

Online Consumer Preference and Sensory Acceptability of Vegetable-Added Pasta Noodles

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Abstract Pasta is considered as a staple food for many countries around the world. There is a great increase in the popularity because of its nutritional aspects. This study determines the consumer preference among three vegetable pasta noodles namely: black bean (*Phaseolus vulgaris*), red bell pepper (*Capsicum annuum*) and *Gynura procumbens* or sabungai through an online survey. The survey included eight questions and was conducted through an open access document with 200 respondents. Based on the results, 50% of the respondents opted to have red bell pepper-added pasta noodles. These respondents are also willing to pay Php 100-200 (USD 2-4) for a single serving of pasta. The online survey was followed by a consumer-type sensory evaluation where the plain (no vegetable-added) pasta noodles and the three vegetable-added pasta noodles were evaluated by 50 untrained panellists. The general acceptability of plain and red bell pepper pasta noodles may not be significantly different from each other but the mean scores showed that the plain (no-vegetable added) pasta noodles has the highest acceptability followed by the red bell pepper pasta noodles. Thus one can see that the result obtained in the online survey and from the sensory evaluation were the same. Through an online survey, together with the sensory evaluation conducted, it can be concluded that the marketability and acceptability of red bell pepper vegetable-added pasta noodles has high potential.

Keywords Black beans, Red bell pepper, *Gynura procumbens*, Pasta noodles, Consumer preference, Sensory acceptability

1. Introduction

Pasta is considered one of the food products that is much appreciated worldwide and its regular consumption was recommended, because it is one of the food options suited to a balanced diet. It is a basic source of carbohydrates and contains protein, vitamins and minerals in small amounts [1]. Pasta is a perfect foundation for healthy, nutritious and satisfying meals. It is generally eaten with nutrient-dense food partners, such as fiber-filled vegetables and beans, heart healthy fish and monounsaturated oils, antioxidant-rich tomato sauce and protein-packed cheeses, poultry and lean meats.

Since the trend in the food industry focuses on healthier eating options, the purpose of adding vegetables to pasta aims to enhance pasta's health value. The incorporation of vegetables in pasta is also being done to make it more attractive and appealing to the consumers. There are a lot of vegetables that can be added and is being added to pasta nowadays e.g. Barilla (a brand of pasta noodles) offers

veggie penne with tomatoes and carrots, but in this study, the focus is on red bell pepper (*Capsicum annuum*), *Gynura procumbens* (sabungai) and black bean (*Phaseolus vulgaris*).

Bell peppers are a part of the nightshade (Solanaceae) family which ranges from green, yellow and red. Red bell peppers are given focus in the study since they tend to be sweeter and provide a more attractive and vibrant color that will be more appealing to the consumers. It also provides an excellent source of carotenoids. It is also a rich source of vitamin A, vitamin C, antioxidants and beta-carotene. Aside for being an excellent source of these nutrients, it is also a good source of dietary fiber, phosphorus and niacin [2]. Anti-inflammatory and anti-carcinogenic phytonutrients are also present due the high carotene content [3].

G. procumbens or sabungai is a fast growing herbaceous plant [4] that is recognized for its medicinal properties such as hypoglycemic, anti-cancer and anti-diabetic properties among others, is widely used in Southeast Asia [5]. It has been traditionally used as anti-inflammatory topical treatment but it can also be eaten fresh or drank like tea. Studies supported claims it has high protein content, anti-hyperglycemic [6], anti-diabetic [7] and anti-oxidative [8] properties.

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Phaseolus vulgaris is the scientific name of common beans such as black beans, pinto beans, navy beans, and kidney beans, which originated in parts of Central and South America [9]. The bean has a glossy black to dark purple shell and a creamy white interior with an “earthy” and “meaty” flavor [10]. It has the highest amounts of fiber of all beans and contains 59.8% of the recommended daily intake [11]. Their soft, mealy texture makes them easy to puree for black bean soup, refried beans, and bean dips [12].

The baseline was established whether the addition of vegetables to pasta will increase the consumer acceptability. The objective of the study is to determine the consumer preference of the three types of vegetable-added pasta noodles through an online survey and to determine the sensory acceptability of the pasta noodles.

2. Materials and Methods

2.1. Online Survey

In line with a current study on consumer acceptability of vegetable-added pasta noodles, an online survey was conducted about the three types of vegetable pasta through an open access online document composed of eight questions in total. The document gathered a total of 200 responses from regular consumers with no particular age bracket, profession requirement, nationality or gender discrimination. This is to stimulate the real nature of the consumers in the market and avoiding biases and favors.

The survey obtained information on whether the respondent is a consumer of pasta or not. It also questioned the frequency of consumption and the amount or price one is willing to pay for a pasta meal. Then the respondents were asked if they were familiar with vegetable-added pasta noodles for the reason that the researchers are trying to create vegetable-added pasta noodle with high consumer acceptability. In line with this, the respondents were presented three vegetables namely red bell pepper (*C. annum*), black beans (*P. vulgaris*) and *G. procumbens* (Sabungai) wherein it was asked whether one is familiar with the vegetable and its benefits or either. To conclude, the respondent was asked to choose one vegetable that interests him or her and would want it to be added in pasta noodles.

The online survey was conducted for five consecutive days from September 3 to 7 of the year 2014, and then was put under statistical analysis for evaluation. The final result was treated by obtaining the percentage of each answer per question. The option with the highest percentage was considered as the representative answer of the majority and is evaluated as such.

2.2. Sensory Evaluation

After the online survey, a sensory evaluation was conducted to determine the consumer acceptability of the

vegetable-added pasta noodles. A total of four coded samples were evaluated by 50 untrained panelists (chosen not from those who took part in the online survey), three of which are vegetable-added pasta noodles and one of which is the plain pasta noodles with no added vegetable that serves as the control. The samples, each weighing approximately 10 grams were evaluated by the panelists individually at the sensory laboratory. Each sample was evaluated with a pasta sauce that is in a separate container so as not to mask the color of the pasta noodles which is to be evaluated as well. To prevent biases, the samples were presented individually and consecutively after each evaluation. A 9-point hedonic scale was used in evaluating the samples for attributes namely appearance, color, aroma, flavor, texture and general acceptability respectively. The results of the evaluation were interpreted and analysed using a one-way Analysis of Variance [13].

3. Results and Discussion

There is a great increase in the popularity and trend for pasta, not only due to its ease of cooking and preparation but also because it is rich in carbohydrates and a minor source of protein, vitamins and minerals. Because more consumers are becoming health-conscious on what they consume and wants an innovation to what they normally eat, the group decided to develop vegetable-added pasta noodles.



Figure 1. Top (L to R): No vegetable-added pasta noodles, Red bell pepper pasta noodles (*Capsicum annum*), *Gynura procumbens* pasta noodles (Sabungai); Bottom (L to R): Black bean pasta noodles (*Phaseolus vulgaris*) as shown in the online survey document

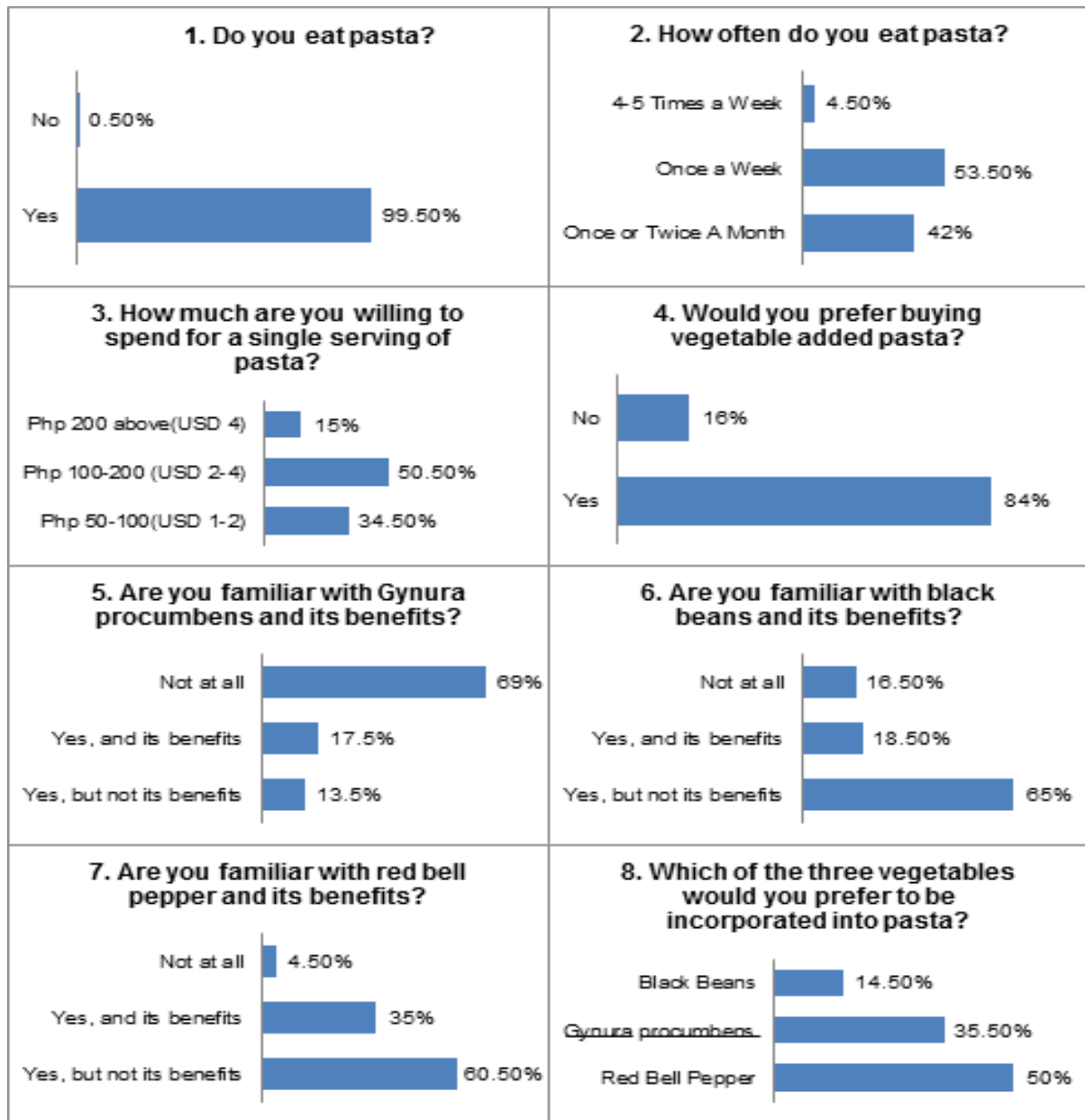


Figure 2. Percentage response of each answer per question in the online survey document with a total of 200 respondents

An online survey is important not only in initiating a business, but also in determining the insight and trend in the consumers. Before conducting the actual development of the product, online surveys must be conducted in order to determine the initial reaction and feedback of the consumers to the product to be developed. It also helps in determining the appropriate marketing strategies to be used in the implementation and development of the product. Further study on the sensory evaluation of the products itself can further verify the results obtained from the online survey. If the online survey results were different from the sensory evaluation results, there may be some factors such as consumer preference, diet and nutritional requirement that have contributed to it.

In order to determine the marketability of the

vegetable-added pasta noodles, an online survey was conducted followed by the sensory evaluation on the consumer acceptability with the actual products. Basic questions such as whether they eat pasta, how often they eat pasta and the acceptable price range were asked in the survey, followed by a series of questions on respondent's familiarity with the said vegetables added to the pasta noodles. These were asked to see whether their familiarity with the vegetable has a certain effect on their pasta noodle preference.

Based on the results obtained in the online survey, only one respondent said that he/she does not eat pasta. This shows that the percentage of the consumers who eat pasta is high. However, since rice is used as the staple food in most Asian market, the availability and convenience of buying or

obtaining rice over pasta is higher. Therefore only a few consumers eat pasta frequently. Aside from the frequency of consuming pasta, the availability and the ingredients used in preparing pasta are not cheap yet not too expensive. This is the reason why almost 50% of the respondents are willing to pay the range of a hundred to two hundred pesos (USD 2-4). In order to assess whether the study is beneficial, it is necessary to know if consumers would prefer buying vegetable-added pasta noodles over the plain pasta noodles (no vegetable-added) sold in the market. Since 84% of the respondents showed positive reactions to the vegetable pasta noodles, then it is better to continue the study and contribute something to the society.

There are a lot of vegetables sold in the market, and specifying the three vegetables that the researchers intended to use would be helpful for the respondents in deciding the one consumers would prefer. From Figure 2 shown above, it is evident that consumers are most familiar with red bell pepper, next was the black beans and the least known vegetable would be *G. procumbens*. When it comes to their preferences over the vegetables, red bell pepper still tops among the three added vegetables. However, respondents preferred *G. procumbens* over black beans. It can be said that this online survey has proven that more consumers are becoming health-conscious and want an innovation to the usual pasta noodles.

Table 1. Sensory Acceptability of Vegetable-Added Pasta Noodles

Attribute	Plain (No vegetable-added)	Red bell pepper	<i>Gynura procumbens</i>	Black beans
Appearance	8.02±.04 ^a	7.84±.19 ^a	6.82±.06 ^b	6.46±.08 ^c
Color	8.02±.11 ^a	8.0±.12 ^a	6.78±.21 ^b	6.4±.19 ^c
Aroma	7.92±.24 ^a	7.82±.18 ^a	7.42±.05 ^b	7.28±.14 ^b
Flavor	8.16±.15 ^a	7.8±.08 ^a	7.16±.09 ^b	7.12±.07 ^b
Texture	7.82±.08 ^a	7.8±.04 ^a	7.36±.04 ^b	6.9±.06 ^c
General Acceptability	8.12±.09 ^a	7.88±.08 ^a	7.14±.04 ^b	6.98±.08 ^b

This table shows the mean scores of the sensory attributes evaluated by 9-point hedonic scale (9 = Like extremely, 8=like very much, 7=like moderately, 6=like slightly, 5=neither like or dislike, 4=dislike slightly, 3=dislike moderately, 2=dislike very much, 1=dislike extremely).

With the online survey showing good results, a sensory evaluation of the product itself was then conducted. From the sensory data obtained, Analysis of variance and the Duncan multiple range test (DMRT) was done to see whether the pasta noodles differ significantly from one another. Results showed that the plain (no vegetable-added) pasta noodles and red bell pepper-added pasta noodles do not differ significantly from each other. However, these two pasta noodles are significantly different from the other two pasta noodles in term of all the attributes analyzed. *G. procumbens* and black beans added pastas also do not differ significantly from each other in terms of their aroma and flavor attribute, and their general acceptability.

The general acceptability of the pasta noodles, showed that the plain (no vegetable-added) and red bell pepper pastas are not significantly different from each other with acceptability scores of 8.12 and 7.88 respectively. Pastas with added black beans (6.98) and *G. procumbens* (7.14) have significantly lower acceptability scores than those with bell pepper added and plain pastas. They however, are not significantly different from each other. From these results one can see that the online survey and the sensory evaluation resulted to the same high acceptability preference of the bell pepper vegetable added pasta.

4. Conclusions

The online survey can be an effective method in determining the insight of the consumers. It is also an important initial method to be used in order to determine if the consumers will respond positively to the food produced.

Among the three vegetables added to pasta, red bell pepper was the best choice which may be because most respondents have more knowledge and awareness of what the vegetable is and its potential health benefits. The bell pepper vegetable-added pasta noodle is feasible to be developed and produced in the market. Further studies on certain factors, such as color, palatability of the vegetables, consumer specific age range, profession, nationality and gender should be done to avoid wide range deviations.

5. Recommendations

It is recommended that when developing pasta noodles it is best that one must consider the abundance and availability of the desired vegetable to be able to develop and produce pasta noodles with an affordable price. It is also recommended that the consumers who took the sensory evaluation would also be the same consumers who would take the online survey. Other than these, future studies on marketability survey for consumers who live in a specific area wherein the vegetables presented are familiar so as to see whether it would be feasible to sell vegetable-added pasta noodles on the desired place, or conduct a survey with the actual product.

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