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Market Dynamics and Consumer Preferences for Organic Rice Purchase in Central Java and Yogyakarta, Indonesia

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ABSTRACT

The production and consumption of organic rice in Indonesia continue to increase along with the growing public awareness of the importance of healthy eating habits and environmental conservation efforts. Consumers in Central Java and Yogyakarta increasingly favor organic rice, prioritizing health and product quality. This has led to increased demand and can also motivate farmers to increase organic rice production to meet the ever-growing market needs. This study analyzes the market dynamics and consumer preferences for organic rice in Central Java and Yogyakarta. The research employed a quantitative descriptive approach, utilizing the 4P marketing mix (product, price, place, promotion) and a Likert scale to measure consumer preferences. Sampling was conducted through proportional stratified random sampling from five regencies, with 310 respondents. The results show that promotion is the most significant factor influencing consumer purchasing decisions, with a relative importance of 30.289%. The primary factors driving consumer preferences for organic rice are health benefits and product quality. Although

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organic rice is priced higher than conventional rice, consumers tend to choose it due to its health and sustainability benefits. However, uneven distribution of organic rice and price fluctuations caused by high production costs and climate factors pose major challenges. The study suggests more intensive promotional strategies, improved market accessibility, and subsidy policies to support farmers' production costs. By understanding market dynamics and consumer preferences, this research provides critical insights for stakeholders to design more effective policies and marketing strategies while supporting sustainable agriculture in Indonesia.

Keywords: Organic Rice; Consumer Preferences; Market Dynamics; Price Fluctuation; Price Setting

1. Introduction

The growing awareness of the importance of health and environmental sustainability has made organic rice one of the increasingly popular commodities in the global market [1, 2]. One of the objectives of organic rice cultivation is to reduce synthetic chemicals and enhance biodiversity and soil quality [3, 4]. Rice, or organic rice, has become a key focus in the development of organic agriculture, as 90 percent of Indonesia's population consumes rice as a staple food, making it necessary to expand production to meet public demand [5]. Based on data from the Indonesian Organic Alliance (2017), organic rice production in Indonesia increased from 7,996 tons in 2012 to 12,276 tons in 2015. The increasing trend of organic rice consumption is evidenced by market research conducted by the Indonesian Organic Alliance (2017) in several cities on the island of Java. This research shows that public awareness of consuming organic rice has increased annually, driven by health reasons, environmental concerns, and trends.

Organic rice is one of the food products increasingly favored by consumers in Indonesia, including Central Java and Yogyakarta. This rice is produced using organic farming methods that avoid synthetic chemicals such as pesticides or chemical fertilizers [6]. Organic farming also adheres to sustainability principles that maintain ecosystem balance and soil fertility [7, 8]. These conditions make organic rice a preferred choice for consumers who care about health, food safety, and the environment [9]. In some cases of consumer preference for organic rice, consumers tend to pay attention to several aspects, such as a more natural taste, softer texture, and distinctive aroma [10, 11]. In addition to quality preferences, consumers may also consider price preferences, such as looking for lower-priced yet high-quality products [12, 13]. In market dynamics, price plays an important role in the marketing of organic rice, as price fluctuations can affect the maximum selling price of organic rice [14]. Moreover, higher production costs, especially in land management and organic crop maintenance, significantly influence the pricing of organic rice [15, 16].

Amid the increasing demand for organic rice products in Indonesia, the level of consumer adoption in Central Java and Yogyakarta is still facing several challenges. The growing awareness of health benefits and environmental sustainability has encouraged consumers to switch to organic rice products. However, several factors hinder consumers from choosing organic rice as their primary option, such as a lack of promotional reach, low product quality, and the perception that prices are higher and not aligned with conventional rice, which reduces consumer interest in switching to organic rice. Additionally, the distribution network for organic rice is not evenly spread across the region, limiting its accessibility to certain areas. This can create an access gap between consumers living in urban and rural areas. The low level of promotion and education regarding the advantages of organic rice means that many consumers are not fully aware of its benefits. Furthermore, the consumption of organic rice is still hampered by significant price fluctuations, which are influenced by factors such as climate change affecting production in the region.

The marketing of organic rice in Central Java and Yogyakarta faces significant challenges that impact consumers, farmers, and policymakers. Farmers deal with high production costs and price fluctuations, which can diminish their profits. On the other hand, consumers often feel burdened by the prices of organic rice that do not match the quality and are higher than conventional rice.

Policymakers also need to support the production and distribution of organic rice to make this product more accessible. Strong consumer preferences for organic products can open up more market opportunities and support sustainable agriculture. Therefore, this research provides insights into consumer preferences and helps stakeholders develop better plans to meet the demand for organic rice.

The marketing mix combines controllable marketing variables a company uses to achieve the desired sales levels in the target market [17]. These variables consist of product, price, promotion, and place, commonly called the 4Ps [18, 19]. Based on this background, this study aims to explore consumer preferences in more depth, analyze the pricing mechanism, and identify the factors that affect price fluctuations in Java, specifically in Central Java and Yogyakarta.

2. Research Methods

This study uses descriptive quantitative research to describe market dynamics and measure consumer preferences using a marketing mix approach with the four variables: product, promotion, price, and place. The research locations were selected purposefully based on considerations such as the high level of organic rice production and local consumption patterns related to organic rice. The chosen locations include three regencies in Central Java: Magelang Regency, Sragen Regency, and Karanganyar Regency. In Yogyakarta, the research covers the Bantul Regency and Sleman Regency (**Table 1**).

This study used interview methods by sampling from a population using a questionnaire. The sampling method used proportional stratified random sampling, dividing the area into five regencies where the sample size for each location proportional to its population. The research involved farmers, traders, and consumers, with a total of 150 farmer respondents, 10 traders, and 150 consumers, resulting in 310 respondents across the various groups (**Table 2**).

The analysis techniques used in this research include two approaches, descriptive analysis and conjoint analysis, to explain the market dynamics and consumer preferences for organic rice in Central Java and Yogyakarta.

- Descriptive Analysis

Descriptive analysis describes or provides an overview of the objects being studied. It tells the selling prices and costs farmers and traders incur for producing organic rice. Additionally, it describes consumer characteristics regarding the purchase of organic rice (**Table 3**).

Table 1. Research locations.

Research Location	Number of Respondents			Total
	Farmers	Traders	Consumers	
Bantul, Yogyakarta	30	2	30	62
Sleman, Yogyakarta	30	2	30	62
Sragen, Central Java	30	1	30	61
Karanganyar, Central Java	30	3	30	63
Magelang, Central Java	30	2	30	62
Total	150	10	150	310

Table 2. Sampling procedure and data collection.

Actor	Type of Data	Data Collection Technique
Farmers	Production costs and sales prices of organic rice	Interviews with a questionnaire
Traders	Production cost, distribution cost, and sales prices of organic rice.	Interviews with a questionnaire
Consumers	Consumers' characteristics and preferences regarding the product, price, promotion, and place of purchase for organic rice.	Interviews with a questionnaire

Table 3. Descriptive analysis techniques.

Actor	Analysis Technique
Farmers	Descriptive analysis (describing the selling prices of organic rice and the production costs incurred as capital for producing organic rice, supply chain analysis)
Traders	Descriptive analysis (describing the selling prices of organic rice, production costs, transportation costs used as capital for producing and distributing organic rice, supply chain analysis)
Consumers	Descriptive analysis (describing consumer characteristics, supply chain analysis, SPSS results to measure reliability test, validity test, and conjoint analysis)

- Validity and Reliability Test

SPSS software is used to process the data to analyze preferences, and the results are presented in table format. Validity and reliability tests are conducted to determine whether the questionnaire is suitable. The validity test uses Pearson Product Moment correlation, with the criterion that if the calculated r > table r with a significance value < 0.05, it can be considered valid. The reliability test is conducted using the Cronbach's Alpha method; if the Cronbach's Alpha value > 0.6, it is stated to be reliable.

- Conjoint Analysis

Conjoint analysis is a statistical technique that analyzes consumer preferences for a product or service [20]. Conjoint analysis is employed to measure consumer preferences regarding the attributes of organic rice through the 4P marketing mix approach (product, promotion, price, place). The attributes studied include product, price, place of purchase, and promotion. Each attribute has several levels, and combinations of these attributes are then arranged into stimuli that respondents evaluate. Respondents rate the combinations of factors and levels using a Likert scale ranging from strongly disagree [1] to strongly agree [5].

Although the analysis using the 4P marketing mix approach is less up-to-date, the 4P model encompasses the core elements needed in this marketing analysis. In the latest marketing mix, the 9P model, additional components such as People, Process, Physical Evidence, Payment, and Packaging can be grouped into the 4P elements. For instance, the components "people" and "process" are included under "place" and "promotion", respectively, based on their influence on consumer preferences. At the same time, "physical evidence" and "packaging" fall under "product" as they relate to product quality and appearance. Furthermore, the "payment" component is directly related to "price", which is already considered accessibility for consumers. Therefore, using the 4P marketing mix model is sufficient to describe consumer preferences in this research.

The steps to be taken are:

1. Designing stimuli

- Determining the attributes or factors to be further studied
- Organizing the levels and combinations of factors for each level (stimuli)
- Constructing a mathematical model for the stimuli
  In general, the basic model of conjoint analysis for respondent choice (r_i) or each factor and level can be formulated as follows:

$$r_i = \beta_0 + \sum_{j=1}^{p} u_{jkji} \quad (1)$$

Description:
r_i = total utility or usefulness
β_0 = intercept of the respondent model
u_{jkji} = utility of factor *j* at level k_{ij}

2. Data collection is conducted by distributing questionnaires to respondents.
3. Determining the utility values of total combinations of factors and levels.
4. Determining the relative importance values of each factor and comparing them with the total importance of all factors for each respondent.

According to Malhotra (1993), the formula for the relative importance value is:

$$W_i = \frac{Ii}{\sum_{i=1}^{m} Ii} \quad (2)$$

W_i = relative importance weight for each attribute
I_i = range of importance values for each attribute
According to Hair (1995), the range of relative importance values for each attribute can be calculated using the formula:
$I_i = \max(a_{ij}) - \min(a_{ij})$

5. Determining the predictive accuracy value.

3. Result and Discussion

3.1. Market Dynamics Analysis

Based on the study by (Hazra et al., 2018) titled "Organic Rice: Potential Production Strategies, Challenges, and Prospects", the study discusses production strategies, challenges, and prospects for organic rice, focusing on high production costs and challenges such as pest control and labor needs, which affect product pricing and market availability[15]. The relevance of this research lies in its findings, which help understand the factors causing price fluctuations and supply chain challenges for organic rice in Central Java and Yogyakarta. Distribution limitations and price fluctuations in organic rice are typically due to production conditions that are vulnerable to climate change and high input costs.

3.1.1. Supply Chain Analysis

The marketing pattern of organic rice in the districts of Bantul, Sleman, Sragen, Karanganyar, and Magelang, based on the research, can be described as follows. The length of the marketing channel affects the margin of a product; that is, the longer the channel, the larger the margin generated, and vice versa. This condition is common in agricultural products, where marketing institutions have a significant influence in determining the selling price. Based on the (**Figure 1**) supply chain analysis describe by the following points:

1. Marketing Channel I (Farmer–Consumer)
   Consumers purchase directly from farmers by visiting the farmers' location.
2. Marketing Channel II (Farmer–Trader–Consumer)
   This channel involves two marketing actors, namely farmers and traders, before reaching the consumers. Farmers sell rice to traders, who then sell it directly to consumers.

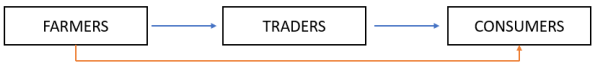

Figure 1. Supply chain analysis.

3.1.2. Price Fluctuations

The rise and fall of the availability of strategic food commodities significantly impact price fluctuations in the economy[21]. Food needs must be met throughout the year[22], while strategic food commodities usually follow seasonal production patterns[23, 24]. This is further complicated by the vulnerability of agricultural products to damage[25]. Therefore, storage and processing are essential to maintain a sustainable food supply[26]. Based on the analysis, the average selling price at the farmer level is Rp 9,764 kg^{-1}, while the maximum price reaches Rp 9,939 kg^{-1}. The price at the farmer level has only increased by Rp 125 kg^{-1}, which is due to several hindering factors such as a lack of available labor, difficulty in pest control, crop failures, and prolonged dry seasons, which affect the decrease in the supply of paddy and rice sold to traders. This can lead to price fluctuations at the trader level, where the average price increased from Rp 15,889 kg^{-1} to Rp 17,000 kg^{-1}, reflecting an increase of Rp 1,111 kg^{-1} (**Table 4**). This price increase can affect consumer purchase prices; the higher the price at the farmer level, the higher the selling price to consumers. However, the price increase for organic rice tends to be more stable than conventional rice.

Table 4. Average price development at the farmer and trader levels.

Respondents	Average Selling Price (Rp kg^{-1})	Maximum Selling Price (Rp kg^{-1})
Farmers	9,764	9,939
Traders	15,889	17,000

3.1.3. Price Mechanism

The pricing of organic rice in Central Java and Yogyakarta is influenced by several main factors, including the capital expended by farmers and traders. Based on the data obtained, the average capital expended by all farmers amounts to Rp 823,847, which includes seed costs of Rp 102,001, organic fertilizer costs of Rp 273,553, organic pesticide costs of Rp 31,102, and labor costs of Rp 417,291. The average seeds commonly used by farmers are *mentik wangi*, *mentik susu*, 64, and *ciherang*. Meanwhile, the total capital for all traders per season reaches Rp 32,133,697, which includes raw material costs of Rp 29,858,333, labor costs of Rp 1,740,000, packaging costs of Rp 535,364, and transportation costs of Rp 0.

The cultivation of organic rice requires more complex care techniques. It takes longer than conventional rice cultivation [27], as farmers must avoid using synthetic chemicals and rely on organic fertilizers and pesticides [28]. Most farmer groups in this region have received government subsidies for organic fertilizers and pesticides, which can help reduce production costs. Capital factors and product delivery locations significantly influence the selling price of organic rice for farmers and traders. The average rice price at the farmer level is Rp 9,764 kg^{-1}, while the maximum price can reach Rp 9,939 kg^{-1}. At the trader level, the average selling price is Rp 15,889 kg^{-1}, with the highest price reaching Rp 17,000 kg^{-1}. This price difference is due to additional costs traders incur for transporting and packaging of rice.

The quality of organic rice products is one of the main determinants of the selling price. Rice with a good aroma, attractive packaging, a delicious taste, and long storage durability will attract more consumer attention. Consumers who switch from conventional rice to organic rice are concerned about health and food quality, even though its price is much higher than that of conventional rice.

Based on the obtained data (**Figure 2**), the analysis results indicate that the increase in production costs at the farmer level, such as seed prices, fertilizer, labor costs, and pesticides, will lead to an increase in production costs for farmers. This increase will subsequently impact the selling prices of farmers' products. The same condition occurs at the trader level, where increases in raw material costs, labor costs, transportation costs, and packaging costs will raise overall distribution costs. In market mechanisms, not everything is linear. Production prices at the farmer level tend to reach a maximum point when influenced by several hindering factors, such as a lack of available labor, difficulties in pest control, crop failures, and prolonged dry seasons. However, this price is expected to decrease again once conditions stabilize, such as an increase in harvested supply or a decrease in operational costs. Therefore, prices will reach a maximum point and then gradually decline to an average price as the factors causing the increases to subside. A similar situation occurs at the trader level, when distribution costs reach a maximum due to factors such as a lack of raw material supply and rising packaging costs, they will decrease again once conditions stabilize. This decrease can occur due to greater availability or increased efficiency in production and distribution. Both production prices at the farmer level and distribution prices at the trader level are volatile and tend to peak before dropping to an average price, significantly affecting the final price determination in the market. Increases in either of these factors (production or distribution) will influence the final price paid by consumers, where the selling price will rise in line with increases in production and distribution costs.

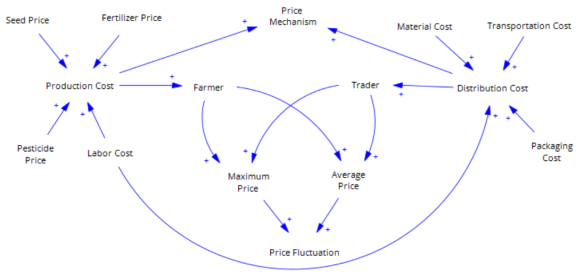

Figure 2. Market dynamics analysis (drawn with Vensim software).

3.2. Preferences Consumers

3.2.1. Validity and Reliability Testing

The validity and reliability tests on 16 questionnaire items were conducted by distributing the questionnaire to 150 respondents, using a confidence level of 95% and a significance level of 5%, with the assistance

of SPSS software version 25 (**Table 5**).

Table 5. Statistical validity.

Question	R Calculated	R Table	Status
1	0.876	0.159	Valid
2	0.892	0.159	Valid
3	0.878	0.159	Valid
4	0.880	0.159	Valid
5	0.890	0.159	Valid
6	0.869	0.159	Valid
7	0.820	0.159	Valid
8	0.893	0.159	Valid
9	0.865	0.159	Valid
10	0.866	0.159	Valid
11	0.862	0.159	Valid
12	0.848	0.159	Valid
13	0.879	0.159	Valid
14	0.855	0.159	Valid
15	0.877	0.159	Valid
16	0.818	0.159	Valid

It is known that all 16 items are considered valid because each item has an R calculated value greater than R table. The R table is adjusted according to the number of respondents, which is N = 150 (**Table 5**).

The reliability test was also performed using the Cronbach's Alpha technique, resulting in a reliability coefficient (α) of 0.981. t is known that all 16 items are considered reliable because the Cronbach's Alpha value is greater than 0.6, specifically 0.981 > 0.6 (**Table 6**).

Table 6. Statistical reliability.

Cronbach's Alpha	N of Items
0.981	16

3.2.2. Consumer Characteristics

Based on (**Table 7**), the analysis of consumer characteristics explains the fundamental factors influencing organic rice consumption, highlighting the majority of contributors to organic rice purchases.

1. Gender

Gender is a term used to describe the differences between males and females in terms of personality, behavior, roles, functions, status, responsibilities, and daily habits [29]. Each gender has unique perceptions and preferences when facing various choices, including consuming products such as organic rice. It is known that most organic rice consumers in Central Java and Yogyakarta are males, totaling 96 individuals, which is 64% of the total respondents. This indicates that males tend to be more involved in the purchasing of organic products. Meanwhile, females comprise only 54 individuals, representing 36%, reflecting their role in daily consumption patterns with a more selective preference.

2. Age

Age refers to the time since an individual was born until their current age. As a person ages, their level of maturity, mindset, and decision-making ability generally develop [30]. The influence of age on the selection of organic rice can be seen in perceptions of health, environmental awareness, and evolving social values over time. Most organic rice consumers in Central Java and Yogyakarta are aged 16 to 32 years, comprising 57.7%. This indicates that younger consumers prefer organic rice, influenced by healthy lifestyles and environmental factors. Furthermore, 37.3% fall within the age range of 33 to 49 years, while the lowest percentage, 6%, consists of consumers aged 50 to 67 years.

3. Occupation

Occupation refers to the relationship between two parties, namely the company and the worker, where the worker performs certain tasks and receives compensation in the form of wages or salaries [31]. The influence of occupation on the selection of organic rice can be observed in the purchasing power and awareness of the importance of consuming healthier and sustainable products [32]. It is noted that organic rice consumers in Central Java and Yogyakarta are predominantly self-employed (32%), indicating that they have better purchasing power and a higher awareness of organic rice consumption. Other occupations account for 29.3%, students for 20%, housewives for 12%, and the lowest percentage of civil servants is 6.7%.

4. Reason for Consuming Organic Rice

Reasons for consumption are the motivations or factors that drive an individual to engage in consumption activities, whether in food, beverages, or other products [33]. The most dominant reason that encourages consumers in Central Java and Yogyakarta to choose organic rice is its health benefits, at 34%. Most consumers who

opt for organic rice are aware of the health advantages of consuming organic rice. The lowest percentage, 2%, is attributed to the ease of cooking.

5. Frequency of Consuming Organic Rice

Consumption frequency refers to the number of meals consumed daily, including main meals and snacks [34]. This frequency can include breakfast, lunch, dinner, and snacks between main meals [35]. Consumers in Central Java and Yogyakarta who consume organic rice are predominantly in the category of less than five times per month, at 36.7%, indicating that public interest in organic rice consumption is still relatively low. The lowest percentage is for those who consume organic rice 16 to 20 times, at 7.3%.

6. Duration of Consuming Organic Rice

The duration of consumption refers to the time an individual spends consuming food or beverages, either in total or over a certain period [24]. The influence of consumption duration on the selection of organic rice can be seen in how long someone has adopted a healthier and more sustainable diet. The majority of consumers in Central Java and Yogyakarta have consumed organic rice for a duration of 0 to 12 years, comprising 82.7%. This indicates that the adoption of organic rice products is relatively new, and most consumers have only begun incorporating these products into their diets in recent years. Following this, consumers with a consumption duration of 13 to 24 years represent 13%, while the lowest percentage is for consumers with a duration of 25 to 36 years at 4%.

7. Income

Income refers to the total earnings received by an individual, whether in the form of money or goods derived from other parties or from one's own business, playing a significant role in supporting an individual's livelihood [36]. Income influences respondents' involvement in the selection of organic rice because income level determines an individual's purchasing power [37]. It is noted that most consumers with an income of less than Rp 2,000,000 in Central Java and Yogyakarta make up 44%. This indicates that organic rice remains popular among low-income consumers, even though its price is higher than conventional rice. The lowest percentage is 6.7% for consumers with an income of Rp 4,100,000 to 5,000,000.

8. Factors Influencing Organic Rice Consumption

Factors that influence consumption are the aspects that play a role in determining or influencing an individual's decision to consume a product [38]. Most consumers in Central Java and Yogyakarta choose organic rice due to health benefits, which account for 43.3%, indicating that health factors remain the primary driver of organic rice consumption. The lowest percentage corresponds to the prestige factor, which is 0%.

9. Place of Purchase

The place of purchase refers to where individuals can buy goods or services [39]. It is known that most consumers in Central Java and Yogyakarta prefer to purchase organic rice offline, with a percentage of 51.3%, indicating that consumers are more interested in buying products directly to assess the quality of the rice properly. The lowest percentage corresponds to consumers who choose more than one place, at 12.7%; these consumers often combine purchasing locations offline, online, and directly from farmers.

10. Consumers Suggestions for Organic Rice

Based on the questionnaires distributed to consumers, they provided suggestions for increasing the popularity of organic rice among the public. The main focus is reducing prices so that the product becomes more affordable for all segments of society. Additionally, consumers desire improved promotion and outreach regarding organic rice's health and environmental benefits, which can be conducted through social media, community engagement, and public awareness activities. Accessibility is also a concern for them, hoping that organic rice will be easier to find in the market, including supermarkets. Attractive packaging and stable prices are also recommended to enhance consumer interest. Furthermore, consumers hope that organic rice production can continue to improve and that there will be more intensive health education to help the public better understand the long-term health benefits of organic rice.

Table 7. Characteristics of organic rice consumers.

	Freq.	Percentage		Freq.	Percentage
Gender					
Male	96	64			
Female	54	36			
	150	100			
Age			**Duration of Consumption (Years)**		
16–32	85	57.7	0–11	124	82.7
33–49	56	37.3	12–23	20	13.3
50–67	9	6	24–36	6	4
	150	100		150	100
Occupation			**Income**		
Self-employed	48	32	<2,000,000	66	44
Civil servant	10	6.7	2,100,000–3,000,000	43	28.7
Student	30	20	3,100,000–4,000,000	17	11.3
Housewife	18	12	4,100,000–5,000,000	10	6.7
Others	44	29.3	>5,000,000	14	9.3
	150	100		150	100
Reason for Consumption			**Factors Influencing Consumption**		
Healthier	51	34	Health benefits	65	43.3
Tastier	22	14.7	Good taste	9	6
Longer lasting	3	2	Storage durability	2	1.3
Trendy	7	4.7	Price	14	9.3
Easy to cook	3	2	*Fomo (trendy)*	7	4.7
Others	13	8.7	Prestige	0	0
Choosing more than 1 reason	51	34	Choosing more than 1 factor	53	35.3
	150	100		150	100
Frequency of Consumption (Per Month)			**Place of Purchase**		
<5	55	36.7	Offline	77	51.3
6–10	34	22.7	Online	28	18.7
11–15	21	14	Direct from farmers	26	17.3
16–20	11	7.3	Choosing more than 1 place	19	12.7
>20	29	19.3		150	100
	150	100			

3.2.3. Conjoint Analysis

Based on the study by Nandi et al.[40] titled "Consumer Motives and Purchase Preferences for Organic Food Products: Empirical Evidence from a Consumer Survey in Bangalore, South India", it is concluded that consumer preferences for organic food are influenced by various factors, including awareness of health benefits, product quality, and price[40]. The relevance of this previous research to my study is that it shows promotion as the most significant factor influencing purchasing decisions, consistent with the finding that information and education about organic products are crucial for enhancing consumer preferences.

1. Designing Stimuli

- Determining the attributes of factors and levels of each factor

The factors to be used are the rice product, rice price, place of purchase, and rice promotion. These factors are then analyzed to determine the levels that influence consumer preferences (**Table 8**).

Table 8. Factor and levels for organic rice purchase.

Factor	Level
Rice product	Good quality Attractive packaging Delicious taste Long shelf life
Rice price	Affordable price Price according to quality Competitive price
Place of purchase	Strategic location Neat and clean location Easily accessible location Friendly service
Rice promotion	Attractive promotion Product match Discounts Use of digital media

- Determining combinations of factors and each level

The factors and levels are then combined to create 16 combinations (**Table 9**).

2. Data Collection Using Questionnaires

The questionnaire was filled out using a Likert scale (ranking of factor importance). The ranking of factor importance indicates the degree of priority of the combination of factors and levels that influence respondents in purchasing the product. Ranking 1 is for combinations of factors that strongly disagree, ranking 2 for combinations of factors that disagree, ranking 3 for combinations of neutral factors, ranking 4 for combinations of factors that agree, and ranking 5 for combinations of factors that strongly agree.

Table 9. Combination of factors and level.

Rice Product	Rice Price	Place of Purchase	Rice Promotion
Good quality	Affordable price	Strategic location	Attractive promotion
Delicious taste	Competitive price	Strategic location	Discounts
Long shelf life	Affordable price	Strategic location	Use of digital media
Attractive packaging	Price according to quality	Strategic location	Product match
Attractive packaging	Affordable price	Easily accessible location	Attractive promotion
Long shelf life	Competitive price	Neat and clean location	Attractive promotion
Delicious taste	Price according to quality	Friendly service	Attractive promotion
Good quality	Affordable price	Friendly service	Discounts
Long shelf life	Affordable price	Friendly service	Product match
Good quality	Competitive price	Easily accessible location	Product match
Attractive packaging	Competitive price	Friendly service	Use of digital media
Attractive packaging	Affordable price	Neat and clean location	Discounts
Delicious taste	Affordable price	Easily accessible location	Use of digital media
Delicious taste	Affordable price	Neat and clean location	Product match
Long shelf life	Price according to quality	Easily accessible location	Discounts
Good quality	Price according to quality	Neat and clean location	Use of digital media

3. Determining the Utility Values of Total Combinations of Factors and Levels

Utility value is the contribution value of each level respondents give for decision-making in purchasing organic rice. The utility value is calculated using the ranking results provided by respondents for the factor combinations [41]. The deviation value is obtained from the average ranking of all levels, while the utility value is derived from the square root of the multiplication between the squared deviation and the standard value [42]. The standard value is obtained from the number of existing levels divided by the total deviation value of all levels. In (**Table 10**), the results of the average total utility values of factors and levels are presented.

The utility value of the attribute combinations for each factor can be analyzed for the product factor. Consumers prefer good-quality rice, which has a utility value of 0.083. For the price factor, the highest preference is for products with prices that match the quality, with a utility value of 0.102, indicating that consumers prefer products that balance price and quality. For the place factor, consumers prefer locations with friendly and satisfactory service, with a utility of 0.080, highlighting the importance of a positive shopping experience. Meanwhile, for the promotion factor, the most favored promotion by consumers is one that matches the product or is advertised as it is, with a utility value of 0.072, indicating that consistency between promotion and product reality is a key consideration for consumers when choosing organic rice (**Table 10**).

4. Determining the Relative Importance Values of Each Factor

It is known that the factor with the greatest influence on consumer preferences in choosing organic rice is promotion, with an average importance value of 30.289%. This promotion factor becomes the primary consideration for consumers when making purchasing decisions. The second rank is the product factor, with an average importance value of 24.905%, indicating that

product quality remains a significant concern for consumers. Following this, the place factor ranks third with an importance value of 24.269%, indicating that location and convenience in purchasing products also play important roles in consumer decisions. Meanwhile, the price factor has the least influence, with an average percentage of 20.537%. Although still relevant, price is not the primary consideration compared to promotion, product quality, and place of purchase. This result indicates that strong promotional strategies, quality products, and convenient locations will be more effective in attracting consumer interest (**Table 11**).

Table 10. Average total utility values of factors and levels.

Factor	Level	Utility Estimate	Std. Error
Product	Good quality	0.083	0.016
	Attractive packaging	−0.045	0.016
	Delicious taste	0.023	0.016
	Long shelf life	−0.059	0.016
Price	Affordable price	−0.094	0.012
	Price according to quality	0.102	0.014
	Competitive prices	−0.009	0.014
Place	Strategic location	−0.050	0.016
	Neat and clean location	0.018	0.016
	Easily accessible location	−0.048	0.016
Promotion	Friendly service	0.080	0.016
	Attractive promotion	−0.099	0.016
	Product match	0.072	0.016
	Discounts	−0.039	0.016
	Use of digital media	0.066	0.016
(Constant)		3.966	0.009

Table 11. The average relative importance of each factor.

Factor	The Average Value (%)
Product	24.905
Price	20.537
Place	24.269
Promotion	30.289

5. Determining Predictive Accuracy Values

Table correlations present Pearson's R and Kendall's tau correlation values. These correlation values represent the correlation between actual assessments and those based on estimation results. The correlation values can be used to measure predictive accuracy (predictive ability). It is known that the significance value of Pearson's R is 0.000 < 0.05 and the significance value of Kendall's tau is 0.000 > 0.05, which indicates that the accuracy between actual assessments and estimations is significant (**Table 12**).

Table 12. Predictive accuracy values results.

	Value	Sig.
Pearson's R	0.991	0.000
Kendall's tau	0.845	0.000

4. Discussion

4.1. Market Dynamics

Based on the study by Hazra et al. (2018) titled "Organic Rice: Potential Production Strategies, Challenges, and Prospects", the research discusses production strategies, challenges, and prospects of organic rice. The high production costs in organic farming are often related to the need for non-synthetic inputs and more intensive cultivation processes compared to conventional rice. The use of organic fertilizers and pesticides also requires special management and sometimes additional labor, increasing production costs and ultimately resulting in higher consumer prices [15].

This journal is relevant to our research in understanding the factors that cause price fluctuations and challenges in the organic rice supply chain in Central Java and Yogyakarta. Price fluctuations and distribution limitations in organic rice are often caused by production conditions that are vulnerable to climate change and high input costs. Additionally, uneven distribution poses further challenges, limiting consumer access to organic

rice and causing prices to fluctuate.

4.2. Consumer Preferences

Based on the study by Nandi et al. (2016) titled "Consumer Motives and Purchase Preferences for Organic Food Products: Empirical Evidence from a Consumer Survey in Bangalore, South India", it was found that consumer preferences for organic food are influenced by various factors, including awareness of health benefits, product quality, and price. The analysis results show that consumers tend to choose organic products that they perceive as healthier and of higher quality, even though they are more expensive. This research emphasizes the importance of effective marketing strategies to raise consumer awareness and address existing barriers to the adoption of organic products [39].

The relevance of our research lies in understanding how awareness of health benefits and product quality influences consumer purchase decisions for organic products. Our findings indicate that promotion is the most significant factor influencing purchase decisions, consistent with the finding that information and education about organic products are crucial for enhancing consumer preferences. Challenges such as the perception of higher prices and uneven distribution are similar issues faced in both studies, underscoring the need for strategic marketing approaches to improve accessibility and consumer understanding of organic rice products.

5. Conclusions

This study concludes that the market dynamics and consumer preferences for organic rice in Central Java and Yogyakarta are significantly influenced by factors such as appropriate promotions, good product quality, friendly service at the point of purchase, and prices that match the quality. Additionally, several factors contribute to the average importance level of consumer preferences, with promotion influencing 30.289%, followed by product at 24.905%, place of purchase at 24.269%, and the lowest factor being price at 20.537%. Consumers tend to choose organic rice for health reasons, even though its price is higher than conventional rice. The price of organic rice remains relatively stable, with an average price at the farmer level of Rp 9,764 kg^{-1} and the trader level of Rp 15,889 kg^{-1}. The pricing set by farmers and traders is based on the calculation of the capital they expend. This price stability is influenced by harvest seasons, labor availability, production costs, distribution costs, and packaging. These factors significantly contribute to the pricing mechanism. Regarding the supply chain, the study shows that shorter marketing channels, such as direct sales from farmers to consumers, can lower costs and enhance profitability. This study has important implications for marketing organic rice to Central Java and Yogyakarta consumers. The high consumer preference for promotion and product quality indicates the need for stronger promotional strategies, such as educating consumers on health benefits and environmental sustainability through digital media. Policy subsidies for production costs for organic rice farmers are also needed to make it more competitive.

6. Recommendations

From the results of this study, it is hoped that the government can provide further contributions by strengthening educational programs regarding the health benefits and sustainability of consuming organic rice. Furthermore, policy support is needed to encourage a reduction in production costs, such as providing subsidies for organic fertilizers and assistance to organic rice farmers. Ongoing promotion is also necessary to raise public awareness of the importance of healthy consumption patterns and to expand access to organic rice markets, making it more accessible to all segments of society.

7. Suggestions

- Increased promotion of organic rice through more aggressive marketing campaigns, especially on social media, can help raise consumer awareness about this product's health and environmental benefits.
- Farmers and traders should evaluate their pricing structure to make it more competitive so that consumers' purchasing power can be accommodated without sacrificing their profit margins.
- Periodic education for consumers on the benefits of

organic rice to increase understanding and interest in this product.

Author Contributions

Conceptualization, Z.R., N.R., T., H.W.P. and Y.E.F.; methodology, Z.R. and N.R.; formal analysis, S.A.; investigation, Z.R. and S.A.; resources, Z.R.; data curation, Z.A., S.S.A.H., and R.A.A.; writing—original draft preparation, Z.R. and SA.; writing—review and editing, Z.R. and S.A. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of Research and Innovation Institute, Universitas Muhammadiyah Yogyakarta (Letter No: 963/D.2-VIII/LRI/XII/2024 on 1 July 2024).

Informed Consent Statement

Informed consent was obtained from all participants involved in this study, including farmers, traders, and consumers. Prior to participation, each participant was provided with a detailed explanation of the research objectives, the methods employed, the potential benefits, and any risks that might arise. Participants were given sufficient time to understand the information and ask questions before voluntarily agreeing to participate. All data collected during the study were securely stored to ensure participant confidentiality and were used solely for academic purposes in accordance with the consent provided

Data Availability Statement

The data supporting the findings of this study are available upon reasonable request to the corresponding author. This includes anonymized data to ensure the confidentiality of participants, such as farmers, traders, and consumers. The available data comprise interview results, survey responses, and statistical analyses utilized in this study. However, raw data such as personal information or identifiable data of participants are not publicly accessible due to privacy and ethical considerations. Any requests for data access will be evaluated based on the purpose of the data use and its alignment with the consent provided by participants.

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Conflicts of Interest

The authors declare no conflict of interest

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