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Unveiling Multidimensional Consumer Preferences for Organic Food: A Multivariate Approach Study in Malang City, Indonesia

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ABSTRACT

This study aims to uncover the dominant dimensions of consumer preferences for organic food using a multivariate approach. Data were collected through a structured survey capturing consumer characteristics, product preferences, price perceptions, quality considerations, and purchasing-related attributes. Principal Component Analysis (PCA) was employed to reduce correlated variables and identify the underlying dimensions that characterize preferences for organic food. The results of Principal Component Analysis identified five preliminary components, which explained 71.18% of the total variance. The components were interpreted as Price and Purchase Accessibility (21.38%), Education, Packaging, and Purchase Timing (17.80%), Demographic and Consumer Profile (12.32%), Household and Purchase Consideration (11.04%), and Purchase Location and Timing (8.64%). The findings contribute to organic consumer behaviour literature by shifting the analytical focus from isolated preference attributes toward a multidimensional preference structure. Practically, the identified dimensions provide an empirical basis for producers, marketers, and policymakers to develop more targeted product positioning, consumer segmentation, and marketing strategies for organic food. The study also provides a foundation for further research on consumer heterogeneity and market opportunities in emerging organic food markets.

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INTRODUCTION

The development of the organic food market reflects growing consumer attention to health, food quality, food safety, and environmental sustainability. Consumers evaluate organic products based on a mix of functional, health-related, environmental, and economic considerations rather than a single product attribute (Parashar et al., 2023). Favourable perceptions of organic food do not always translate into consistent purchasing behaviour. This issue is particularly relevant in emerging markets such as Indonesia, where organic food consumption still faces challenges related to affordability, accessibility, consumer acceptance, and market penetration.

Previous research indicates that the relative importance of organic food determinants varies across empirical contexts. Teixeira et al. (2022) found that attitude was the strongest determinant of organic food purchase intention, while subjective norms and perceived behavioural control were not significant. Yilmaz (2023) reported that health, environmental, animal-welfare, and food-safety values did not significantly translate into actual purchasing behaviour, while several demographic characteristics were significantly associated with purchasing behaviour. These differences indicate that organic food preferences may involve multiple economic, product-related, psychological, and socio-demographic considerations whose relative importance varies across consumer and market contexts.

Most existing studies have focused on whether individual determinants, such as attitude, health consciousness, environmental concern, perceived quality, perceived value, subjective norms, and perceived behavioural control, are associated with purchase intention or purchasing behaviour. These approaches explain specific behavioural relationships but offer less insight into how multiple observed consumer and product characteristics are organized simultaneously within a broader preference pattern. Research examining price, certification, availability, packaging, quality, and consumer characteristics also provides useful evidence on individual attributes. Still, it does not necessarily reveal how these heterogeneous characteristics co-vary within an integrated empirical structure.

The methodological orientation of previous research further reinforces this gap. Organic food consumer studies have frequently employed the Theory of Planned Behaviour, Structural Equation Modelling, Partial Least Squares-SEM, regression, and conjoint analysis to test theoretically specified relationships or estimate the effects of individual attributes (Teixeira et al., 2022; Yilmaz, 2023). The present research addresses a different exploratory question by examining the structure of relationships among multiple observed consumer, product, price, accessibility, and purchasing-related characteristics. Principal Component Analysis (PCA) provides an exploratory dimension-reduction approach that summarizes correlated observed variables into a smaller number of components while retaining a substantial proportion of the information in the data (Greenacre et al., 2022).

This study addresses the limited understanding of how heterogeneous consumer, product, price, accessibility, and purchasing-related characteristics are empirically organized within an integrated preference structure in the Indonesian organic food context. This study examines how these characteristics are organized among organic food consumers in Malang City, Indonesia, using PCA as an exploratory analytical approach.

By integrating consumer characteristics, price perceptions, accessibility conditions, product-related attributes, and purchasing considerations within a single exploratory analysis, this study provides a context-specific perspective on how heterogeneous attributes may co-vary across broader preference dimensions. This approach shifts attention from examining determinants independently toward understanding their empirical configuration within the local organic food market. The resulting component structure provides preliminary evidence that may inform hypothesis development and future research on consumer heterogeneity rather than a definitive or generalizable representation of Indonesian organic food consumers.

RESEARCH METHOD

This study employs a qualitative research approach to explore consumer characteristics regarding organic product preferences. Qualitative research emphasizes understanding how individuals interpret and experience social realities (Mohajan, 2018). To comprehensively identify consumer traits, this research investigates social variables, motivations, and barriers associated with the purchase of organic food, as suggested by Chen et al. (2022). Motivating factors for purchasing organic products include convenience, availability, product variety, quality, brand trust, price, health benefits, taste, and environmental friendliness. In contrast, barriers include premium pricing, limited availability, and low attractiveness from the community perspective (Chen et al., 2022; Mohajan, 2018).

To better understand consumer preferences, this study adopts Principal Component Analysis (PCA), a technique widely used by previous researchers such as Merlino et al. (2022), Muziri et al. (2021), and Liu et al. (2025). The consumer characteristics observed in this study encompass gender, place of residence, number of family members, income level, age, occupation, and education level. Specifically, three variables were analyzed: the preferred type of organic product (α), the preferred price (β), and the perceived quality (γ). Quality was measured using several indicators, including comfort, price stability, raw material composition, nutritional content (fat, calories, cholesterol), product safety (additives, pesticide residues), and environmental aspects.

Price preferences were rated on an ordinal scale divided into three levels: cheap ($\beta = 1$), medium ($\beta = 2$), and expensive ($\beta = 3$). Data were collected from 28 consumers who had experience purchasing organic products either in residential or non-residential settings. According to Elhaik (2022), Principal Component Analysis (PCA) is a multivariate statistical technique used to simplify complex datasets while maintaining the original data's covariance structure. The results of PCA are instrumental in guiding research design, distinguishing and describing individual and population traits, and supporting historical as well as ethnobiological interpretations related to origin, development, distribution, and interrelationships.

Principal Component Analysis (PCA) was employed as an exploratory data-reduction technique to examine patterns of association among 13 observed variables related to consumer characteristics, product attributes, price perceptions, accessibility, and purchasing considerations. The purpose of PCA was to summarize the observed variables into a smaller number of empirical components rather than to identify latent psychological constructs or estimate causal relationships. PCA and Exploratory Factor Analysis (EFA) differ in their analytical objectives: PCA forms linear combinations of observed variables to account for total observed variance, whereas EFA seeks to identify latent factors that explain the common variance shared among observed variables. Accordingly, the present study refers to the extracted dimensions as principal components rather than latent factors.

This study employed an exploratory quantitative research design to examine the multidimensional pattern of consumer preferences for organic food in Malang City, Indonesia. Data were collected through a structured survey of consumers with previous experience purchasing organic food. Respondents were drawn from residential and non-residential settings to capture variation in consumer characteristics and purchasing contexts. The final dataset consisted of 28 respondents.

Consumer preferences were examined using 13 observed variables covering demographic characteristics, economic conditions, and purchasing-related considerations. These variables included gender, residential location, household size, income, age, occupation, educational attainment, price perception, ease of purchase, packaging, purchase location, purchasing considerations, and purchase frequency. The variables were measured using categorical and ordinal response formats according to their substantive characteristics. For example, price perception was measured on a three-level ordinal scale representing low or affordable, moderate, and expensive price perceptions.

Principal Component Analysis (PCA) was employed as an exploratory data-reduction technique to examine patterns of association among the observed variables and summarize them into a smaller number of empirical components. PCA constructs principal components as linear combinations of the original variables to represent as much variation in the original data as possible. PCA was selected because the study sought to identify patterns within multiple observed consumer and purchasing characteristics rather than to estimate causal relationships or establish latent psychological constructs. In this respect, PCA differs conceptually from Exploratory Factor Analysis (EFA): PCA primarily serves data reduction and considers total observed variance, whereas EFA seeks to identify latent factors underlying relationships among observed variables (Omura et al., 2022).

Before component extraction, we evaluated the suitability of the correlation structure for PCA using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity. KMO indicates sampling adequacy, whereas Bartlett's test evaluates whether the observed correlation matrix differs sufficiently from an identity matrix to support multivariate dimension reduction. Recent applications of PCA regard KMO values below 0.50 as inadequate and values between approximately 0.50 and 0.60 as indicating relatively weak sampling adequacy (Shaaban & Stevens, 2025). The Measure of Sampling Adequacy (MSA) was also used to identify variables poorly represented by the correlation structure before extracting a multivariate solution (Lorenzo-Seva & Ferrando, 2021).

Table 1
The Descriptions of Characteristic Respondents

Variable	Indicator	Percentage (%)
Gender	Woman	92,86
	Man	7,14
Residence	Housing	85,71
	Non-Residential	14,29
Family Members	2-3 people	64,29
	4-5 people	28,57
	> 6 peoples	7,14
Consumer earnings	1-2 billion	32,14
	2,5-3,5 billion	21,43
	4-5 billion	21,43
	More 5 billion	25,00
Age	21-30 year	14,29
	31-40 years	42,86
	> 51 years	14,29
Profesion	Teacher	28,57
	Self-employed	28,57
	Household	21,43
	Official	21,43
Education	SD-SMP	10,71
	SLTA	17,86
	D1-D3	17,86
	S1-S2	53,57

Source: Data processed

The PCA initially considered 13 observed variables. With 28 respondents, the study therefore had approximately 2.15 observations per variable. This low observation-to-variable ratio represents an important methodological limitation because the stability of principal-component solutions depends partly on sample size relative to the dimensionality and correlation structure of the data. Simulation evidence indicates that principal-component stability can vary substantially across samples and generally improves as sample size increases, although stability also depends on the underlying covariance structure. Accordingly, we used the present PCA as a preliminary exploratory analysis, and we interpret the resulting components as sample-specific empirical patterns rather than a stable or population-representative structure of organic food preferences. Replication using a substantially larger and more heterogeneous sample is required to assess the reproducibility of the identified component structure.

We retained components based on their eigenvalues and contribution to cumulative explained variance. Eigenvalue-based criteria and the proportion of cumulative variance explained are commonly used in PCA component-retention decisions (Shaaban & Stevens, 2025). We then examined component loadings to identify the observed variables most strongly associated with each retained component. We provisionally interpreted and labelled the components according to the substantive meaning of the variables with the strongest absolute loadings. Because PCA components are mathematical combinations of observed variables rather than latent constructs, these labels are descriptive interpretations of the observed loading patterns rather than validated psychological constructs (Omura et al., 2022).

The analytical procedure consisted of four stages. First, we summarized respondent characteristics and organic food purchasing characteristics using descriptive statistics. Second, we assessed the data's suitability for exploratory multivariate analysis using KMO, Bartlett's test of sphericity, and MSA. Third, PCA reduced the dimensionality of the observed variables and identified preliminary principal components. Finally, the extracted components were interpreted according to their dominant loading patterns and substantive relevance to organic food consumption.

Table 2
Preliminary Kendall's Tau Association Assessment

Variable	Kendall's Tau Coefficient	Relative to Original Reference Value (0.338)
Gender (X1)	-	Not reported
Place of Residence (X2)	0.283	< 0.338
Number of Family Members (X3)	0.059	< 0.338
Income (X4)	0.416	≥ 0.338
Age (X5)	−0.389	≥ 0.338
Occupation (X6)	0.082	< 0.338
Education Level (X7)	0.026	< 0.338
Price Perception (X8)	−0.345	≥ 0.338
Ease of Purchase (X9)	0.258	< 0.338
Packaging (X10)	0.083	< 0.338
Place of Purchase (X11)	−0.240	< 0.338
Considered Aspects (X12)	0.076	< 0.338
Purchase Frequency (X13)	−0.108	< 0.338

Source: Primary Data Processed

RESULTS AND DISCUSSION

The analysis used data from 28 respondents and 13 observed variables, for approximately 2.15 observations per variable. The sample was predominantly female, with women accounting for 92.86% of respondents. In addition, 85.71% of respondents resided in residential areas, while 64.29% belonged to households comprising two to three members. Given the limited sample size, interpret these characteristics as a description of the respondents included in the study rather than as a representative profile of organic food consumers in Malang City, Indonesia. The detailed data chararteristic respondendent display on the table 1.

The predominance of female respondents aligns with previous research suggesting that women tend to show stronger awareness and more favourable attitudes toward organic food, particularly regarding health and food safety (Fatha & Ayoubi, 2023; Iqbal et al., 2021). However, this finding should not be interpreted as evidence that gender determines organic food purchasing behaviour. Yilmaz (2023), for example, found that gender was not significantly associated with actual organic food purchasing behaviour, whereas age, education, employment status, and marital status were significant. These differences indicate that demographic characteristics may operate differently across consumer and market contexts.

Therefore, the demographic characteristics observed in the present sample are treated primarily as contextual information. The PCA does not test whether individual demographic variables cause purchasing behaviour; instead, it explores how demographic, economic, and purchasing-related characteristics may co-vary within the observed sample.

Preliminary Association Assessment

Note: The table presents the correlation coefficients reported in the original analysis. "Above" and "Below" indicate whether the absolute coefficient exceeds the original reference value of 0.338. These classifications do not indicate whether an individual variable is valid or invalid. Kendall's tau was used in the original analysis to examine the reported associations among the observed variables. Several variables were measured using nominal or ordinal response categories, making a non-parametric correlation approach appropriate for the preliminary assessment. The coefficients are presented as descriptive information on the correlation pattern rather than as evidence of construct validity.

The original analysis compared the reported correlation coefficients with a reference value of 0.338 for a sample of 28 respondents. The observed variables represent heterogeneous demographic, economic, and purchasing characteristics rather than items designed to measure a single latent construct. The coefficients therefore do not indicate whether individual variables are "valid" or "invalid." The reported values describe only the strength and direction of the observed associations before the multivariate analysis (Table 2).

Table 3
Reliability Assessment

Assessment	Reported Value	Interpretation in the Revised Analysis
Cronbach's Alpha	0.349	Reported as supplementary information
Original reference value	0.338	Used in the original analysis for comparison
Role in PCA assessment	—	Not used as the primary criterion for PCA suitability

Source: Primary Data Processed

Note: The Cronbach's Alpha value is reported to document the original analysis. The observed variables represent different demographic, economic, and purchasing characteristics; the coefficient is therefore not interpreted as evidence that all variables form a single internally consistent construct.

Table 4
MSA Values

Variable	MSA Value	Conclusion
Gender (X1)	0.500a	Retained
Residence (X2)	0.570a	Retained
Family Size (X3)	0.357a	Excluded
Income (X4)	0.613a	Retained
Age (X5)	0.382a	Excluded
Occupation (X6)	0.431a	Excluded
Education Level (X7)	0.524a	Retained
Price Perception (X8)	0.585a	Retained
Ease of Purchase (X9)	0.584a	Retained
Packaging (X10)	0.559a	Retained
Purchase Location (X11)	0.574a	Retained
Considered Aspects (X12)	0.374a	Excluded
Time Intensity (X13)	0.447a	Excluded

Source: Primary Data Processed

Note: MSA values compared to the 0.5 threshold

The preliminary association assessment was not used as the primary criterion for determining variable suitability for PCA. We further evaluated the correlation structure using the Measure of Sampling Adequacy (MSA), the determinant of the correlation matrix, the Kaiser–Meyer–Olkin (KMO) measure, and Bartlett's test of sphericity. These diagnostics assessed the adequacy of the observed variables for the subsequent exploratory component analysis.

Reliability Test

The original analysis calculated Cronbach's Alpha to assess the internal consistency of the observed variables. The analysis produced a Cronbach's Alpha value of 0.349. The original assessment compared this value with the reference coefficient of 0.338 and interpreted the result as indicating reliability. The variables included in the present analysis represent heterogeneous demographic, economic, and purchasing characteristics rather than multiple items designed to measure a single underlying construct. Consequently, we report Cronbach's alpha as supplementary information and do not use it as the primary criterion for determining the variables' suitability for PCA. We assess PCA suitability primarily based on the correlation structure and the subsequent MSA, determinant, KMO, and Bartlett's test results (Table 3).

Assessment of Data Suitability

The suitability of the observed variables for Principal Component Analysis (PCA) using several diagnostic measures. The assessment included the Measure of Sampling Adequacy (MSA), determinant of the correlation matrix, Kaiser–Meyer–Olkin (KMO) measure, and Bartlett's test of sphericity. These diagnostics were examined collectively to evaluate the strength and adequacy of the correlation structure before interpreting the principal component solution.

The diagnostic results were interpreted cautiously because the analysis was based on 28 respondents and 13 observed variables. Particular attention was given to individual MSA values and the overall KMO value to identify potential limitations in sampling adequacy. Bartlett's test and the determinant of the correlation matrix were also examined to assess the extent of intercorrelation among the observed variables. The diagnostic assessment was not treated as definitive confirmation that the data provided a strong basis for PCA. The results were used to assess the degree of support for exploratory component analysis and to guide cautious interpretation of the extracted components.

Measure of Sampling Adequacy (MSA)

Measure of Sampling Adequacy (MSA) were examined for each observed variable to assess its representation within the correlation structure. The MSA values were obtained from the diagonal elements of the anti-image correlation matrix and were evaluated using the 0.50 threshold adopted in the original analysis. Eight variables recorded MSA values of at least 0.50: gender (0.500), residence (0.570), income (0.613), education level (0.524), price perception (0.585), ease of purchase (0.584), packaging (0.559), and purchase location (0.574). Five variables recorded MSA values below 0.50: family size (0.357), age (0.382), occupation (0.431), considered aspects (0.374), and time intensity (0.447).

The variation in individual MSA values indicates that the observed variables were not equally well represented by the correlation structure. Variables with MSA values below 0.50 require particular caution when interpreting the subsequent component solution. Consequently, the MSA results are treated as diagnostic evidence of exploratory PCA's limitations rather than as definitive evidence for removing or retaining individual variables. The MSA values obtained from the analysis are presented in Table 4.

Determinant of the Correlation Matrix

The determinant of the correlation matrix was examined as part of the preliminary assessment of intercorrelations among the observed variables. The analysis produced a determinant value of 0.009. This value indicates intercorrelations among the variables included in the analysis. The determinant was considered together with the KMO and Bartlett's test results when evaluating the overall suitability of the correlation structure for PCA. The determinant value was not interpreted independently as evidence that the dataset provided a strong basis for PCA. We interpreted it alongside the other diagnostic results, particularly given the small sample size and variation in individual MSA values. Table 5 summarizes the overall diagnostic results.

Kaiser–Meyer–Olkin (KMO) Measure

The Kaiser–Meyer–Olkin (KMO) measure assessed the overall sampling adequacy of the observed variables for PCA. The analysis produced a KMO value of 0.521. This value was slightly above the 0.50 threshold adopted in the original analysis but indicates only marginal sampling adequacy. The KMO result suggests that the correlation structure provides limited support for a stable component solution. The small sample size of 28 respondents further restricts the strength of the evidence provided by this diagnostic measure. The KMO value therefore supports only a preliminary, exploratory application of PCA, rather than confirming a robust component structure. The KMO result was evaluated together with the determinant of the correlation matrix, individual MSA values, and Bartlett's test of sphericity. Table 5 presents the combined diagnostic evidence.

Bartlett's Test of Sphericity

Bartlett's test of sphericity assessed whether the correlation matrix differed significantly from an identity matrix. The analysis produced a Chi-square value of 95.006 with a significance level of 0.092. The reported p-value exceeds the conventional 0.05 significance level. Therefore, the null hypothesis that the correlation matrix is an identity matrix cannot be rejected at the 5% level. The result provides no strong statistical evidence that the observed correlation structure differs substantially from an identity matrix. The Bartlett's test result reinforces the need for a cautious interpretation of the PCA findings. The component solution is treated as preliminary exploratory evidence in the present sample, particularly given the small sample size, marginal KMO value, and uneven individual MSA values.

Preliminary PCA Loading Matrix

Table 6 presents the reconstructed loading matrix for the five principal components retained in the exploratory PCA. The component loadings indicate the direction and relative strength of the association between each

observed variable and the extracted components. Larger absolute loading values indicate a variable's stronger contribution to the corresponding component.

Interpret the loading matrix with caution, given the limited sample size and the previously reported diagnostic results. The matrix describes preliminary patterns within the present sample rather than establishing a stable or generalizable component structure.

a. PC1 showed its strongest loadings for price perception (0.789), ease of purchase (−0.715), income (−0.635), and home (−0.585). The pattern indicates that price-related, economic, and accessibility characteristics contributed prominently to the first component within the observed sample.
b. PC2 was characterized primarily by study (0.784), packaging (−0.682), and interval (0.662). These variables suggest a component involving educational characteristics, packaging, and purchasing timing.
c. PC3 showed its strongest loadings for age (−0.807), sex (0.629), and passion (−0.530). The loading pattern indicates that demographic and consumer-profile characteristics dominated this component.
d. PC4 was dominated by considered aspects (0.808) and family size (0.634). The component reflects the joint presence of household characteristics and considerations reported in relation to organic food purchasing.
e. PC5 was characterized primarily by purchase place (0.537) and interval (−0.501). The pattern suggests an association between purchasing location and purchasing timing within the present sample.

The loading patterns provide the empirical basis for the provisional component labels presented in the subsequent analysis. The labels should be understood as descriptive summaries of the observed associations rather than as validated latent constructs.

Table 5
Summary of Diagnostic Tests for PCA Suitability

Diagnostic Measure	Result	Interpretation
Determinant of the Correlation Matrix	0.009	Intercorrelations were present among the observed variables
Kaiser–Meyer–Olkin (KMO) Measure	0.521	Marginal sampling adequacy
Bartlett's Test of Sphericity	$\chi^2 = 95.006$; $p = 0.092$	Not statistically significant at the 5% level

Source: Primary Data Processed

Note: The diagnostic measures were interpreted collectively when assessing the suitability of the correlation structure for PCA. The KMO value indicates marginal sampling adequacy, while Bartlett's test is not statistically significant at the 5% level. The results therefore support a cautious, exploratory interpretation of the subsequent PCA solution.

Table 6
Eliminary PCA Loading Matrix

Variable	PC1	PC2	PC3	PC4	PC5
Sex	−0.487	−0.204	0.629	−0.184	−0.013
Home	−0.585	0.385	0.044	−0.142	0.330
Family Size	−0.119	−0.290	−0.166	0.634	−0.386
Income	−0.635	0.257	−0.270	0.058	0.093
Age	−0.132	0.294	−0.807	0.120	0.170
Passion	−0.431	−0.230	−0.530	−0.177	−0.424
Study	−0.352	0.784	0.052	0.198	0.229
Price Perception	0.789	0.336	−0.012	0.046	−0.049
Ease of Purchase	−0.715	−0.339	0.076	0.097	0.202
Packaging	−0.149	−0.682	−0.253	−0.283	0.058
Purchase Place	0.458	−0.275	−0.143	0.382	0.537
Considered Aspects	−0.294	−0.117	0.265	0.808	−0.098
Interval	−0.073	0.662	0.085	−0.031	−0.501

Source: Primary Data Processed

Several variables displaying relatively strong component loadings also recorded MSA values below 0.50 in the preceding diagnostic assessment. Family size, age, considered aspects, and time intensity were among the variables with relatively low individual sampling adequacy. Consequently, interpret these variables' contribution to the component structure with particular caution. The observed loading pattern is retained as part of the preliminary exploratory analysis, but its stability requires confirmation using a larger sample.

Exploratory PCA Results

The exploratory PCA retained five principal components with eigenvalues greater than 1. The five components explained 71.180% of the total observed variance. PC1 accounted for the largest proportion of variance (21.378%), followed by PC2 (17.802%), PC3 (12.322%), PC4 (11.041%), and PC5 (8.637%).

The proportion of variance explained indicates that the retained components summarize a substantial share of the variation observed in the present dataset. The result should not be interpreted as evidence of a stable five-dimensional structure because the analysis was based on only 28 respondents and the preceding diagnostic assessment showed marginal sampling adequacy. The five-component solution is therefore presented as preliminary exploratory evidence within the study sample.

The exploratory analysis retained five principal components with eigenvalues greater than 1. The cumulative variance of 71.180% describes the proportion of observed variance summarized by the five components and should not be interpreted as evidence of a validated or population-representative component structure. The component labels were provisionally derived from the variables with the strongest absolute loadings within each principal component. PC1 was characterized primarily by price perception, ease of purchase, income, and home. PC2 was characterized by study, packaging, and interval. PC3 was dominated by age, sex, and passion. PC4 was represented primarily by considered aspects and family size, while PC5 was associated mainly with purchase place and interval.

The observed loading patterns provide the basis for the provisional labels presented in Table 8. The labels are used only to facilitate interpretation of the component structure within the current sample. They do not represent validated latent constructs or established dimensions of organic food preferences.

Table 7
Eigenvalues and Variance Explained by the Retained Principal Components

Principal Component	Eigenvalue	Variance Explained (%)
PC1	2.779	21.378
PC2	2.314	17.802
PC3	1.602	12.322
PC4	1.435	11.041
PC5	1.123	8.637
Total	9.254	71.180

Source: Primary Data Processed

Table 8
Provisional Interpretation of the Retained Principal Components

Component	Variance Explained (%)	Dominant Observed Variables	Provisional Interpretive Label
PC1	21.378	Price perception, ease of purchase, income, home	Price and Purchase Accessibility
PC2	17.802	Study, packaging, interval	Education, Packaging and Purchase Timing
PC3	12.322	Age, sex, passion	Demographic and Consumer Profile
PC4	11.041	Considered aspects, family size	Household and Purchase Consideration
PC5	8.637	Purchase place, interval	Purchase Location and Timing

Source: Primary Data Processed

a. PC1, provisionally labelled Price and Purchase Accessibility, explained the largest proportion of variance. The component was characterized by relatively strong loadings for price perception, ease of purchase, income, and home, suggesting that economic and accessibility-related characteristics co-varied within the present sample.
b. PC2, provisionally labelled Education, Packaging and Purchase Timing, was characterized primarily by study, packaging, and interval. The observed pattern suggests that these characteristics varied together within the second component, although the interpretation remains tentative because interval recorded an MSA value below 0.50.
c. PC3, provisionally labelled Demographic and Consumer Profile, was dominated by age, sex, and passion. Age recorded the strongest absolute loading in this component. The interpretation requires particular caution because age recorded an MSA value below 0.50 in the preceding diagnostic assessment.
d. PC4, provisionally labelled Household and Purchase Consideration, was characterized mainly by considered aspects and family size. Both variables recorded MSA values below 0.50. The component should therefore be regarded as especially tentative and requires confirmation in a larger sample.
e. PC5, provisionally labelled Purchase Location and Timing, was characterized primarily by purchase place and interval. Purchase place met the adopted MSA threshold, while interval did not. The component is interpreted as an exploratory pattern rather than a stable dimension of purchasing behaviour.

The five-component solution suggests a preliminary multidimensional pattern among the observed variables in the present sample. The results do not show that Indonesian organic food consumers have five established preference dimensions. The small sample size, marginal KMO value, non-significant Bartlett's test at the 5% level, and low MSA values for several variables limit the stability and reproducibility of the component structure. Validation with a substantially larger, more heterogeneous sample is required before drawing broader conclusions.

Price Perception and Purchasing Pattern

The descriptive results show an apparent contrast between respondents' perceptions of organic food prices and their reported purchasing frequency. A total of 76.92% of respondents perceived organic products as expensive, while 23.08% perceived them as moderately priced. Purchase-frequency responses showed that 50.00% reported purchasing organic products sometimes, 42.31% reported purchasing them regularly, and 7.69% reported purchasing them rarely. These findings indicate that perceptions of high prices and continued organic food purchasing coexist within the observed sample.

The coexistence of high price perceptions and continued purchasing should be interpreted cautiously. The present study did not estimate a causal model linking price perception, perceived value, willingness to pay, and purchasing behaviour. The descriptive results consequently do not demonstrate that respondents continued purchasing organic food because they perceived sufficient benefits to compensate for higher prices. The findings also do not establish that price is unimportant or that consumers are willing to tolerate a price premium.

The observed pattern indicates only that perceived expensiveness did not coincide with an absence of purchasing among the respondents represented in the descriptive data. Other considerations may be associated with organic food evaluation, but the present analysis cannot establish their role in explaining continued purchasing.

Table 9
Descriptive Distribution of Price Perception and Purchase Frequency

Variable	Category	Percentage (%)
Price Perception	Expensive	76.92
	Moderately priced	23.08
Purchase Frequency	Sometimes	50.00
	Regularly	42.31
	Rarely	7.69

Source: Primary Data Processed

Table 10
Reported Considerations in Organic Food Purchasing

Purchase Consideration	Percentage (%)
Environmental Concerns	46.15
Nutritional Content	34.62
Product Quality	23.08
Price Stability	3.85

Source: Primary Data Processed

Teixeira et al. (2022) reported that perceived quality and health concerns were associated with attitudes toward organic food, while perceived behavioural control was not significant. The findings from that study provide relevant context for understanding the range of considerations that may accompany organic food evaluation. The present results do not test whether these considerations explain the relationship between price perception and purchasing frequency. Their relevance should therefore be treated as a direction for further investigation rather than as an explanation established by the current data.

Environmental, Nutritional, and Quality Considerations

The descriptive results show variation in the considerations respondents reported when evaluating organic food. Respondents most frequently reported environmental concerns (46.15%), followed by nutritional content (34.62%), product quality (23.08%), and price stability (3.85%). These findings describe the considerations reported within the present sample and should not be interpreted as evidence that any single consideration determines organic food purchasing behaviour.

Environmental considerations were the most frequently reported category in the analysis. Previous studies have similarly identified environmental awareness and sustainable consumption attitudes as relevant to organic food preferences (Kirmani et al., 2022; Parashar et al., 2023). Yilmaz (2023) also reported significant relationships between sustainable consumption attitudes and perceived environmental and animal-welfare values. These findings provide contextual support for the relevance of environmental considerations in organic food research without establishing that environmental concern directly drives purchasing behaviour in the present sample.

Teixeira et al. (2022) reported that environmental concern did not significantly influence attitudes toward organic food. The difference between that finding and the descriptive pattern observed here reinforces the need for cautious interpretation across empirical contexts. The present study does not estimate the effect of environmental concern on attitudes or purchasing behaviour. It cannot determine whether the observed importance of environmental considerations translates into actual purchase decisions.

Nutritional content and product quality were also frequently reported considerations. Previous research has identified perceived quality as an important element in organic food evaluation (Teixeira et al., 2022). The present findings indicate that nutritional and quality-related considerations were salient in the observed sample, but the descriptive analysis cannot establish their relative influence on purchasing behaviour.

Theoretical Implications

The findings offer several preliminary theoretical implications for research on organic food consumer behaviour. The exploratory PCA suggests that the observed demographic, economic, accessibility, product-related, and purchasing characteristics may be organized across multiple empirical components within the present sample. This pattern offers an alternative perspective to studies that examine individual determinants separately. Still, the limited sample size prevents interpreting the component structure as an established multidimensional model of organic food preferences.

The exploratory findings also provide a complementary perspective on the variation reported in previous studies of organic food behaviour. Research based on behavioural frameworks has produced different results regarding the roles of attitudes, perceived behavioural control, environmental considerations, and consumer characteristics (Teixeira et al., 2022; Yilmaz, 2023). The present analysis does not explain these inconsistencies or establish that they result from multidimensional preference formation. Instead, the observed component structure suggests that examining several consumer and purchasing characteristics simultaneously may offer an additional perspective for future research on heterogeneity in organic food preferences.

The study also demonstrates the exploratory use of PCA to summarize heterogeneous observed characteristics into a smaller set of empirical components. PCA helps reduce complex multivariate information into more interpretable dimensions (Greenacre et al., 2022). The present study's contribution lies primarily in its context-specific exploratory application to organic food consumers in Malang City, rather than in methodological novelty. The resulting component structure may serve as a basis for developing hypotheses that can be examined and validated with larger, more heterogeneous samples.

Managerial and Marketing Implications

The exploratory findings identify several consumer and purchasing characteristics that may merit attention in subsequent organic food market research. Price perception, purchase accessibility, packaging, educational characteristics, environmental considerations, nutritional attributes, and product quality appeared across the descriptive findings and preliminary component patterns. These observations may help producers and marketers identify issues that warrant further investigation when designing consumer-oriented marketing strategies.

The coexistence of high perceived prices and continued purchasing within the observed sample may also warrant further examination in future market research. The present findings do not establish that consumers accept higher prices because of perceived environmental, nutritional, quality, or safety benefits. Marketing strategies based on price justification or value-based positioning should therefore not be derived directly from the current analysis. Future studies could examine these relationships explicitly before translating them into specific positioning or communication strategies.

The preliminary PCA results may also provide an initial basis for developing hypotheses about consumer heterogeneity. The extracted components should not be treated as established consumer segments because PCA summarizes relationships among variables rather than classifying respondents into distinct market groups. Consumer segmentation would require a larger and more heterogeneous sample followed by an appropriate segmentation analysis, such as cluster analysis or latent class analysis.

The managerial contribution of the present study is consequently exploratory rather than prescriptive. The observed patterns may inform the design of subsequent consumer studies and help identify variables to consider in future product-positioning, communication, and segmentation research. Develop broader marketing recommendations only after validating the preliminary component structure in a larger sample.

CONCLUSION

This study explored patterns among consumer characteristics, product-related attributes, price perceptions, accessibility, and purchasing considerations associated with organic food consumption in Malang City, Indonesia. Principal Component Analysis identified five preliminary components that jointly explained 71.18% of the total observed variance. The components were provisionally interpreted as Price and Purchase Accessibility, Education, Packaging and Purchase Timing, Demographic and Consumer Profile, Household and Purchase Consideration, and Purchase Location and Timing. The findings suggest a preliminary multidimensional pattern among the observed variables within the study sample. The five-component structure should not be interpreted as a definitive or population-representative model of organic food preferences. The small sample size of 28 respondents, marginal KMO value of 0.521, variation in individual MSA values, and limitations of the correlation structure restrict the stability and reproducibility of the extracted components. The descriptive findings also showed that 76.92% of respondents perceived organic food as expensive, while many respondents reported purchasing organic products occasionally or regularly. This coexistence does not establish a causal relationship between perceived price, perceived value, and purchasing behaviour. The findings indicate only that the sample simultaneously reported high prices and continued purchasing. Environmental considerations, nutritional content, and product quality were also reported as relevant purchasing considerations. These patterns are consistent with the broader view that organic food evaluation may involve several types of consumer considerations. The present study does not establish the relative causal influence of these considerations on purchasing behaviour. The study's main contribution is an exploratory perspective on how heterogeneous consumer and purchasing characteristics can be summarized into a smaller set of empirical components in the Malang organic food context. The findings can serve as a basis for generating hypotheses and identifying variables for further investigation rather than as direct evidence for market segmentation or specific positioning strategies. Future research should examine the reproducibility of the preliminary component structure using a substantially larger and

more heterogeneous sample. Subsequent studies may apply clustering, latent class analysis, or related segmentation approaches after adequately validating the underlying component structure.

AI DISCLOSURE STATEMENT

During the preparation of this manuscript, the authors used Grammarly to assist with grammar checking, language editing, translation, and improving academic English writing. All outputs generated by these tools were carefully reviewed, verified, and revised by the authors to ensure the accuracy, clarity, and appropriateness of the content. The authors take full responsibility for the integrity, originality, and final content of this manuscript.

DATA AVAILABILITY

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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