.1 The number of female participants is greater than the number of male participants.

   1.2 Most of the bakers are under 20-25 years old.

   1.3 Majority of the respondents were baking cakes and breads for about three to four years.

   1.4 Baking Preferences

      1.4.1. The bakers usually bake once a week.

      1.4.2. Shortened cakes are the commonly baked type of cakes and bakers frequently bake quick breads.

      1.4.3. The most commonly used type of sugar is white granulated sugar.

2. **What are the perceived factors to consider in using apple fruit concentrate as alternative sweetener for cakes and breads:**

   2.1 It shows that apple fruit concentrate provides the same sweetness as sugar, has a fruity flavor, and is free from unacceptable flavors.

   2.2 It is evident that apple fruit concentrate adds moisture, stabilize, and does not affect the color of cakes and breads.

   2.3 Apple fruit concentrate provides essential nutrients.

   2.4 The respondents are not that concerned regarding the availability of apple fruit concentrate since it is available in the market.

   2.5 The cost of the apple and the apple fruit concentrate still affects the decision of the respondents.

3. **What is the respondents' level of acceptability in using apple fruit concentrate as an alternative sweetener for cakes and breads?**

   3.1 The use of apple fruit concentrate was accepted by the respondents because it is nutritious, helps in reducing diseases associated to sugar, and gives more flavor to cakes and breads.

4. **Is there a significant relationship between the perceived factors considered by the respondents and their acceptability in using apple fruit concentrate as an alternative sweetener to cakes and breads?**

   4.1 There is a significant relationship between the perceived factors and the acceptability of the respondents on the use of apple fruit concentrate as an alternative to sweeteners for cakes and breads.

Recommendations

Recommendations are considered as an important part of a research wherein it would be beneficial for the people that would use this as a guide for their researches and for other educational purposes.

For the Baking Industry

1. They can develop new products which is based from apple fruit concentrate as their sweetener.

2. To enhance their existing products into something healthier.

For the Entrepreneurs

1. For the entrepreneurs, this will provide them with new knowledge regarding cakes and breads with apple fruit concentrate as an alternative sweetener.

2. They can make a business out of apple fruit concentrate and offer it to the market.

For the Bakers

1. To help them formulate new products and maximize the products that can be potentially saleable in the market.

2. They may try apple fruit concentrate in baking breads and cakes.

For the Parents

1. For them to be aware and choose healthier and better alternative sweetener ingredients for their family.

2. They can try out the apple fruit concentrate in other dishes that requires sweeteners.

For the Students

1. The students may try the apple fruit concentrate in baking cakes and breads that the researchers were not able to do.

2. They can use and share the knowledge that they have learned from the research.

For the Future Researchers

1. For the future researchers to be able to gather related information for the improvement of the study.

2. They can improve the research paper by formulating additional questions as well as increasing the number of participants.

Apple Fruit Concentrate Recipe

Ingredients:

Apples
Water

Procedure:

1. Wash, peel, and slice the apple fruit.

2. Put the fruit in a pot; add water to just cover.

3. On medium heat, bring to a boil (uncovered).

4. Boil at least until the fruit is mushy pulp. (Boiling longer will reduce water content, but may alter the flavor of your concentrate)

5. Strain pulpy apple fruit sludge.

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