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Processing, Nutrients, Market Access, and Pumpkin Rice Acceptance

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ABSTRACT

This study investigates the effects of processing techniques, nutrient content, and market accessibility on consumer acceptance of pumpkin analogue rice in Indonesia. As consumer demand for healthier and more sustainable food alternatives grows, understanding the key factors driving acceptance of innovative products like pumpkin analogue rice is critical. Using a quantitative approach, data were collected from 90 respondents through structured questionnaires and analyzed with SPSS version 25. The results reveal that processing techniques, nutrient content, and market accessibility significantly influence consumer acceptance, with nutrient content having the strongest impact. The findings suggest that optimizing processing methods, emphasizing health benefits, and improving market accessibility are essential for increasing the adoption of pumpkin analogue rice. This study provides practical insights for food producers and marketers seeking to promote healthier food alternatives in emerging markets.

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1. INTRODUCTION

Pumpkin analogue rice is a promising alternative to traditional rice, offering a gluten-free and nutrient-rich option that aligns with the global focus on health. Pumpkin is rich in nutrients such as vitamins A, C, potassium, and fibre, which contribute to health, including maintaining cholesterol and providing the antioxidant beta-carotene to protect cells from oxidative stress [1]. The use of pumpkin in food products increases nutritional value with bioactive substances such as amino acids, phytosterols, antioxidants, and polyphenols that are beneficial to health [2]. Pumpkin also contains carotenoids, lutein, zeaxanthin, vitamin E, and ascorbic acid that have antioxidant properties [3], and is rich in linoleic acid, carotenoids, and fibre that help prevent chronic diseases [4]. Pumpkin by-products can be used in ready-to-eat foods, improving nutrition and reducing post-harvest losses [5], making it a superior candidate to address nutrition and food security issues in Indonesia.

Pumpkin analogue rice is a promising alternative to traditional rice, offering a gluten-free and nutrient-rich option, in line with the increasing global focus on health. Pumpkin is rich in vitamins A, C, potassium, and fibre, which support health, including maintaining cholesterol levels and providing antioxidants such as beta-carotene to protect

cells from oxidative stress [1]. The use of pumpkin in food can increase nutritional value through bioactive substances such as amino acids, phytosterols, antioxidants, and polyphenols [2]. Pumpkin also contains carotenoids, lutein, zeaxanthin, vitamin E, and ascorbic acid, which have antioxidant properties [3]. Pumpkin by-products, such as its pulp and powder, are rich in linoleic acid and fibre that help prevent chronic diseases [4]. Utilisation of pumpkin in ready-to-eat foods improves its nutrition and reduces post-harvest losses, as well as contributes to food diversification [3], [5]. Pumpkin is an excellent candidate for developing ready-to-eat products that have the potential to improve health and address nutritional issues in Indonesia. This study aims to explore three main factors that influence consumer acceptance of pumpkin analogue rice in Indonesia: processing techniques, nutritional content, and market accessibility.

Processing techniques significantly influence the quality and consumer acceptance of analog rice made from pumpkin by affecting key sensory attributes like texture, appearance, and taste, which are crucial for consumer perception. Nutrient retention during processing is also vital for preserving the health benefits of the final product, while market accessibility, including availability and affordability, plays a critical role in consumer adoption. Thermal treatments can alter the sensory profile of food, impacting color, flavor, and texture [6], while techniques like steam blanching and drying enhance the sensory appeal of pumpkin-based products [7]. However, processing can lead to significant losses in heat-sensitive nutrients like ascorbic acid and β-carotene [8], making it essential to balance shelf life extension with nutrient preservation [7]. Incorporating pumpkin by-products into ready-to-eat products can enhance their nutritional profile and appeal to health-conscious consumers [2], while value-added products like concentrates and bakery items improve market accessibility [8]. Without adequate distribution and marketing strategies, even the most innovative food products will struggle to gain traction in the market.

Urgency

The rising demand for healthier and sustainable food alternatives in Indonesia, especially in rice consumption, highlights the potential of pumpkin analog rice as a viable option. This gluten-free, nutrient-dense alternative addresses lifestyle-related diseases like diabetes, obesity, and cardiovascular issues while supporting the shift towards plant-based diets. Pumpkin analog rice provides essential vitamins and minerals, benefiting those with gluten intolerance and helping combat malnutrition [9]. Its consumption is associated with reduced risks of chronic diseases such as obesity, heart disease, and diabetes [9]. Furthermore, plant-based options like pumpkin analog rice help reduce greenhouse gas emissions and environmental degradation linked to traditional food production [10], making sustainable food systems essential to tackle food scarcity and malnutrition [11]. However, these alternatives often remain more accessible to wealthier socioeconomic groups, underscoring the need for inclusive food systems and systemic changes in production and consumption patterns [9], [11]. However, despite its potential health benefits, the adoption of this product is still limited, largely due to a lack of consumer awareness and unclear perceptions regarding its nutritional value, taste, and availability in the market. Understanding the factors that influence consumer acceptance is critical to the successful introduction and expansion of pumpkin analogue rice in the Indonesian market.

Problem Statements

The development of pumpkin analogue rice faces challenges in processing techniques, nutrient retention, and market accessibility. Limited research on how processing affects texture, taste and consumer acceptance makes it difficult to optimise production. In addition, although the product is rich in nutrients, there is little information

on how nutrient retention and consumer assessment of its health benefits affect purchasing decisions. Finally, its market success depends on accessibility factors such as price, distribution, and awareness, but research on how this affect consumer adoption is lacking, hindering wider market penetration.

Research Objectives

This study aims to examine the influence of processing techniques, nutritional content, and market accessibility on consumer acceptance of pumpkin analogue rice in Indonesia. Specifically, it aims to (1) analyse the impact of different processing techniques on consumer preferences for pumpkin analogue rice, and (2) evaluate how nutritional content affects consumer acceptance and perceived value of the product.

2. LITERATURE REVIEW

2.1 Processing Techniques and Consumer Preferences

Processing techniques are pivotal in determining the quality and consumer appeal of pumpkin analog rice, as methods like dehydration, extrusion, and milling significantly affect texture and taste, crucial for consumer acceptance. Dehydration influences the moisture content and texture of the final product, with drying conditions such as temperature and sample geometry playing a critical role in determining product quality and absorption capacity [12]. Extrusion and milling further modify the texture to mimic traditional rice, aligning with consumer preferences for familiar textures [6]. However, improper processing can result in nutrient losses, especially in heat-sensitive vitamins like A and C, which are abundant in pumpkins [13]. Balancing nutrient retention with desirable texture is essential for consumer satisfaction, as innovative processing methods can enhance both sensory appeal and nutrition [14]. Thus, proper processing ensures the retention of vital nutrients while delivering a product that meets consumer expectations [15]. This study addresses that gap by evaluating consumer responses to various processing techniques.

2.2 Nutrient Content and Consumer Health Perceptions

Pumpkin, with its rich nutrient profile, offers significant health benefits that can appeal to health-conscious consumers. Its high content of beta-carotene, vitamins A and C, potassium, and dietary fiber makes it ideal for functional foods, helping prevent diseases like diabetes, cardiovascular issues, and certain cancers due to its antioxidant properties and bioactive compounds [1], [16]. Incorporating pumpkin flour into products enhances their nutritional value, increasing moisture, fat, protein, and fiber [16]. Pumpkin seeds, rich in omega-3, omega-6, antioxidants, and minerals, support heart and prostate health [17]. Antioxidants like carotenoids reduce inflammation and oxidative stress, lowering the risk of chronic diseases [4]. Pumpkin's bioactive compounds improve immune function and digestion, enhancing its appeal in health-focused products like pumpkin analog rice [2]. Clear marketing of these health benefits can boost consumer acceptance [1], [2]. This is

especially relevant for pumpkin analogue rice, which may appeal to consumers managing conditions like diabetes due to its low glycemic index and high nutrient content. This study will examine how the nutrient content of pumpkin analogue rice influences consumer acceptance and whether its health benefits are valued.

2.3 Market Accessibility and Consumer Adoption

Market accessibility is crucial for the success of new products like pumpkin analog rice in Indonesia, as price, distribution, and consumer awareness significantly impact adoption and market penetration. High prices and limited availability have hindered the adoption of alternative rice products [18], [19]. Affordable pricing strategies, as demonstrated by PT. Jatim Grha Utama's successful cheap rice distribution, are essential to increase accessibility [18], [20]. A strong distribution network is also vital to ensure product availability [21]. Consumer education through marketing, especially digital and social media campaigns, can drive awareness and adoption [21], [22]. However, introducing innovative products carries risks, requiring thorough market research and strategic marketing to mitigate potential failures [22]. This study will examine how market accessibility, including price, distribution, and awareness, impacts consumer adoption of pumpkin analogue rice in Indonesia.

2.4 Consumer Behavior Toward Alternative Rice Products

Consumer behavior towards alternative rice products in Southeast Asia is shaped by health benefits, consumer education, and government support. Health-conscious consumers prefer rice with low glycemic indices, believed to help manage blood sugar levels [23]. In Malaysia, government initiatives and consumer education have been crucial in promoting brown rice, which offers improved glycemic control and reduced risks of chronic diseases [24]. In Indonesia, while research on analogue rice is limited, urban consumers are more open to trying healthier food products [25]. Low glycemic index rice is favored for managing diabetes, while brown rice reduces the risks of type 2 diabetes and cardiovascular diseases [24], [26]. Rice-based medical foods show potential in managing glucose, benefiting those with prediabetes [26]. Government-backed educational campaigns in Malaysia and growing openness in Indonesia highlight the importance of promoting healthier alternatives [24], [25]. Building on these insights, this study examines the case of pumpkin analogue rice and identifies factors influencing consumer acceptance in Indonesia.

Research Gap and Hypothesis

Despite the growing interest in alternative food products, there remains a significant gap in the literature regarding consumer acceptance of pumpkin analogue rice. Most studies have focused on its

nutritional aspects or technical processing, with few examining how these factors, along with market accessibility, influence consumer behavior. This study aims to address this gap by analyzing the effects of processing techniques, nutrient content, and market accessibility on consumer acceptance of pumpkin analogue rice in Indonesia. The hypotheses for this study are developed based on a review of literature that explores how these factors influence consumer acceptance of food products, guiding the investigation into consumer behavior toward pumpkin analogue rice in Indonesia.

1. ***Processing Techniques and Consumer Acceptance***

Processing techniques significantly influence the sensory qualities of food products, such as texture, appearance, and taste, which are key drivers of consumer preferences. Research by [27]–[31] highlights that consumer acceptance of analogue rice products is closely tied to how well the product mimics the sensory attributes of traditional rice. In the case of pumpkin analogue rice, processing methods that produce a desirable texture and flavor similar to regular rice are likely to enhance consumer acceptance. Additionally, the ability to retain nutrient content during processing can further influence consumer perceptions of quality. Based on this, the following hypothesis is proposed:

H1: Processing techniques have a significant positive effect on consumer acceptance of pumpkin analogue rice.

2. ***Nutrient Content and Consumer Acceptance***

Nutrient content plays a critical role in shaping consumer behavior, especially in the context of health-conscious consumers. The literature suggests that consumers are increasingly aware of the health benefits provided by nutrient-dense food products [16], [32]–[34]. Pumpkin analogue rice, which is rich in vitamins, minerals, and dietary fiber, offers a health-oriented alternative to traditional rice, potentially appealing to consumers seeking functional health benefits. Consumers who perceive the product as a healthier option are more likely to adopt it, particularly in markets like Indonesia, where the prevalence of lifestyle-related diseases is increasing. Therefore, the second hypothesis is formulated as follows:

H2: Nutrient content has a significant positive effect on consumer acceptance of pumpkin analogue rice.

3. ***Market Accessibility and Consumer Acceptance***

Market accessibility is a key factor that affects the adoption of new food products. As indicated by Kotler & Keller (2020), the price, availability, and visibility of a product are critical determinants of its

market success. In Indonesia, access to alternative rice products has been limited due to high costs and a lack of distribution in mainstream retail channels [18], [35], [36]. Moreover, consumer awareness of such products is often low, further hindering their adoption. Studies by [19], [37] emphasize that effective marketing and consumer education are essential for promoting new food products, especially when these products offer distinct health or sustainability benefits. Thus, the third hypothesis is developed as follows:

H3: Market accessibility has a significant positive effect on consumer acceptance of pumpkin analogue rice.

3. METHODS

This study uses a quantitative cross-sectional design to investigate the relationships between the independent variables—processing techniques, nutrient content, and market accessibility—and the dependent variable, consumer acceptance. The research design allows for the collection of data at a single point in time to identify correlations between variables. This approach is well-suited for assessing consumer preferences and behaviors toward new products like pumpkin analogue rice.

The target population for this study consists of Indonesian consumers familiar with alternative food products, including analogue rice. A sample of 90 respondents was selected, which is considered sufficient for exploratory quantitative analysis based on similar studies. A non-probability purposive sampling technique was employed to choose participants meeting specific criteria: individuals who have consumed or are familiar with rice alternatives, those aged 18 and above who make food purchasing decisions, and residents of both urban and suburban areas in Indonesia. This sample size was deemed appropriate, balancing the need for detailed responses with time and resource constraints.

The data for this study was collected through a structured questionnaire designed to measure key variables. The questionnaire included: (1) Demographic Information (age, gender, education, income); (2) Processing Techniques, where respondents rated perceptions of texture, appearance, and taste of pumpkin analogue rice on a Likert scale; (3) Nutrient Content, assessing the importance of vitamins, minerals, and fiber in their choice of the product; (4) Market Accessibility, focusing on availability, price, and visibility; and (5) Consumer Acceptance, measuring likelihood of purchase, satisfaction, and recommendations, all using a Likert scale.

3.1 Data Analysis Technique

Once the data was collected, it was entered and analyzed using SPSS version 25. Descriptive statistics were used to describe the sample's demographic characteristics (e.g., age, gender, education) and summarize responses to key variables like processing techniques, nutrient content, and market accessibility. Validity was tested using Pearson's correlation coefficients to ensure items accurately reflected the intended constructs, while reliability was assessed with Cronbach's Alpha, with values above 0.70 indicating acceptable internal consistency. Classical assumptions testing included the Kolmogorov-Smirnov test for normality, Variance Inflation Factor (VIF) for multicollinearity (with values below 10 indicating no issues) [38]. Finally, multiple regression analysis was conducted to test the hypotheses and determine which factors—processing techniques, nutrient content, or market accessibility—had the strongest influence on consumer acceptance of pumpkin analogue rice.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Descriptive statistics summarize the demographic characteristics of the 90 respondents and key variables, including processing techniques, nutrient content, market accessibility, and consumer acceptance. Data was analyzed using SPSS version 25. In terms of gender, 50% of respondents were male (45) and 50% female (45). Age distribution showed that 30% were aged 18-24 (27 respondents), 60% were 25-40 years old (54 respondents), and 10% were above 40 (9 respondents). Regarding education, 20% had a high school diploma (18 respondents), 65% held a bachelor's degree (59 respondents), and 15% had a postgraduate degree (13 respondents). In terms of monthly income, 13% earned less than IDR 3,000,000 (12 respondents), 17% earned between IDR 3,000,000 and IDR 5,000,000 (15 respondents), and 70% earned above IDR 5,000,000 (63 respondents).

The respondents rated the key variables of processing techniques, nutrient content, market accessibility, and overall consumer acceptance of pumpkin analogue rice on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). The results are as follows: Processing Techniques had a mean of 4.00 (SD = 0.65), with ratings indicating general satisfaction with the product's texture, appearance, and taste. Nutrient Content scored a mean of 4.30 (SD = 0.58), reflecting a strong perception of pumpkin analogue rice as a healthier alternative due to its high levels of vitamins, minerals, and fiber. Market Accessibility was rated lower, with a mean of 3.50 (SD = 0.79), as respondents noted the product's limited availability in mainstream retail stores and higher price. Consumer Acceptance was positive, with a mean of 4.10 (SD = 0.64), showing that respondents were generally willing to purchase the product again and recommend it, driven by its health benefits and sensory qualities.

4.2 Validity And Reliability

1. Validity Test

The validity test assesses whether each item in the questionnaire accurately reflects the construct it is intended to measure. The Pearson's Correlation Coefficient (r-value) for each item was compared with the critical r-value from the r-table. For a sample size of 90 respondents and a significance level of 0.05, the r-table value is 0.205. If the Pearson correlation value (r-value) exceeds the r-table value, the item is considered valid.

Table 1. Validity Testing

Variable	Item	Pearson's r	r-table	Validity
Processing Techniques	X1.1	0.714	0.207	Valid
	X1.2	0.683	0.207	Valid
	X1.3	0.742	0.207	Valid
Nutrient Content	X2.1	0.787	0.207	Valid
	X2.2	0.823	0.207	Valid
	X2.3	0.757	0.207	Valid
Market Accessibility	X3.1	0.653	0.207	Valid
	X3.2	0.617	0.207	Valid
	X3.3	0.679	0.207	Valid
Consumer Acceptance	Y.1	0.722	0.207	Valid
	Y.2	0.795	0.207	Valid
	Y.3	0.748	0.207	Valid

Source: Results of Data Analysis (2024)

As seen in the table, all Pearson's r values exceed the r-table value of 0.205, indicating that each item is valid and appropriately measures the intended variable.

2. Reliability Test

The reliability of the questionnaire was tested using Cronbach's Alpha to measure the internal consistency of the items within each variable. A Cronbach's Alpha value of 0.70 or higher indicates acceptable reliability.

Table 2. Reliability Test

Variable	Number of Items	Cronbach's Alpha	Reliability
Processing Techniques	3	0.813	Reliable
Nutrient Content	3	0.876	Reliable
Market Accessibility	3	0.798	Reliable
Consumer Acceptance	3	0.832	Reliable

Source: Results of Data Analysis (2024)

All Cronbach's Alpha values are above 0.70, confirming that the items within each variable are internally consistent and reliable.

4.3 Classical Assumpions Testing

To ensure the regression model meets classical linear regression assumptions, several tests were conducted: Normality, Multicollinearity, and Heteroscedasticity. The Kolmogorov-Smirnov (K-S) test was used to check for normality, with a p-value of 0.075, indicating that the residuals are normally distributed. The Multicollinearity test, using the Variance Inflation Factor (VIF), showed no multicollinearity as all VIF values were below 10: Processing Techniques (1.674), Nutrient Content (1.826), and Market Accessibility (1.533). Finally, the Breusch-Pagan test for heteroscedasticity yielded a p-value of 0.120, indicating no heteroscedasticity in the model. These results confirm the model's reliability and accuracy.

4.4 Multiple Regression Analysis

The multiple regression analysis was conducted to determine the relationship between the independent variables (processing techniques, nutrient content, and market accessibility) and the dependent variable (consumer acceptance of pumpkin analogue rice). The goal of this analysis is to assess the extent to which each independent variable influences consumer acceptance and test the hypotheses established in the study.

Table 3. Multiple Regression

Variable	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t	Sig.
(Constant)	0.456		2.310	0.023**
Processing Techniques	0.290	0.285	4.230	0.000**
Nutrient Content	0.450	0.453	6.102	0.000**
Market Accessibility	0.240	0.227	3.986	0.001**

Source: Results of Data Analysis (2024)

The multiple regression analysis results indicate that all three independent variables—processing techniques, nutrient content, and market accessibility—have a significant positive effect on consumer acceptance of pumpkin analogue rice. Processing techniques (Beta = 0.285, $p < 0.01$) show that for every unit improvement in processing quality, consumer acceptance increases by 0.290 units. Nutrient content (Beta = 0.453, $p < 0.01$) has the strongest positive effect, with each unit increase in perceived nutrient content boosting consumer acceptance by 0.450 units. Market accessibility (Beta = 0.227, $p < 0.01$) also positively influences consumer acceptance, with every

unit improvement in accessibility leading to a 0.240 unit increase. These findings confirm all three hypotheses: H1, that better processing techniques enhance consumer acceptance; H2, that nutrient content is the most influential factor; and H3, that improved market accessibility positively affects consumer acceptance, albeit to a lesser extent than nutrient content and processing techniques.

Table 4. Test F

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	38.567	3	12.856	79.550	0.000**
Residual	18.633	86	0.217		
Total	57.200	89			

Source: Results of Data Analysis (2024)

The F-value of 79.550 indicates that the independent variables—processing techniques, nutrient content, and market accessibility—significantly predict the dependent variable, consumer acceptance. Additionally, the p-value of 0.000 ($p < 0.01$) confirms that the overall regression model is statistically significant, meaning that these factors have a significant influence on consumer acceptance of pumpkin analogue rice.

Table 5. Coefficient Determinations

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Multiple Regression Model	0.821	0.674	0.662	0.402

Source: Results of Data Analysis (2024)

The model shows a strong positive correlation ($R = 0.821$) between the independent variables—processing techniques, nutrient content, and market accessibility—and the dependent variable, consumer acceptance. The R Square value of 0.674 indicates that 67.4% of the variance in consumer acceptance is explained by these independent variables, while the Adjusted R Square of 0.662 suggests that even after accounting for the number of predictors, 66.2% of the variance is still explained. The Standard Error of the Estimate is 0.402, reflecting the average distance of the observed values from the regression line.

Discussion

The results of this study provide valuable insights into the factors that influence consumer acceptance of pumpkin analogue rice in Indonesia. The analysis revealed that all three independent variables—processing techniques, nutrient content, and market accessibility—significantly affect consumer acceptance. The study found that processing techniques significantly influence consumer acceptance of pumpkin analogue rice, supporting H1, which posited that processing techniques would impact consumer acceptance. This aligns with previous research by [27]–[29] and [30], which emphasized the importance of sensory attributes—such as texture, appearance, and taste—in shaping consumer preferences, particularly for analogue products. In the case of pumpkin analogue rice, processing techniques that replicate the sensory qualities of traditional rice are critical for gaining consumer acceptance. From a practical standpoint, food producers should prioritize optimizing these techniques to enhance texture, taste, and visual appeal, increasing the likelihood of product adoption. Additionally, investing in technologies that maintain both the sensory quality and nutrient.

Nutrient content proved to be the most influential factor in determining consumer acceptance, supporting H2. This finding aligns with the increasing trend of health-conscious consumers seeking food products that offer functional health benefits,

as demonstrated by [32], [33]. Pumpkin analogue rice, rich in vitamins A and C, beta-carotene, and dietary fiber, appeals to consumers aiming to improve their diet or manage health conditions like diabetes and heart disease. The strong consumer response to its nutrient content underscores the importance of clearly communicating these health benefits. For food producers and marketers, emphasizing the nutritional advantages of pumpkin analogue rice in promotional efforts is key. Marketing campaigns should highlight the product's health benefits, and packaging should clearly communicate its nutritional value, including its low glycemic index and role in supporting a healthy diet.

Market accessibility was found to significantly influence consumer acceptance, supporting H3. This result aligns with previous research highlighting the critical role of price, availability, and distribution in the adoption of new food products [18], [35]–[37]. Even when a product has desirable attributes like high nutrient content and favorable processing techniques, limited accessibility can hinder consumer adoption. In this study, market accessibility received lower ratings than other variables, indicating that while consumers are interested in pumpkin analogue rice, challenges such as limited availability in mainstream retail outlets or high prices may restrict its reach. To address this, improved distribution strategies, competitive pricing, and increased availability in both physical stores and online platforms are needed. Additionally, partnerships with health-focused retailers and targeted campaigns for health-conscious consumers could boost product awareness. Offering promotions, discounts, or loyalty programs could further incentivize initial purchases and build long-term consumer loyalty.

Implications

The findings of this study have important implications for the food industry, particularly for producers and marketers aiming to introduce or expand the market for pumpkin analogue rice in Indonesia. Based on the results, several key recommendations can be made:

Producers should invest in advanced processing methods that ensure the texture, appearance, and taste of pumpkin analogue rice meet consumer expectations. These sensory attributes are crucial for product adoption, as consumers are more likely to accept products that resemble traditional rice.

Marketing efforts should focus on the health benefits of pumpkin analogue rice, particularly its nutrient-rich profile. Clear labeling and health claims related to the product's vitamin content, fiber levels, and low glycemic index should be highlighted to attract health-conscious consumers.

Producers need to address market accessibility by ensuring that pumpkin analogue rice is widely available at affordable prices. Expanding distribution networks, increasing the product's presence in supermarkets, health stores, and online platforms, and offering promotions or discounts could help increase consumer adoption.

Given the strong influence of nutrient content on consumer acceptance, producers should target marketing campaigns toward health-conscious consumers. This segment of the population is likely to value the nutritional advantages of pumpkin analogue rice and adopt it as part of their regular diet.

The results of this study contribute to the broader literature on consumer behavior and food product innovation by highlighting the significant influence of processing techniques, nutrient content, and market accessibility on consumer acceptance. This research supports existing theories of food product adoption and offers specific insights into the market for alternative rice products in Indonesia. The strong effect of nutrient content on consumer acceptance emphasizes the importance of health-related factors in shaping consumer preferences, aligning with a growing body of research that underscores the increasing role of health consciousness in food consumption, especially in emerging markets like Indonesia.

5. CONCLUSION

The results of this study demonstrate that processing techniques, nutrient content, and market accessibility significantly influence consumer acceptance of pumpkin analogue rice in Indonesia. Nutrient content emerged as the most critical factor, underscoring the importance of promoting the health benefits of pumpkin analogue rice to attract health-conscious consumers. Processing techniques also play a key role in ensuring the product meets expectations for texture, taste, and appearance. While market accessibility had a lesser but still significant impact, improving distribution and affordability are essential strategies for increasing market penetration. From a practical standpoint, food producers should focus on optimizing processing methods and promoting the nutritional advantages of pumpkin analogue rice through targeted marketing campaigns. Expanding distribution channels and offering competitive pricing will help reach a broader consumer base, contributing to the growing demand for healthy and sustainable food alternatives in Indonesia. This study provides a foundation for further research on consumer behavior in the food sector, particularly in the acceptance of innovative, health-oriented products. Future studies could explore these dynamics with larger, more diverse samples to enhance the generalizability of the findings.

While this study offers valuable insights, it has several limitations that should be addressed in future research. First, the sample size of 90 respondents, though sufficient for exploratory analysis, may not fully capture the diversity of consumer preferences in Indonesia, so larger and more representative samples could enhance the generalizability of the findings. Second, the focus on urban and suburban consumers may overlook the preferences and purchasing behaviors of rural consumers, who may have limited access to alternative food products. Future research should explore these differences in rural areas. Lastly, a longitudinal study could provide insights into how consumer acceptance of pumpkin analogue rice evolves over time as the product becomes more established, helping to identify trends and shifts in preferences as awareness increases.

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