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Consumer preferences for rice attributes in Makassar City (case study of Daya Traditional Market, Terong Traditional Market, and Pabaeng-baeng Traditional Market)

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ABSTRACT

The objectives of this study are: 1) Identifying consumer characteristics who purchase rice in Makassar City. 2) Determine the rice quality preferred by consumers. 3) Analyzing the rice attributes that consumers prefer. 4) Assess which attributes are prioritized during rice purchasing decisions. This research was conducted in Makassar City at three different traditional markets: Daya Traditional Market, Terong Traditional Market, and Pabaeng-baeng Traditional Market, with a total of 100 respondents. The data analysis method used is descriptive analysis and conjoint analysis. The results of the study are: 1) The characteristics of respondents are dominated by female respondents with the average age of 42 years, entrepreneur, high school education level, average income of IDR 4,407,470/month, number of family members of 3 people, purchase frequency of 2 times per month, and rice consumption of 16 kg per month. 2) The types of rice quality chosen by respondents are physical characteristics such as size, grain shape, color, and aroma. 3) The rice attributes that consumers prefer are premium rice quality, soft rice, clean, medium shape, pandan-scented rice, shelf life <1 month, price between IDR 12,000–13,000 per kg and rice with a degree of milky whiteness. 4) The rice attribute that consumers consider most in purchasing rice is the quality, with a test value of 22.161. These findings have implications for producers and marketers to enhance the sensory and functional quality of rice, aligning it with consumer expectations. Future research should investigate consumer behavior over time and across different market segments.

Keywords:
Conjoint analysis, Consumer characteristics, Rice

1. Introduction

Rice remains the primary staple food for most Indonesians. However, it is difficult to substitute despite food diversification initiatives. Consumers consider attributes such as price, aroma, cleanliness, shape, and quality in their decisions [1,2]. Studies by Cavite et al. [2] and Romadhon et al. [1] emphasize the significance of aligning product features with consumer needs. Previous research has predominantly focused on consumer behavior in modern retail settings or in other regions outside Makassar [3–5]. For example, Cavite et al. [2] explored purchasing behavior in Thailand's supermarkets, while Romadhon et al. [1] analyzed nationwide preferences. In contrast, traditional markets in Makassar serve a distinct population segment with unique consumption behaviors. According to the 2023 Makassar Trade Agency report, approximately 65% of household rice purchases still occur through traditional markets. Although a few studies have analyzed rice consumer preferences in different regions and countries, there is limited research specifically focused on traditional markets in Makassar City.

Despite the dominance of traditional markets, few studies investigate how local preferences differ from those in modern outlets. Studies by Yuliyanti et al. [6] and Trang et al. [7] suggest that traditional market consumers emphasize tactile attributes such as aroma and fluffiness, whereas modern consumers focus more on packaging and branding. Nevertheless, the influence of such differences on rice purchasing decisions remains underexplored, especially through conjoint analysis.

This study contributes to this gap by assessing preferences across eight rice attributes in three strategic markets: Daya, Terong, and Pabaeng-baeng. Operationally, the eight rice attributes analyzed in this study are defined as follows: (1) Quality: level of rice grade based on grain integrity and impurities; (2) Price: price per kilogram; (3) Shape: physical form of the grain (whole, medium, broken); (4) Degree of Whiteness: visual whiteness level of rice (milky vs clear white); (5) Fluffiness: texture after cooking; (6) Durability: expected storage time; (7) Cleanliness: absence of foreign material or defects; (8) Aroma: scent of rice when raw/cooked. These markets are vital hubs in the city's rice supply chain, linking local producers and consumers. Through conjoint analysis, this research evaluates how consumers rank rice features and what this implies for agribusiness strategy.

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2. Methods

This research was conducted in Makassar City in three different traditional markets, namely Daya market, Terong market and Pabaeng-Baeng market. These markets were selected due to their high transaction volume and diverse consumer base. This research was conducted in May-July 2024. The sampling technique used is the accidental sampling method. Accidental sampling taking respondents as samples who happen to meet with researchers and match the characteristics can be used as samples.

According to Riyanto et al. [8], the sample calculation with the *Lemeshow* formula approach can be used to calculate the number of samples with a total population that is certainly unknown. The determination of the number of samples in this study using the *Lemeshow* formula (unknown populations: $n = Z^2 P(1–P)/d^2$. Assuming P = 0.5, Z = 1.96, d = 0.1) there were 96 people who were then rounded up to 100 respondents and divided into three markets, namely 33 respondents in Daya Market, 33 respondents in Terong Market, and 34 respondents in Pabaeng-baeng Market. The population in this study consisted of rice consumers who routinely purchase rice for household needs in the selected traditional markets. Respondents were considered eligible if they were adults (over 18 years old), responsible for purchasing rice in their households, and made purchases regularly (at least three times in the targeted research markets). This population criteria ensures that the study captures habitual consumer behavior relevant to daily rice consumption and spending patterns, making the findings more generalizable to similar urban traditional market contexts.

The data analysis uses quantitative descriptive analysis techniques to assess 1st, 2nd, and 4th objectives. Additionally, conjoint analysis techniques are used to assess the

3rd objective. Conjoint analysis technique is also used with the help of SPSS software. Conjoint analysis is one of the multivariate statistical analyses that can be used to obtain a combination or composition of the attributes of a product or service most preferred by consumers so that consumer preferences for a product or service can be known. The use of this analysis refers to the following attributes:

a. Determine attribute and level design

The design of attributes affects the identification of these attributes with levels, each of which is used to create stimuli. The vegetable attributes and levels were determined based on the results of researchers who conducted *pre-surveys* and related literature.

Table 1. Forms of attributes and levels in rice

No.	Attributes	Level
1.	Quality	1) Premium
		2) Medium
		3) Low
2.	Price	1) < IDR 12,000 per kg
		2) IDR 12,000–IDR 13,000 per kg
		3) > IDR 13,000 per kg
3.	Shape	1) Whole grain
		2) Medium
		3) Broken grain
4.	Degree of whiteness	1) Milky white
		2) Clear white
5.	Fluffiness	1) Very fluffy
		2) Medium
		3) Less fluffy
6.	Durability	1) < 1 month
		2) 1 month
		3) > 1 month
7.	Cleanliness	1) Clean
		2) Medium
		3) Not clean
8.	Aroma	1) Pandanus-scented
		2) Unscented

b. Create a combination of attributes (stimuli)

The combination of attributes with levels is called one stimuli. The number of attribute combinations can be calculated as follows, there are eight attributes, namely quality, price, shape, degree of whiteness, whiteness, durability, cleanliness and aroma. Each attribute has two to three levels, so the combination of attributes is 3×3×3×2×3×3×2 = 2,916 combinations. The number of combinations is too much to be evaluated by respondents, so researchers use orthogonal techniques with SPSS tools.

c. Collect respondents' opinions on the combinations formed

Respondents evaluate each stimuli by giving a *rating* value, ranging from the most attractive stimuli to the least attractive stimuli. The assessment uses a measured

ordinal scale in the form of a Likert scale with numbers 1 = very dislike, 2 = dislike, 3= neutral, 4 = like, 5 = very like.

d. Perform the conjoint analysis process

A mathematical model that expresses the fundamental relationship between attributes and usability is written in formula form [9].

$$U(X) = \sum_{i=1}^{M} \beta_{ij} X_{ij} \quad (1)$$

Description:
U(X) = Total utility
β_{ij} = *Partworth* or utility value of the jth attribute (quality, price, shape, degree of whiteness, fluffiness, durability, cleanliness, aroma)
k_1 = The jth level of the i-th attribute (quality, price, shape, degree of whiteness, fluffiness, durability, cleanliness, aroma).
M = Number of attributes (quality, price, shape, degree of whiteness, fluffiness, durability, cleanliness, aroma).
X_{ij} = Attribute dummy variable (quality, price, shape, degree of whiteness, fluffiness, durability, cleanliness, aroma) of the i-th level (takes the value of 1 if the corresponding level appears and 0 otherwise).

The next step is to find the relative *importance* value, which is the basis for interpreting the results. To determine the relative importance value of the i-th attribute (Wi), it is determined through the following formula [9] :

$$W_i = \frac{I_i}{\sum_{i=1}^{m} I_i} \times 100\% \quad (2)$$

Description:
Ii = (max(αij)–min(αij), for each i-th attribute
m = Number of attributes

e. Interpreting

The output results obtained from the conjoint analysis are useful and important *values*. The *utility* value describes the consumer's choice of preferred product attributes if the value obtained is positive; otherwise, if the result is negative, then the consumer does not like the product attribute. Importance values describe the level of importance of respondents to product attributes in making rice purchases [6].

To evaluate the validity of the conjoint analysis results, SPSS provides two key statistics: Pearson's R and Kendall's tau. Pearson's R measures the correlation between observed and estimated preference scores, while Kendall's tau assesses the rank-order consistency. High values for both coefficients (close to 1.0) indicate that the model accurately predicts respondent preferences. In this study, the conjoint model was deemed valid if Pearson's R and Kendall's tau both exceeded 0.80 with statistical significance ($p < 0.05$), supporting the reliability of the derived utility and importance scores.

3. Results and Discussion

3.1. Respondent Characteristics

The general characteristics of respondents in this study are distinguished by gender, age, occupation, education level, income level, number of family members, frequency of purchase and amount of consumption.

Table 2. Respondent characteristics

Characteristics	Number (Person)	Percentage (%)
Gender		
- Female	82	82
- Male	18	18
Age (years)		
- 22-34	20	20
- 35-47	49	49
- 48-62	31	31
Occupation		
- Housewife	34	34
- Private employee	16	16
- Entrepreneurship	37	37
- Civil servant	13	13
Number of family members (people)		
- 1-2	26	26
- 3-4	62	62
- 5-6	12	12
Education level		
- Elementary (SD)	11	11
- Junior High School (SMP)	22	22
- Senior High School (SMA)	38	38
- Bachelor's Degree (S1)	29	29
Income level (IDR)		
- 2,325,000–3,900,000	35	35
- 4,000,000–5,500,000	47	47
- 5,600,000–6,850,000	18	18
Frequency of purchase (times per month)		
- 1	47	47
- 2	53	53
Total consumption (kg per month)		
- 10–14	22	22
- 15–18	34	34
- 19–22	44	44

Source: Primary data analysis, 2024

This study involved 100 respondents, the majority of whom were women (82%), aged between 35 and 47 years. Most of the respondents were housewives or small-scale entrepreneurs, with a senior high school education and a monthly household income ranging from IDR 4,000,000 to 5,500,000. The average household consisted of 3–4 members, with monthly rice consumption ranging from 15 to 18 kilograms. These

demographic patterns suggest that women in middle-income families predominantly conduct household decision-making regarding rice purchases. Their purchasing behavior is likely shaped by practical considerations, household food security, and perceived value and quality of rice products [7,10]. Moreover, Yuliyanti et al. [6] found that female consumers in traditional markets are more selective when buying rice products because the choices they make will certainly have an impact on what their family members consume.

This demographic profile appears to influence preference patterns observed in the conjoint analysis. For example, middle-income consumers with household responsibilities tend to prioritize sensory and functional attributes —such as fluffiness, cleanliness, and aroma— over branding or packaging. The predominance of female respondents also aligns with previous studies showing that women, especially housewives, are more attentive to cooking quality and hygiene when selecting staple foods. Moreover, the educational background (mostly senior high school) suggests consumers rely on direct sensory assessment rather than abstract quality indicators like certification. These links between demographic traits and preferences indicate the contextual relevance of the results to similar consumer segments.

3.2. Rice Attribute Type

The types of rice attributes include various important aspects that are the main considerations for consumers in choosing rice products such as rice quality, affordable price, ideal grain shape, degree of whiteness that is pure white or milky white or depending on the variety, fluffiness or firmness after cooking, durability of the level of dryness or humidity of rice that affects storability, cleanliness and distinctive aroma and pandan fragrance, where all these attributes together determine consumer preferences for the quality and value of a rice product in the market. These attributes influence the quality of rice as well as the way rice is processed, thus playing an important role in determining consumer preferences and the usefulness of rice [11].

Based on the results of conjoint analysis in this study, the specific consumer preference patterns for these attributes are as follows: The analysis reveals several key findings. First, based on consumer responses to the 25 orthogonal profile combinations, rice with premium quality, pandan aroma, and very fluffy texture received the highest utility values. Specifically, the utility score for premium quality was +0.478, indicating a strong preference, while low quality scored −0.566, showing a clear aversion. Similarly, fluffiness scored +0.332 and cleanliness +0.291, while broken grain and unclean rice received negative utility values of −0.284 and −0.316, respectively.

Second, the attribute with the highest importance value was quality (22.16%), followed by fluffiness (19.67%) and cleanliness (13.41%). Other attributes with moderate influence included grain shape (11.57%) and aroma (10.66%). Price and degree of whiteness had the lowest relative importance, 9.00% and 4.45% respectively, indicating that consumers prioritize sensory and cooking performance characteristics over cost and appearance.

Although price is generally a critical factor in consumer decision making, in this study it ranked lower than other attributes, with an importance value of only 9.00%. This

may be due to two key factors. First, most respondents were middle-income consumers who showed a stronger orientation toward quality and performance than price sensitivity. Second, the price range presented (IDR 12,000–13,000 per kg) is perceived as a standard market rate in Makassar's traditional markets, which reduces its role as a differentiating factor. If rice falls within this acceptable price range, consumers appear to prioritize other tangible qualities —such as grain integrity, aroma, and texture— when making purchase decisions.

Third, the most favored rice profile overall was one that combined the following: premium quality, whole grain shape, milky white color, very fluffy texture, pandanus aroma, price between IDR 12,000–13,000 per kg, and less than one month durability. This specific combination reflects the optimal consumer preference structure.

Fourth, preferences suggest that consumers in traditional markets are driven more by tangible, directly observable or experienced product features —especially those that relate to texture after cooking and smell— than by branding, labeling, or long shelf life. This highlights a need for rice producers to maintain consistency in these physical attributes to build loyalty in traditional market segments.

3.3. Consumer Preferences Rice Attributes

High-quality rice is widely preferred by consumers [12,13]. Consumer preference is a level of satisfaction obtained from consumers through ranking goods or services based on their satisfaction or utility. Preferences have a goal, which is the final decision in the buying process, to be enjoyed by consumers so that they can achieve consumer satisfaction [14].

Table 3. Respondents who chose each rice attribute category

No.	Attributes	Level	Number of Respondents
1.	Quality	Premium	54
		Medium	32
		Low	14
2.	Price	< IDR 12,000 per kg	16
		IDR 12,000–IDR 13,000 per kg	63
		> IDR 13,000 per kg	21
3.	Shape	Whole grain	60
		Medium	23
		Broken grain	17
4.	Degree of whiteness	Milky white	65
		Clear white	35
5.	Fluffiness	Very fluffy	63
		Medium	21
		Less fluffy	16
6.	Durability	< 1 month	69
		1 month	18
		> 1 month	13
7.	Cleanliness	Clean	59
		Medium	25
		Not clean	16
8.	Aroma	Pandanus-scented	67
		Unscented	33

Source: Primary data analysis, 2024

Table 3 shows that there are differences in consumer preferences for the attributes that exist in the rice attribute. Respondents have their preferences for each inherent attribute. These differences indicate that certain factors are more important to certain groups of consumers, which can influence their purchasing decisions. For example, some consumers may prioritize affordability, while others are more concerned with premium quality or product authenticity. Understanding these preferences is crucial in developing effective marketing and market segmentation strategies [11].

The analysis reveals that consumers demonstrate a clear preference for premium-quality rice, generally priced between IDR 12,000 and 13,000 per kilogram. The most desirable rice characteristics include a milky white appearance, pandan aroma, and a fluffy texture after cooking [7,15]. These attributes are commonly associated with freshness, high cooking performance, and overall satisfaction [16].

The following results of the research that has been carried out can be seen from the *overall statistics* on SPSS. The correlation table between the respondent's data and the actual data aims to measure the accuracy or suitability of the model estimate. The output for the correlation value can be seen in Table 4.

Table 4. Attribute correlation value

Correlations		
	Value	**Sig**
Pearson's R	.965	.000
Kendall's tau	.849	.000

Source: Primary data analysis, 2024

Based on Table 4, it can be seen that the correlation of the sig value the *Pearson's R* test is 0.000 and *Kendall's tau is* 0.000, both tests are below the significant level of 0.05, which means that there is a significant relationship between consumer preferences in purchasing rice. A Pearson's R value of 0.965 reflects a very strong model fit, demonstrating that the estimated preferences closely align with the actual ratings provided by respondents. This high level of consistency enhances confidence in the validity of the conjoint analysis results and affirms that the utility and importance scores reliably reflect true consumer priorities. Furthermore, this statistical strength reinforces the practical value of the findings for rice producers and retailers, who can use this insight to support product development and strategic marketing decisions. Yuliyanti et al. [6] found a real correlation between the results of conjoint analysis and consumer preferences. Thus, the opinions of 100 respondents can be accepted to describe the desires of the buying population on rice attributes.

The results of Pearson and Kendall tau correlation tests show statistically significant associations between stated preferences and selected rice attributes ($p < 0.001$), thereby supporting the validity of the analytical model used in this study [17]. The utility analysis indicates that consumers tend to avoid rice with broken grains, lack of aroma, poor quality, and unclean appearance. Conversely, high utility values were assigned to rice with pandan aroma, premium quality, and cleanliness [12].

Product attributes are favoured by looking at the results of the utility estimate test, where if the results obtained are negative or the value obtained is smaller, it can be said that consumers do not like these product attributes [7].

Table 5. Utility value test on rice attribute

Attributes	Level	Utility Estimate	Std. Error
Quality	Premium	.478	.078
	Medium	.088	.078
	Low	-.566	.078
Price	< IDR 12,000 per kg	.029	.078
	IDR 12,000–IDR 13,000 per kg	.111	.078
	> IDR 13,000 per kg	-.140	.078
Shape	Whole Grain	.120	.078
	Medium	.164	.078
	Broken Grain	-.284	.078
Degree of Whiteness	Milk White	.002	.059
	Clear White	-.002	.059
Fluffiness	Very fluffy	.332	.078
	Medium	.204	.078
	Less fluffy	-.537	.078
Durability	< 1 month	.077	.078
	1 month	-.092	.078
	> 1 month	.016	.078
Cleanliness	Clean	.246	.078
	Medium	.070	.078
	Not Clean	-.316	.078
Aroma	Pandanus-Scented	.261	.059
	Unscented	-.261	.059
(Constant)		**3.080**	**.062**

Source: Primary data analysis, 2024

The study reveals that when choosing rice, consumers prioritize quality, freshness, and overall eating experience. Most respondents prefer premium-quality rice due to its cleanliness, intact grains, and superior cooking and eating satisfaction [9]. Price also plays a role, with consumers favoring rice in the IDR 12,000–IDR 13,000 per kg range, as it offers a good balance between affordability and quality [18]. The shape of the rice matters too-many prefer medium-grain rice because it cooks well and produces a fluffy texture, making meals more enjoyable [19].

When it comes to appearance, people tend to choose milky white rice over clear white rice, associating it with better hygiene and overall quality [15]. Fluffiness is another important factor, as many consumers enjoy soft, fluffy rice, which is a staple in Indonesian households [11]. Freshness is also a concern, with respondents preferring rice that lasts less than a month to ensure they always have fresh stock and avoid spoilage [20]. Cleanliness is a major priority which people naturally want rice that looks and feels pure, free from impurities [7]. Lastly, aroma plays a big role in the overall experience, with pandanus-scented rice being the top choice because its fragrance enhances the taste and makes meals more appetizing [21]. These insights highlight that when buying rice, people seek not just affordability but also quality, freshness, and a sensory experience that makes their meals more enjoyable.

3.4. Consideration of Rice Attributes

Importance values are the largest values that indicate the most important rice attributes [22]. Importance values in conjoint analysis are used to determine which attributes consumers consider important when choosing rice.

Table 6. Importance value of rice attributes

Attributes	Importance Values
Quality	22.161
Fluffiness	19.671
Cleanliness	13.413
Shape	11.566
Aroma	10.658
Durability	9.082
Price	9.001
Degree of Whiteness	4.447

Source: Primary data analysis, 2024

Based on the results of conjoint analysis in the form of the level of importance of the rice quality attribute, the first attribute is considered when buying rice with the highest importance value of 22.161. This is in line with research conducted by Anwar et al. [9], which states that respondents prefer premium quality rice for several simple reasons related to comfort and satisfaction when cooking and consuming the rice. On the other hand, degree of whiteness attribute is least considered by respondents when buying rice, with an important value of 4.447. This illustrates that the degree of whiteness of rice is not very important to consumers. These results align with research conducted by Shalihin et al. [18], which states that consumers do not care if the degree of whiteness to be consumed is milky white or clear white because it does not affect taste.

Based on the utility scores, rice quality emerged as the most important attribute (utility score: 22.16), followed by fluffiness (19.67), cleanliness (13.41), and grain shape (11.57). The attribute considered least important was the degree of whiteness (4.45). This finding is consistent with prior studies, which suggest that consumers place greater emphasis on functional characteristics such as taste and texture, rather than purely visual attributes [19,23,24].

4. Conclusion

Based on the results of the research conducted, it can be concluded that the typical rice consumer in Makassar's traditional markets is a woman with moderate income and a household size of 3–4 members. The types of rice quality chosen by respondents are physical characteristics such as size, grain shape, color and aroma. Consumers tend to prefer rice with premium quality characteristics, including a price range of IDR 12,000–13,000 per kg, whole grain shape, milky white color, fluffy texture, pandan aroma, cleanliness, and a storage life of less than one month. The attribute most strongly influencing consumer purchasing decisions is overall rice quality, followed by fluffiness and cleanliness.

Producers and marketers maintain the quality of the rice produced as quality is one of the attributes consumers consider in determining rice preferences. Maintaining consistent rice wholesomeness is key for producers to meet consumer expectations and remain competitive. For future researchers, it is important to develop knowledge about rice consumer preferences and rice attributes to be analyzed by considering factors such as consumption behaviour, market segmentation, and trends in eating habits. Further research can explore the influence of attributes on consumer purchasing decisions, thus providing more comprehensive insights.

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