

Development of Indigenous Fruit Jam

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Abstract

This study was conducted to develop a new jam from the rattan fruit. The study used the developmental method, defined as the systematic study of designing, developing, and evaluating programs, processes, and products that meet internal consistency and effectiveness criteria. The study includes 100 respondents with equal numbers from the students, faculty and staff, vendors, and civilians in Poblacion, San Isidro, Nueva Ecija to ensure appropriateness and completeness of data. The respondents were chosen using convenience sampling. The main instrument of the study was a questionnaire based on the Design and Performance of Small Scale Sensory Consumer Tests of Linn Svensson (2012). The study instrument was composed of 9 point Hedonic Scale to quantify the consumer preference or degree of liking/disliking of the jam. The method of presentation and analysis of data was also based on the study of Linn Svensson (2012). In addition, the researchers used focus group discussion, interviews, and surveys in collecting data needed for the study. Frequency distribution was used to summarize the data.

The researchers arrived at the procedure of making the yantok fruit jam. The process requires three kg of rattan fruit, $\frac{3}{4}$ kg of sugar, 75 tbsp of honey, 5 tbsp baking soda, and 1 cup of water. After the production, the researchers conducted a consumer test on 100 respondents. Based on the study's findings, the results of the sensory test method of evaluation of the respondents are very high and the feedback about the output is very good.

As to the taste, 42% like it very much after adding the results from the four groups of respondents. Furthermore, as to the appearance of the jam, most of the respondents, or 40% of them, like it very much. Moreover, as to the smell/aroma of the proposed product, 46% of the total respondents like it very much. In addition, the texture respondents like it very much got the highest response of 42%. Lastly, as to the respondents' overall opinion regarding the output of the researchers, half of the total respondents or 54%, like it very much.

The researchers also gathered data on the respondents' suggestions for further improvement of the jam. The majority of the respondents suggested the improvement of the packaging and the aroma of the jam.

The researchers recommended that follow-up studies be conducted to identify the chemical contents, nutritional facts and shelf life of jam. Another may be conducted using the Just About Right (JAR) Scale to identify the consumer's reaction on specific attributes: example, sweetness, saltiness, crunchiness, thin/thickness, etc.

Keywords: Fruit Jam, Rattan Fruit, Product Development

1. Introduction

Filipinos like to eat bread, especially spreading it with different fruit jams. Some of these are Coco, strawberry, grapes, mango, and apple jams. They are prominent because of the extraordinary flavors that one will continually look for. These flavors are evidence that people have their flavor preferences, and most people think that only sweet fruits can be used as the main ingredients in making jam. Sour fruits like rattan fruit are not popularly known that can be eaten, and it is even rarer cultivated because of their fruits. Rattan fruits are an uncommon sight in the Philippine markets, and finding one may be challenging (PinoyWarrior, 2011). Sour fruits like rattan are indeed viewed as a souring mix in cooking and can be eaten raw without realizing that they can be possibly used to develop a new variety of fruit jam.

Cooking jams, jellies and marmalades using fruits, sugar, pectin, and edible acids are some of the oldest food preserving processes known to humanity and present a way of making food stable by increasing the content of insoluble solids (Herbstreith & Fox, 2017). Jam is made from crushed or ground fruit. It tends to hold its shape but is generally less firm than jelly (Dinstel, 2017). Jam is a mixture brought to a suitable gelled consistency of sugars, the pulp, and purée of one or more kinds of fruit and water (Codex Stan, 2009). Generally, jam is produced by taking mashed or chopped fruit or vegetable pulp and boiling it with sugar and water. Furthermore, rattan, as the main ingredient in the new variety of the fruit jam is known as climbing palms exploited for their flexible stems that form the basis of a significant market for cane and cane products. The word 'rattan' is an Anglicized version of the Malayan term 'rotan'. It is the collective name for climbing a big group of palms with scaly fruits. Rattan belongs to the family of Palmae. Its leaves and climbing organs are variously covered with thorns or spines, hairs and bristles. The stem of a mature rattan becomes relatively smooth, with regularly spaced scars left by the fallen leaves (RattanCraft.Com, 2017).

About 600 species belong to 13 genera of rattan. This group of plants mainly occurs in Southeast Asia and the Pacific. Only 22 species are found in the lowlands of Tropical Africa. Some species of rattan are edible, and some bear edible fruit. Like bamboo, the shoots could be turned into delicacies. On the other hand, the fruit resembles a scaly egg and tastes sweetly sour. (PinoyWarrior, 2011). The researchers decided to use rattan fruit as the main ingredient in making fruit jam. They aimed to discover if it is possible to use rattan fruit as a substitute in making jams instead of using sweet fruits. This study can be revolutionary since it promotes value-adding to the cultivation and selling of local fruit rattan. Thus, it opens new opportunities to farmers for additional income and employment for others, especially to those living in remote areas.

Statement of the Objectives

Generally, the aim of the study is to develop a new jam from rattan fruit. Specifically, the objectives of the study are the following:

1. To develop new rattan fruit jam
2. To assess the new rattan fruit jam using sensory test analysis method on the following characteristics:
 - 2.1 Taste;
 - 2.2 Appearance;
 - 2.3 Texture;
 - 2.4 Smell/Aroma;
 - 2.5 Overall opinion of respondents.
3. To identify the suggestions and comments of the respondents for further improvement of the study.

3. Methodology

Research Design

The researchers aimed to develop a new rattan jam. To achieve this, the researchers used the developmental research method. This method is defined as the systematic study of designing, developing, and evaluating programs, processes, and products that must meet internal consistency and effectiveness criteria. The most common types of developmental research involve situations in which the product-development process is analyzed and described, and the final product is evaluated. (Richey, Rita C. 1999).

Location of the Study

The first phase of the study, which includes developing the new product, was conducted in San Antonio, Nueva Ecija. This is because of the availability of the tools and equipment used in the process in the researchers' places. The evaluation of the product was conducted in Poblacion, San Isidro, Nueva Ecija, in which the respondents were located.

Respondents

The study respondents were composed of different groups of individuals in San Isidro, Nueva Ecija. The respondents were chosen using convenience sampling. Convenience sampling is also known as availability sampling. The distribution of respondents according to different types is in the table below.

Table 1: Distribution of the Respondents According to Group

| Groups | Number of Respondents |
|--------------------------------|-----------------------|
| Vendors | 25 |
| Students of NEUST-SIC | 25 |
| Faculty and Staff of NEUST-SIC | 25 |
| Civilians | 25 |

Data Gathering Techniques

The researchers used focus group discussion, interviews, and surveys in collecting data needed in the study. There were focus group discussions in the first phase of the study. Intensive conceptualization was conducted to generate ideas on the main problem of the study and on how to use rattan fruit as the main ingredient in making jam. Documentary and records collection was also used to gather existing information related to the study. Information such as rattan fruit's nature, characteristics, and benefits were gathered using this technique. Lastly, a survey was used to evaluate the product using a structured questionnaire. In this technique, the researchers can gather data about the taste, aroma, appearance, and texture of the product and the respondents' overall opinion about the product.

Research Instrument

The instrument used in the evaluation of the product was adopted from the Design and Performance of Small Scale Sensory Consumer Tests of Linn Svensson (2012). The instrument is composed of Affective Analysis, also called acceptance tests, preference tests or hedonic tests.

The effective analysis is used to quantify the consumer preference or degree of liking/disliking of a product (Lawless and Claassen, 1993). The purpose is to evaluate the personal response of preference or acceptance from current or potential customers concerning a product idea, existing product, or specific product characteristics (Meilgaard et al., 2007). Affective tests are so-called consumer tests, which means that the study participants should always be untrained and representatives of the consuming population. (Svensson L., 2012)

The hedonic rating scales quantify the affective dimension of the consumer perception of foods (Tuorila, 2008). Among the hedonic rating scales, the 9-point degree of liking scale, also called the 9-point hedonic scale, is probably the most commonly used (Tuorila, 2008) (Lawless and Heymann, 2010). The scale was invented in the 1940s and has been carefully developed, tested, and evaluated (Lawless and Heymann, 2010). In the test, participants/consumers are asked to give their hedonic opinion to a product sample by choosing and marking nine alternatives (ranging from 1 = like extremely to 9 = dislike extremely). The 9-point hedonic scale is nowadays present in several different appearances (Lawless and Heymann, 2010). The verbally anchored scale is probably one of the most used forms (Tuorila, 2008). Here every option on the 9-point scale has a verbal expression. Behind the verbal anchors/expressions lies comprehensive work and research to ensure and validate that each scale option is based on almost equal differences to give the scale ruler-like properties. However, the precise construction of the 9-point hedonic scale and its verbal anchors limit the scale's use in languages other than English (Lawless and Heymann, 2010). The 9-point hedonic scale can be printed vertically and horizontally, with the like side or the dislike side first. According to studies made by the Quartermaster Institute, the way the scale is printed on the score sheet should not affect the results (Jones et al., 1995). The hedonic 9-point scale also exists in different modifications, except for the anchored verbal scale. For example, can the scale be used without the verbal labels, or can it be altered into unbalanced, containing more like than dislike options (Lawless and Heymann, 2010). The figure below shows the verbally anchored 9-point hedonic scale, "The degree of liking scale."

3. Results and Discussion

Four groups of individuals served as the study's respondents and evaluators of the rattan jam. These groups of individuals are composed of 25 persons in each group which are the students from NEUST- San Isidro Campus, Faculty and Staff, civilians in Poblacion, San Isidro, Nueva Ecija, and vendors in the municipal market of Poblacion, San Isidro, Nueva Ecija. The most widely used scale for measuring food acceptability is the 9-point hedonic scale. The food industry quickly adopted the scale, and now it is used not just for measuring the acceptability of foods and beverages but also of personal care products, household products, and cosmetics (The Society of Sensory Professionals, 2017). In schools, Sensory Evaluation provides an ideal opportunity for students to evaluate and give feedback on their dishes, test products and experimental designs. (British Nutrition Foundation, 2017).

Taste

The table 2 shows the evaluation of the respondents on the taste of the fruit jam:

Table 2: Evaluation of the Respondents on the Taste

| Taste | Students | | Faculty & Staff | | Civilian | | Vendors | |
|-----------------|----------------|------------------|-----------------|------------------|----------------|------------------|----------------|------------------|
| | f | % | f | % | f | % | f | % |
| Like extremely | 9 | 36% | 1 0 | 40% | 1 2 | 48% | 9 | 36% |
| Like very much | 1 4 | 56% | 1 2 | 48% | 7 | 28% | 9 | 36% |
| Like moderately | 2 | 8% | 3 | 12% | 5 | 20% | 4 | 16% |
| Total | 2 5 | 100 % | 2 5 | 100 % | 2 5 | 100 % | 2 5 | 100 % |

Table 2 shows the evaluation of the students on the taste of the jam. The result shows that 14 or 56.00% of the total respondents liked the product very much, and 9 out of the 25 respondents, or 36.00%, liked the jam extremely. The lowest response is 2 out of 25 or 8.00% of the respondents, moderate. This indicates a high potential for the jam to include students in its target market.

Moreover, 12 out of 25 or 48% of the respondents liked the product's taste very much. On the other hand, 10 out of 25 or 40% of the respondents like incredibly the taste of the jam. Meanwhile, 3 out of 25 or 12% of the respondents like the jam moderately. It denotes that Faculty and Staff like the product and can be one of the potential buyers of the jam.

Regarding the civilian, 12 out of 25 or 48% of the respondents like remarkably. Furthermore, 7 out of 25 or 28% of the respondents like very much, and 5 out of 25 or 20% of the respondents like moderately. Lastly, only 1 out of 25 or 4% of the respondents like slightly. This result implies that almost half of the civilians significantly want the product.

Lastly, like significantly and like very much are the highest, nine out of 25 of 36%, while the lowest is slightly, 3 out of 25 or 12% of the respondents. It illustrates that the taste of the proposed jam from the vendor's perspective ranges from like significantly and like very much.

Appearance

The table 3 shows the evaluation of the respondents on the texture of the fruit jam:

Table 3: Evaluation of the Respondents on the Appearance

| Taste | Students | | Faculty & Staff | | Civilian | | Vendors | |
|--------------------------|-----------|-------------|-----------------|-------------|-----------|-------------|-----------|-------------|
| | f | % | f | % | f | % | f | % |
| Like extremely | 9 | 36% | 8 | 32% | 9 | 36% | 10 | 40% |
| Like very much | 10 | 40% | 16 | 64% | 9 | 36% | 5 | 20% |
| Like moderately | 5 | 20% | 1 | 4% | 7 | 28% | 6 | 24% |
| Like Slightly | | | | | | | 3 | 12% |
| Neither like nor dislike | 1 | 4% | | | | | | |
| Dislike slightly | | | | | | | 1 | 4% |
| Total | 25 | 100% | 25 | 100% | 25 | 100% | 25 | 100% |

10 or 40% of the total respondents like very much from the table above. Meanwhile, 9 out of 25 or 36% of the respondents like extremely. Also, 5 out of 25 or 20% of the respondents like moderately. And lastly, 1 out of 25 or 4% of the respondents neither like nor dislike. It denotes that the students find the product attractive and appealing.

From the table above, like extremely is the highest, 16 or 64%, while the lowest is like moderately, which is 1 or 4% of the respondents. It illustrates that the appearance of the proposed jam ranges from like extremely.

With the given data above, 9 or 36% of the total respondents like significantly and 9 or 36% like very much. Meanwhile, 7 out of 28% of the respondents like moderately. This result implied that civilians find the product and the packaging suitable to their taste.

Lastly, it is clearly stated that 10 or 40% of the total respondents like extremely. On the other hand, 6 or 24% of the respondents like moderately and 5 or 20% like very much. Others from the respondents like 3 or 12% like slightly, and lastly, only 1 or 4% dislike slightly. Based on the result, it shows that the vendors approved how the product is presented.

Texture

The table 4 shows the evaluation of the respondents on the texture of the fruit jam:

Table 4: Evaluation of the Respondents on the Texture

| Taste | Students | | Faculty & Staff | | Civilian | | Vendors | |
|-------------------|-----------|-------------|-----------------|-------------|-----------|-------------|-----------|-------------|
| | f | % | f | % | f | % | f | % |
| Like extremely | 9 | 36% | 12 | 48% | 8 | 32% | 5 | 20% |
| Like very much | 10 | 40% | 12 | 48% | 8 | 32% | 12 | 48% |
| Like moderately | 4 | 16% | | | 6 | 24% | 4 | 16% |
| Like Slightly | 2 | 8% | 1 | 4% | 2 | 8% | 4 | 16% |
| Dislike extremely | | | | | 1 | 4% | | |
| Total | 25 | 100% | 25 | 100% | 25 | 100% | 25 | 100% |

The given data above shows that 10 or 40% of the respondents like it very much. Also, 9 or 36% of the respondents like significantly. Meanwhile, 4 or 16% of the respondents like moderately. And lastly, 2 or 8% of the respondents want slightly. It implies that students find the consistency of the jam like very much.

From the table above, 12 or 48% of the total respondents like extremely and like it very much. Meanwhile, 1 or 4% of the respondents like it slightly. This result implied that in the perspective of faculty and staff, the appearance of the jam is presentable.

From the table above, the highest response of the civilians is ranging from 8 out of 25 or 32%, which is extremely, and the response dislike extremely got 1 out of 25 or 4%. This denotes that some civilians like the presentation and some are dissatisfied.

From the given data above, like very much is the highest, which is 12 or 48%, while the lowest is like moderately and slightly which is 4 or 16% of the respondents. It illustrates that the texture of the proposed jam ranges from very much for the vendors.

Smell/Aroma

The table 5 shows the evaluation of the respondents on the smell/aroma of the fruit jam:

Table 5: Evaluation of the Respondents on the Smell/Aroma

| Taste | Students | | Faculty & Staff | | Civilian | | Vendors | |
|--------------------------|-----------|-------------|-----------------|-------------|-----------|-------------|-----------|-------------|
| | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % |
| Like extremely | 8 | 32% | 12 | 48% | 6 | 24% | 5 | 20% |
| Like very much | 10 | 40% | 12 | 48% | 9 | 36% | 14 | 56% |
| Like moderately | 6 | 24% | | | 9 | 36% | 1 | 4% |
| Like Slightly | | | 1 | 4% | 1 | 4% | 3 | 12% |
| Neither like nor dislike | 1 | 4% | | | | | 2 | 8% |
| Total | 25 | 100% | 25 | 100% | 25 | 100% | 25 | 100% |

The table above shows, 10 out of 25 or 40% of the total respondents like very much. On the other hand, 8 or 32% of the respondents like significantly. Moreover, 6 or 24% of the respondents like moderately. And lastly, 1 or 4% of the respondents neither like nor dislike. This implies that students like the smell of the proposed jam.

From the table above, the highest response is 13 out of 25 or 52% of the total respondents, which is like very much and 3 or 12% of the respondents is the lowest, which is neither like nor dislike. The result illustrates that half of the faculty and staff like the smell very much and some find it good.

From the given data above, 9 out of 25 or 36% of the total respondents like very much and like it moderately. Moreover, 1 or 4 % of the respondents like slightly. With this result, the civilians' response concludes that the smell of the proposed jam passed from their criteria.

14 out of 25 or 56% of the total respondents like the given data above very much. Also, 5 or 20% of the respondents like significantly. Meanwhile, 3 or 12% of the respondents want slightly. On the other hand, 2 or 8% of the respondents neither like nor dislike. And lastly, 1 or 4% of the respondents like moderately. This implied that half of the vendors liked the smell of the proposed jam very much.

Overall Evaluation

The table 5 shows the overall evaluation of the respondents on the fruit jam:

Table 6: Overall Evaluation of the Respondents

| Taste | Students | | Faculty & Staff | | Civilian | | Vendors | |
|--------------------------|-----------|-------------|-----------------|-------------|-----------|-------------|-----------|-------------|
| | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % |
| Like extremely | 10 | 40% | 9 | 36% | 7 | 28% | 7 | 28% |
| Like very much | 13 | 52% | 15 | 60% | 11 | 44% | 15 | 60% |
| Like moderately | 1 | 4% | | | 6 | 24% | 2 | 8% |
| Like Slightly | 1 | 4% | 1 | 4% | | | | |
| Neither like nor dislike | | | | | 1 | 4% | 1 | 4% |
| Total | 25 | 100% | 25 | 100% | 25 | 100% | 25 | 100% |

From the table above, 13 out of 25 or 52% of the total respondents like it very much and 1 or 4 % of the respondents like it moderately and slightly. The result implied that the student perspective about the product is good; half of the student respondents find the proposed jam very much. It indicates that students can include in its target market.

As to the faculty and staff, 15 out of 25 or 60% of the total respondents like very much. On the other hand, 9 or 36% of the respondents like extremely. Meanwhile, 1 or 4% of the respondents like slightly. It denotes that for Faculty and Staff, the overall evaluation on the proposed product ranges from like very much.

Furthermore, based on the survey on the civilian, 11 out of 25 or 44% of the respondents liked it very much. On the other hand, 1 or 4% of the respondents neither like nor dislike. The result illustrates a high potential for the proposed jam to include civilians in its target market.

Lastly, 15 out of 25 or 60% like very much for the vendors. Meanwhile, 7 or 28% of the respondents like extremely. Moreover, 2 or 8% of the respondents like moderately. On the other hand, 1 or 4% of the respondents neither like nor dislike. This result indicates that half of the vendors like the product very much. It denotes a high potential that the vendors can also market the product.

Conclusion

After the tedious study about this topic, the researchers have found out that this kind of research can be feasible because it is possible to use rattan fruit as a substitute in making jams instead of using sweet fruits. There is a high potential that it can be a business somehow and commercialized. Based on the respondents' evaluation in terms of taste, appearance, smell/aroma, and texture, most of the respondents like it very much. The overall evaluation result is very high, and the feedback about the product is very good. Therefore, the jam made from rattan fruit can be offered to the potential market. Perhaps, anybody who has available money to engage in this kind of business will be a sure winner and can benefit from this research.

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