

Perceptions and Factors Affecting Consumers' Purchase Intentions of Fermented Rice Bran (FRB)-Enriched Bakery Products in Leyte, Philippines

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ABSTRACT

Rice bran is typically utilized as animal feed but is recently been used in nutraceuticals due to its vast nutritional components. Using fermented rice bran (FRB) as adjunct food ingredient promotes health among consumers. In the Philippines, adding FRB into foods is a fresh product concept. Developing FRB-incorporated food products requires that the new products are consumer-oriented, that is, it optimally fit with the needs and expectations of the consumers. The study seeks to assess consumers' perceptions and purchase intention for loaf bread, *pan de sal*, cookies, and other bread added with fermented rice bran (FRB) as input to developing FRB-incorporated bakery products. Descriptive analysis was performed to analyze the respondents' socio-demographic characteristics, purchase and consumption data for the existing bakery products, and their awareness, perceptions, and purchase intentions for FRB-incorporated bakery products. Binary regression analysis was employed to determine the factors affecting consumers' purchase intention toward bakery products added with FRB. Results showed that majority (79%) of the respondents perceived FRB-incorporated bakery products as nutritious. Their willingness to pay for FRB-incorporated loaf bread (PhP53.39/piece), FRB-incorporated *pan de sal* (PhP3.80/piece), FRB-incorporated *other breads* (PhP7.67/piece), and FRB-incorporated cookies (PhP8.31/piece) were higher than the prices of the existing (*non-FRB-incorporated*) bakery products. Regression analysis reveals that educational attainment (coefficient=0.86, p=0.038), mother as household decision-maker (coefficient=2.40, p=0.051), consumers' perception for the FRB-incorporated bakery products being healthy (coefficient=3.29, p=0.022) and perceived good taste (coefficient =0.19, p=0.001) were significant factors affecting consumers' willingness to buy bakery products added with fermented rice bran. The results can be used by product developers, potential technology adopters, and other stakeholders for developing FRB-incorporated bakery products.

Keywords: Fermented Rice Bran, bakery products, new product development, market study, binary regression

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INTRODUCTION

Rice bran is a rice milling by-product. It is rich in vitamins, minerals, amino acids, dietary fiber, essential fatty acids, and antioxidants. Its antioxidant compounds like polyphenols, vitamin E, tocotrienols, and carotenoids help prevent oxidative damage to DNA and other body tissues (Jariwalla 2001). The rice bran bioactive compounds possesses health-promoting properties for reducing the risk of non-communicable chronic diseases (Ferreira et al 2019). It provides health benefits, including its anti-cancer effects and protection against cardiovascular system disease (Esa et al 2013). In addition, rice bran can reduce systolic blood pressure, improve blood sugar levels, reduce insulin resistance and increase nitric oxide in the blood (Ardiansyah et al 2019; Ardiansyah 2021).

Fermentation has been widely used to improve food quality (Ardiansyah et al 2021). It enhances the taste and increases the food's bioactive compounds and protein content (Cheng et al 2016; Srivastava et al 2018; Oliveura et al 2010). Fermented rice bran has been used in food applications such as in bakery products (Christ-Ribeiro et al, 2017; Demirci et al 2017; Wang et al 2016); and coffee whiteners, toppings, beverages, confectionery and meat (Giese 1994 as cited by Hamada 2000).

New product development (NPD) refers to the introduction of new products to the market for continuing business or organizational success (Bhuiyan 2013). New products could be major innovations, product improvements, product additions, or repositioned products. Major innovations are products that are totally new in the market created by new technological developments and provide new experiences to the customers. On the other hand, product improvements are existing products which are added with some features or attributes to differentiate from competitors' product. Product additions refers to imitations products which uses the market of the producers of the original products. Conversely, repositioned products are products positioned in a different way to attract different group of consumers.

Understanding the market prior to creating new product is critical to ensure the product meets market demand. Putting customers in consideration before developing a new product helps to identify customers' problems, unmet needs, and even unarticulated needs (Cooper et al 2001).

Statement of the Problem

Rice bran has shown great potential in food applications due to its high health beneficial components. In the Philippines, however, using fermented rice bran as a supplemental ingredient to foods is a new product concept. Incorporating fermented rice bran to bakery products requires prior market information such as consumers' perceptions and purchase intentions toward the new products to increase the chance of the new products' market success. Market research plays a significant role before developing a new product (Sarstedt & Moi 2019). Understanding consumers in early stages of the new product development process is a critical success factor for new product development (Kleef et al 2005). Previous studies have shown that not understanding the needs and expectations of the consumers prior to launching new products in the market increases the

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likelihood of market failure (Dijksterhuis 2016; Horvat et al 2019).

Objectives of the Study

The study aims to determine the perceptions and purchase intentions of consumers toward bakery products added with fermented rice bran.

METHODOLOGY

Respondents, Study Location, and Data Collection Procedure

The study was conducted in the three major cities of Leyte, namely, Baybay, Ormoc, and Tacloban. These cities are considered commercial hubs in the province where business activities are mostly concentrated. The respondents were consumers of bakery products with age ranging from 15-64 years old. According to Ballesteros and Ramos (2018), consumers of these age range have the capacity to make purchasing decision.

Using Cochran's formula, a total of 200 consumers of bakery products were included as respondents of the study. The respondents were proportionately distributed among the three selected cities. Specifically, 85 respondents were picked from Tacloban City, 76 from Ormoc City, and 39 from Baybay City. The survey was carried out outside of bakeshops where consumers of breads and cookies usually buy the products. A face-to-face interview was conducted using a structured survey questionnaire to randomly selected bakery products' consumers or buyers. As the FRB-incorporated bakery products are yet to be developed, information about fermented rice bran and its health benefits were explained to the respondents to give them idea about the studied products.

Data Analysis

The study employed descriptive analysis to analyze the respondents' socio-demographic characteristics, purchase and consumption data for the current bakery products, and their awareness, perceptions, and purchase intentions for FRB-incorporated bakery products. On the other hand, binary logistic analysis was used to examine the factors that affect consumers' purchase intention toward FRB-incorporated bakery products. Binary regression is typically used to analyze several factors influencing a dependent variable with only two possible outcomes. In the case of this study, the predictor variables are the respondents' socio-demographic characteristics, health consciousness, awareness on fermented rice bran and its health benefits, and consumers' perceptions toward FRB-incorporated food products. On the other hand, the outcome variable is the consumers' purchase intention with only two outcomes, that is, purchase or not purchase. The regression model is specified as follows:

$$WTB (\text{probability is } 1) = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Male} + \beta_3 \text{Married} + \beta_4 \text{HHsize} + \beta_5 \text{EducAtt} + \beta_6 \text{Inc} + \beta_7 \text{HealthCon} + \beta_8 \text{FRBAware} + \beta_8 \text{HealtBen} + \beta_{10} \text{PerHealth} + \beta_{11} \text{PerExp} + \beta_{12} \text{PerShort} + \beta_{13} \text{PerLong} + \beta_{14} \text{PerTaste} + u$$

Where:

Consumers' purchase intention (Probability is 1)	=	a dummy for intention to purchase, taking 1 for willing and 0 for not willing
Age	=	the actual age of the respondent in years
Male	=	a dummy variable for sex of the respondent, taking 1 for male and 0 for female
Married	=	a dummy variable for the civil status of the responder taking 1 for married and 0 otherwise
HHsize	=	actual household size of the respondents
EducAtt	=	actual years of educational attainment of the respondent
Inc	=	measures the annual income of the respondent
HealthCon	=	a dummy variable for health consciousness of the respondent, taking 1 for health conscious and 0 otherwise
FRBAware	=	a dummy variable for respondent's awareness on fermented rice bran taking 1 for aware on fermented rice bran and 0 otherwise
FRBBen	=	a dummy variable for respondent's awareness on the health benefits of fermented rice bran taking 1 for aware on the health benefits of FRB and 0 otherwise
PerHealth	=	a dummy variable for the respondent's perception of the fermented rice bran incorporated bakery products being healthy taking 1 for perceived healthy and 0 otherwise
PerExp	=	a dummy variable for the respondent's perception of the fermented rice bran incorporated bakery products being expensive taking 1 for perceived expensive and 0 otherwise
PerShort	=	a dummy variable for the respondent's perception of the fermented rice bran incorporated bakery products having a short shelf life taking 1 for perceived short life and otherwise
PerLong	=	a dummy variable for the respondent's perception of the fermented rice bran incorporated bakery products having a long shelf life taking 1 for perceived long shelf life and 0 otherwise
PerTaste	=	a dummy variable for the respondent's perception of the fermented rice bran incorporated bakery products having a good taste taking 1 for perceived good taste and otherwise
u	=	error term

The statistical method was subjected to the goodness of fit test, a diagnostic test to check for any misspecifications or non-linearity that might have existed among predictor variables included in the model. In addition, some variables suspected of causing errors in the model were removed in the final analysis.

RESULTS AND DISCUSSIONS

Socio-Demographic Characteristics of Respondents

Descriptive statistics showed that consumers of bakery products have an average age of 30 years old. This signifies that many of the respondents are relatively young and in their economically active stage. The majority of them are female (56.5%) while the remaining 43.5% are male. The high proportion of female respondents can be due to the fact that Filipino mothers or wives are the ones who make the decision regarding what and how much food, clothing and other household items to buy (David 1994). Similarly, the study of Yilmaz-Ersan 2020 revealed that females were the primary decision-maker in food purchasing in the household, had higher levels of health awareness, and were more knowledgeable about nutrition than men. Interestingly, the result of the study also showed that mothers are the primary purchase decision-maker in the household as shown in Table 1.

Table 1. Socio-demographic characteristics of the respondents

CHARACTERISTICS	COUNT	PERCENT
Age		
15 to 24 years old	99	49.5
25 to 34 years old	39	19.5
35 to 44 years old	27	13.5
45 to 54 years old	18	9.0
55 to 64 years old	17	8.5
Total	200	100
Mean	30.15 years old	
Sex		
Female	113	56.5
Male	87	43.5
Total	200	100
Civil Status		
Single	130	65.0
Married	66	33.0
Widow/widower	4	2.0
Total	200	100
Sources of Income (n=192)		
Professional	49	25.5
Service	36	18.8
Business	24	12.5
Farming	23	12.0
Construction work	20	10.4
Students	13	6.8
Self-employed	11	5.7
Remittance	10	5.2
Pension	6	3.1
Total	192	100

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Table 1 continued ..

Monthly Income in Php (n=184)		
< Php 10,000.00	110	59.8
Php 10,000.00 – 15,000.00	26	14.1
Php 15,001 – 20,000.00	22	12.0
>Php 20,001.00	26	
<i>Minimum</i>	<i>Mean</i>	<i>Maximum</i>
1,000.00	12,651.75	52,000.00
Educational attainment (n=198)		
<i>Minimum</i>	<i>Mean</i>	<i>Maximum</i>
1 year	11.36 years	16 years
Household Size (n=195)		
<i>Minimum</i>	<i>Mean</i>	<i>Maximum</i>
1	5.44	15
Decision Maker		
Mother	91	45.5
Father	84	42.0
Both parents	13	6.5
Older siblings	12	6.0
Health consciousness		
Health conscious	176	88.0
Non-health conscious	24	12.0
Total	200	100

The results further reveal that the average number of years that the respondents spent in school was 11 years. The average household size was five (5) and they earned an average monthly income of PhP 12,651.75. Based on the Philippine Institute of Development Studies (PDIS) income classification, the respondents belong to the low-income class but not the poor income category. Another important finding of the study is that most of the respondents consider themselves as health conscious. This implies that FRB-incorporated bakery products can be effectively positioned in the market as healthy foods considering that consumers think of their health as important to them.

Consumers' Purchase and Consumption Data of Bakery Products

The study results revealed that almost all of the respondents have purchased loaf bread (98%), pan de sal (99.5%), other bread (97.5%), and cookies (90.5%). The high purchase and consumption rate of bakery products can be attributed to the fact that breads are widely consumed among Filipinos. Bakery products are naturally eaten for any meal of the day or as snack partnered with ice-cold juice or soft drinks. *Pan de sal*, which was introduced to the Philippines in the 16th century and other breads are commonly partnered with hot coffee or chocolate and eggs during breakfast. Furthermore, loaf bread has become part of the Leyteños diet (PSA Region VIII 2017).

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Table 2. Purchase and consumption of bakery products by the respondents

	Loaf Bread		Pan de sal		Other bread		Cookies	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes	196	98	199	99.5	195	97.5	181	90.5
No	4	2	1	0.5	5	2.5	19	9.5
Total	200	100	200	100	200	100	200	100

Figure 1 shows the consumer's purchase frequency of bakery products. *Pan de sal* appears to be the commonly consumed baked good as more than half (114 or 57%) of the respondents purchased the product once a day. On the other hand, the consumers commonly purchase loaf bread, cookies, and other bread once a week.

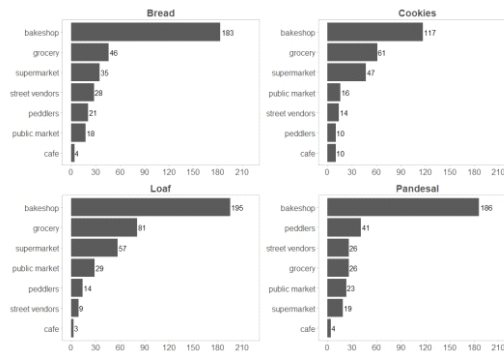


Figure 1. Purchase frequency of bakery products

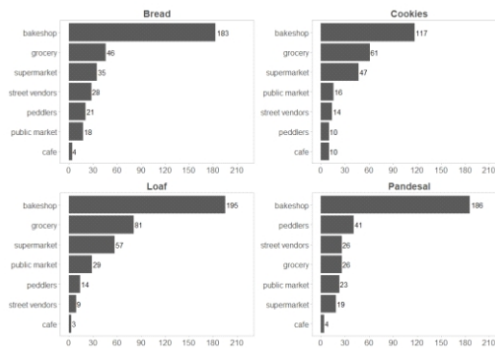


Figure 2. Existing market outlets for bakery products

As presented in Figure 2, consumers typically purchase loaf bread, *pan de sal*, cookies, and other bread from bakeshops. This is followed by retail stores, except for *pan de sal* which the consumers also purchased from peddlers. Many respondents also purchased loaf bread (28.8%) and cookies (28%) from

supermarkets.

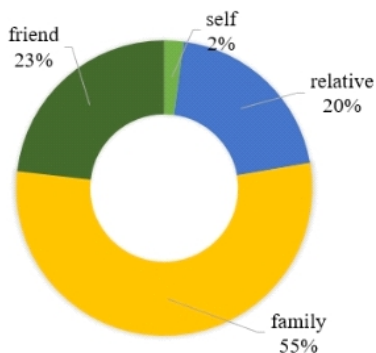


Figure 3. Influencers in buying bakery products

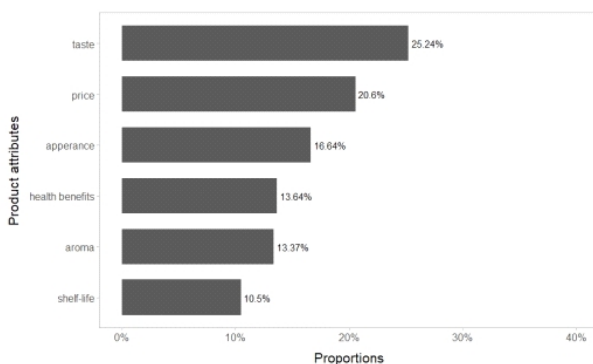


Figure 4. Attributes consumers are looking for in buying bakery products

Family (54.57%) is the top influencer of the consumers in buying bakery products. This is followed by friends (23.17%), relatives (20.21%), and self (2.13%). The finding is consistent with the study of Vella et al (2014), which also identified that family and friends were among the most common sources of information about functional foods (Figure 3).

Figure 4 presents the attributes consumers look for in buying bakery products. Results show that taste (25.24%) is the key product attribute that consumers consider when purchasing baked products. According to Stanton (2013), taste is the main reason people buy food, better taste means better profit. Price (20.6%) is the second attribute consumers consider in buying bakery products, followed by appearance (16.64%), health benefits (13.64%), aroma (13.37%) and shelf life (10.5%).

Respondents Awareness on Fermented Rice Bran

Respondents were asked about their awareness of fermented rice bran. Almost all (199 out of 200 or 99.95%) respondents did not know about fermented

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rice bran (FRB). The single respondent who was aware of FRB acquired the information from the school course. This very low level of awareness on fermented rice bran is expected since FRB has not been used for food applications in the Philippines food industry (Figure 5).

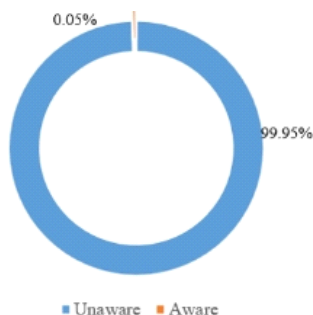


Figure 5. Respondents' awareness and knowledge of the fermented rice

Consumers' Perceptions toward Bakery Products Added with Fermented Rice Bran

Generally, consumers gave optimistic perceptions toward bakery products added with fermented rice bran as an adjunct ingredient. They perceived the new products to be nutritious or healthy (79%), tastes good (54%), with reasonable price (45.5%), have a long shelf-life (45.5%), and unique (0.5%). These positive perceptions toward FRB-incorporated bakery products implies a high propensity of the consumers to purchase the new products when made available in the market since consumers with positive responses toward well-being foods are more likely to buy them in the future (Lim & An 2020). Some respondents, however, had negative perceptions about bakery products added with FRB. They perceived the new products to be expensive (31%) primarily due to value addition in terms of enhanced nutrition, have a short shelf-life (28%), and have a bad taste (20%). In addition, one respondent (0.5%) was doubtful about bakery products added with fermented rice bran due to the belief that rice bran is mainly used as feed for livestock (Table 3). Given this negative views of the consumers toward FRB-incorporated bakery products, marketers should formulate strategies to convert this doubtful consumers to become potential buyers.

Table 3. Respondents' perceptions of bakery products when incorporated with fermented rice bran*

PERCEPTION	COUNT	PERCENT
Nutritious/healthy	158	79.0
Taste good	108	54.0
Price is per reasonable	91	45.5
Long shelf -life	69	34.5
Expensive	62	31.0
Short shelf -life	56	28.0
Taste bad	40	20.0
Doubtful since bran is mainly used for livestock consumption	1	0.5
Unique	1	0.5

*Multiple response

Consumers' Purchase Intention toward FRB-Incorporated Bakery Products

Figure 6 presents the willingness of the consumers to buy FRB-incorporated bakery products. It shows that majority of the consumers are willing to purchase loaf bread (72%), *pan de sal* (72%), other bread (72%), and cookies (69%) added with fermented rice bran. Nonetheless, a number of them expressed being unsure and not willing to buy the new products primarily because they don't trust new foods. They also perceived the products to be expensive due to the added nutritional contents (Table 4).

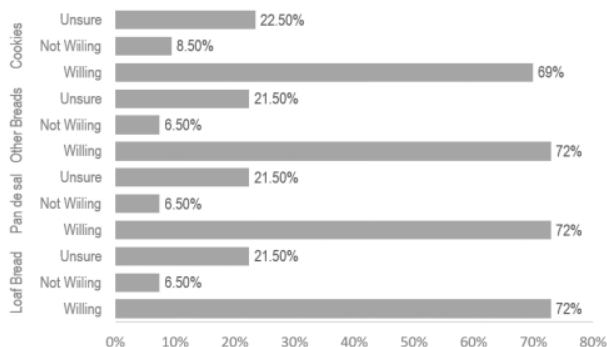


Figure 6. Respondents' willingness to buy bakery products when incorporated with fermented rice bran (n=200)

As shown in Table 4, consumers are willing to purchase an average of 2 packs of FRB-incorporated loaf bread, 16 pcs of FRB-incorporated *pan de sal*, 12 pcs of FRB-incorporated other breads and 9 pcs FRB-incorporated cookies per month.

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Table 4. Reasons why respondents are unsure/unwilling to buy FRB-incorporated bakery products (n=123)*

	COUNT	PERCENT
I don't trust new food	60	48.8
Maybe expensive due to enhance nutritional content	59	48.0
Not sure about the taste	16	13.0
Perhaps the taste is bad	7	5.7
Unaware of the health benefits to human	7	5.7
Not familiar	6	4.88

*Multiple response

Respondents who were willing to buy bakery products incorporated with fermented rice bran were asked how often they would buy the products if made available in the market. As presented in Figure 3, 41.5% of the respondents will purchase it weekly for loaf bread, while 14.5% will buy it monthly. For the *pan de sal*, 37.5% of the respondents will buy it daily while 21% will buy it every week. For other breads, 32.5% of the respondents will purchase it every week while 21% will buy it daily. Lastly, for cookies, 29.5% and 28.5% of the respondents will purchase the product monthly and weekly basis, respectively (Figure 7).

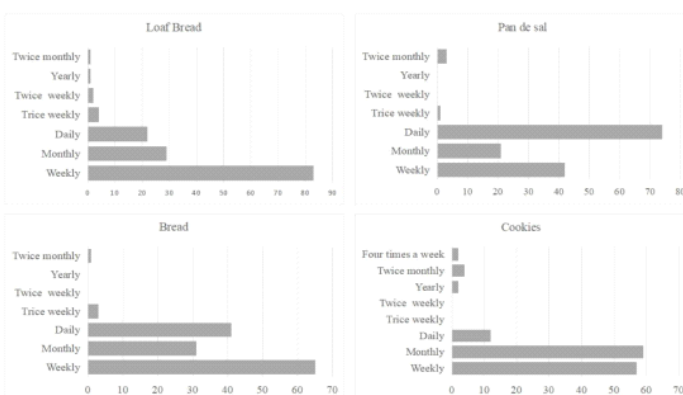


Figure 7. Respondents' purchase frequency for bakery products when incorporated with fermented rice bran (n=200)

Considering the health benefits that the FRB-incorporated bakery products may provide to the consumers, respondents were asked of how much they were willing to pay for the products. Consumers' willingness to pay for FRB-incorporated bakery products is determined per demographic factors like age, sex, civil status, educational attainment, income level, health consciousness, and household decision-makers.

Table 5. Quantity that consumers are willing to buy for bakery products when added with fermented rice bran monthly

	MINIMUM QUANTITY	AVERAGE QUANTITY	MAXIMUM QUANTITY
Loaf bread (packs)	1	2	7.0
Pan de sal (piece)	2	16	50.0
Other bread (piece)	1	12	60.0
Cookies (piece)	1	9	50.0

Age

Table 6 shows the willingness to pay of the consumers according to age range. Based on average values, consumers belonging to the age range of 35 to 44 years old has the highest willingness to pay for loaf bread at Php53.64/pack among age groups. Conversely, consumers with age ranging from 15 to 24 years old have the highest willingness to pay for pan de sal (Php4.51/piece), other bread (Php8.46%/piece), and cookies (Php8.84/piece). The higher willingness to pay for loaf bread of the consumers within the age range of 35-44 years old could be attributed to their high purchasing power since they have a more stable income compared to the younger ones. *Pan de sal*, other breads, and cookies are priced at Php2.35/piece, Php5.00/piece, and Php6.00/piece respectively in the market (DTI 2022), which is more affordable for consumers with age ranging from 15 to 24 years old.

Table 6. Respondents' willingness to pay by age range

AGE RANGE	LOAF BREAD			PAN DE SAL			OTHER BREAD			COOKIES		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
15 to 24	10	51.88	85	2	4.51	30	2	8.46	30	5	8.84	30
25 to 34	30	52.69	75	2	3.19	5	5	6.92	15	5	7.12	20
35 to 44	35	53.64	75	2	3.29	10	5	7.1	20	5	8.19	20
45 to 54	35	55	100	2	2.82	5	5	6.82	10	2	8.2	20
55 to 64	35	50.36	75	2	3	10	5	6.71	19	5	8.25	19

Sex

Table 7 shows that females have a higher willingness to pay for all FRB-incorporated bakery products: loaf bread (Php 53.81/pack), *pan de sal* (Php 4.33/piece), other bread (Php8.07/piece), and cookies (Php9.01/piece). This suggests that females are relatively health-conscious than males (Barebring et al. 2020), indicating their high willingness to pay for healthy food products.

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Table 7. Respondents' willingness to pay by sex/gender

	MALE			FEMALE		
	Min	Mean	Max	Min	Mean	Max
Loaf Bread	30	50.34	100	10	53.81	85
Pan de Sal	2	3.02	10	2	4.33	30
Other Bread	5	7.09	20	2	8.07	30
Cookies	2	7.3	20	5	9.01	30

Civil Status

Table 8 below shows that widower respondents are highly willing to pay for loaf bread (Php53.75/pack) and *pan de sal* (Php5.25/piece). At the same time, single respondents recorded the highest willingness to pay for other bread (Php8.13/piece) and cookies (Php8.74/piece).

Table 8. Respondents' willingness to pay by civil status

	Single			Married			Widow/wer		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Loaf Bread	10	52.83	100	35	51.46	75	35	53.75	65
Pan de Sal	2	4.1	30	2	3.13	10	2	5.25	10
Other Bread	2	8.13	30	5	6.83	20	5	7.5	10
Cookies	2	8.74	30	5	7.64	20	5	6.25	10

Table 9. Respondents' willingness to pay by educational attainment

	LOAF BREAD			PAN DE SAL			OTHER BREAD			COOKIES		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Primary School	35	48	75	2	3.4	10	5	6.5	20	5	7.35	15
High School/ Junior High	30	49.31	65	2	4.33	30	5	7.64	30	5	8.61	30
Senior High/ College	10	54.65	100	2	3.77	19	2	8.39	29	2	8.43	20
Graduate Education	30	54.29	75	2	3.29	5	5	6.07	10	5	7.29	15

Income

Respondents with a household income between Php 10,001.00 to Php 15,000.00 had a higher willingness to pay for loaf bread (Php56.43/pack), other bread (Php9.93/piece), and cookies (Php9.54/piece), and respondents with income above Php20,000.00 had higher willingness to pay for pan de dal (Php5.55/piece) (Table 10).

Table 10. Respondents' willingness to pay by the level of income

	LOAF BREAD			PAN DE SAL			OTHER BREAD			COOKIES		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
<10000	10	50.57	85	2	3.35	10	5	6.97	20	5	8	20
10001 - 15000	30	56.43	75	2	4.86	19	5	9.93	29	5	9.54	20
15001 -20000	35	50.71	65	2	3	7	2	7.64	15	5	8	20
>20001	30	54.55	100	2	5.55	30	5	9.05	30	2	9.23	30

Health Consciousness

Table 11 presents the health consciousness of the respondents. Most of the respondents considered their health as very important (88%) while 12% considered it as important to them indicating that all respondents were health-conscious. Consumers who considered their health as very important had an increased willingness to pay for loaf bread (Php54.54/pack) and cookies (Php8.46//piece). While the respondents who considered their health important recorded a high willingness to pay for pan de sal (Php4.00/piece) and other breads (Php7.62/piece).

Table 11. Respondents' willingness to pay by health consciousness

	VERY IMPORTANT			IMPORTANT		
	Min	Mean	Max	Min	Mean	Max
Loaf Bread	10	52.54	100	40	50.83	75
Pan de Sal	2	3.79	30	2	4	10
Other Bread	2	7.62	30	5	8.4	19
Cookies	2	8.46	30	5	6.5	10

Decision Maker

Father as decision-maker had a high willingness to pay for loaf bread (Php56.32/pack), pan de sal (Php7.65/piece), and cookies (Php8.52/piece). Other decision-makers (both parents and other older siblings) had a higher willingness to pay for other bread (Php8.07/piece). Table 12 presented the respondents' willingness to pay for household decision-maker.

Table 12. Respondents' willingness to pay by the household decision-maker

	FATHER			MOTHER			OTHERS		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Loaf Bread	35	56.32	100	10	50.85	75	30	46.94	65
Pan de Sal	2	3.81	19	2	3.77	30	2	3.81	7.5
Other Bread	5	7.65	29	2	7.54	30	5	8.07	15
Cookies	2	8.52	20	5	8.07	30	5	8.42	14.5

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The willingness to pay analysis results indicates that the bakery products added with FRB appeals to general consumers across all socio-demographic variables. It is found out that the willingness to pay of the consumers for the FRB-incorporated bakery products is higher than the current market price of the current (non-FRB incorporated) bakery products. Based on the Department of Trade and Industry (DTI) 2022 the suggested retail price for loaf bread (Pinoy Taste) was Php38.50 per pack, pan de sal was Php2.35 per piece, bread was Php5.00 per piece, and cookies was Php6.50 per piece. This is a good indicator that health-food effects can be associated to high value.

Determinants of Consumers' Purchase Intention toward FRB-Incorporated Bakery Products

Table 13 presents the result of the binary logistic regression analysis. It was found that educational attainment is a positive significant (coeff.= of 0.86, p-value=0.038) predictor of consumers' willingness to buy the products. This shows that for every one year increase in educational attainment, the logit of the willingness to buy of the respondents increases by 0.87. As the decision-maker of the household, the mother has a positive significant (coeff.= of 2.40, p-value=0.051) predictor of consumers' willingness to buy at a 5% level of significance. This suggested that mothers are more likely to purchase FRB-incorporated bakery products than any other household decision-makers. Respondents' perception of FRB-incorporated bakery products being healthy has a positive significance (coeff.= 3.29, p-value=0.022) at a 5% level of significance. Respondents' perception of FRB-incorporated bakery products having good taste is a positive and highly significant (coeff.= 0.19, p-value=0.001) predictor of consumers' willingness to buy the products. This signifies that in every unit increase in the perception of FRB-incorporated bakery products having a good taste, the likelihood of the consumers' willingness to buy the product increases by 0.20. This implies that food product developers or processor should ensure that incorporating fermented rice bran to bakery products should not give these products a bad taste.

Table 13. Factors affecting the WTP for FRB-incorporated bakery products using binary logistic regression

PREDICTORS	COEFFICIENT	P-VALUE
(Intercept)	0.55	0.819
Age	1.00	0.973
Sex (Female)	1.28	0.579
Civil status: married	0.93	0.906
Household size	0.98	0.783
Education	0.86 **	0.038
Income	1.43	0.182
Decision (Mother)	2.40 *	0.051
Decision (Siblings)	0.61	0.549
Decision (Both parents)	1.86	0.471
Perception: health	3.29 **	0.022
Perception: expensive	1.02	0.959
Perception: short shelf-life	0.88	0.800
Perception: long shelf-life	1.16	0.774
Perception: taste	0.19 ***	0.001
WTP loaf	1.00	0.865
WTP pan de sal	1.02	0.787
WTP bread	0.98	0.712
WTP cookies	0.95	0.307
Observations	178	
Hosmer and Lemeshow R-square	0.191	
Cox and Snell R-square	0.203	
Negelkerke R-square	0.292	
Deviance	171.01	
log-Likelihood	-85.505	

CONCLUSIONS

The findings of the study show that consumers commonly consume bakery products. When buying bakery products, consumers consider the taste, price, appearance, and nutritional value. The results reveal that almost all the respondents were not aware (99.95%) of FRB, and only one (0.05%) respondent had knowledge but was unaware of incorporating it into bakery products. On the other hand, the respondents' perception of the FRB-incorporated bakery products was nutritious, taste good, and affordable. A fascinating insight is that most respondents were willing to buy FRB-incorporated bakery products. Furthermore, the respondents were willing to pay a higher price for the FRB-incorporated bakery products than the non-FRB incorporated bakery products. It was also found out through the logistic analysis that consumers with higher educational attainment, mother as decision-makers, and health-conscious individuals were more likely to purchase FRB-incorporated bakery products. At the same time, the respondents' perception of FRB-incorporated bakery products' having a good taste was a positive and highly significant predictor of consumers' willingness to buy the products.

RECOMMENDATIONS

The study's overall finding reveals the positive possibilities of integrating fermented rice bran into bakery products. Based on the study findings, the following are recommended:

1. The development of FRB-incorporated bakery products should be pursued since there is a high consumers' purchase intention for the new products.
2. Product developers should make sure that incorporating fermented rice bran to bakery products should not give a bad taste to the products as taste highly influence the consumers to buy FRB-incorporated bakery products.
3. In marketing the FRB-incorporated bakery products, educational attainment, mother as a household decision-maker, and health-consciousness of the consumers should be used as basis in market segmentation and product positioning strategies as these consumers' characteristics were significant factors affecting their willingness to buy the products.
4. The willingness to pay for FRB-incorporated bakery products varies according to age, gender, income ranges, or their behavior toward health consciousness and other characteristics. Further studies are recommended to validate the consumers' willingness to pay to have a solid basis if used in market segmentation.
5. For future research, a Consumer Acceptability Study on FRB-incorporated bakery products should be conducted wherein the prototype of the products is introduced to the respondents for actual product attributes evaluation.

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