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Consumer Preference Analysis of Snack Bar Product Attributes in Surabaya Using Conjoint Analysis Method

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A B S T R A C T

This study examines consumer preferences for snack bar attributes in Surabaya using the conjoint analysis method. The research aims to identify key product attributes that influence purchasing decisions and provide recommendations for manufacturers to develop healthier snack bar products. Data were collected through a survey of 100 purposively selected respondents. The study analyzed attributes such as flavor, texture, composition, packaging, weight, and price, evaluating 16 stimulus combinations using a Likert scale. The findings indicate that consumers prefer snack bars with a sweet taste, sticky texture, single-pack packaging, a weight of 25 grams, and a price above Rp10,000. Conjoint analysis reveals that price and taste exert the greatest influence on consumer preferences. These insights offer valuable guidance for snack bar manufacturers in optimizing product development and enhancing market competitiveness.

Contribution to Sustainable Development Goals (SDGs):
SDG 3: Good Health and Well-being
SDG 9: Industry, Innovation, and Infrastructure
SDG 12: Responsible Consumption and Production

1. INTRODUCTION

1.1. Research Background

Food is a necessity in human life. As lifestyles evolve, the demand for healthy and convenient food continues to rise. One emerging solution to meet the needs of busy consumers who prioritize nutritional intake is ready-to-eat food products. Given the increasing demand for food that is both practical and nutritious, the development of healthy ready-to-eat options has become a major focus in the food industry.

In today's fast-paced world, ready-to-eat food has become the preferred choice for many consumers. However, with the growing variety of products available on the market, each featuring distinct attributes and characteristics, understanding consumer preferences is crucial. Key factors such as nutritional content, ingredient composition, taste, texture, price, and other attributes significantly influence purchasing decisions.

Snacks, which are consumed outside of main meals (breakfast, lunch, or dinner), serve to temporarily satisfy hunger, provide an energy boost, or simply offer enjoyment. Healthy snacks should not only be energy-dense but also rich in protein, vitamins, minerals, and dietary fiber. One such example is the snack bar—a product made from a blend of three or more ingredients with specific nutritional value and taste combined with binding agents to achieve the ideal texture. Its bar shape is designed for convenience, making it an easy and practical choice for on-the-go consumption.[1].

Consumer preference is the choice made by an individual based on their perception of a product. These preferences are personal and relatively stable, ultimately influencing consumers' decisions when selecting a product. When making decisions, consumers are more likely to choose products and brands that have symbolic meanings consistent with their self-concept. This means they tend to select products that reflect their values or personal identity. Consumer preference refers to a consumer's inclination toward a particular product among various available

options. It influences their decisions in selecting products or services and plays a crucial role in shaping marketing strategies for businesses [2].

One of the systematic methods used to uncover consumer preferences is conjoint analysis. This method enables the measurement of the importance of different attributes in consumer product selection. Therefore, conjoint analysis helps identify the attributes that have the most significant impact on consumer decisions, ultimately assisting manufacturers in designing products that better align with market needs. Conjoint analysis is unique among multivariate analysis methods because researchers construct stimuli (combinations of attribute levels), which are then presented to respondents for overall evaluation using a rating system [3].

1.2. Research Objective

To analyze the extent to which attributes influence consumer purchasing decisions and to provide recommendations for snack bar manufacturers in developing products that align with consumer needs.

2. MATERIALS AND METHODS

The subject of this consumer preference study is snack bar products available for sale in Surabaya. These products or samples are only used as references to observe and determine the attributes and sub-attributes for the study. The data collection process in this research utilizes research instruments, including a questionnaire sheet and writing tools for completing the questionnaire during the interview process.

2.1. Research Procedures

The study was conducted using a survey method, which is a research approach used to collect data from respondents through questionnaires or structured interviews. The questionnaire consists of several stages: first, a descriptive analysis of respondent characteristics, followed by validity testing, reliability testing, and finally, consumer preference analysis using the conjoint method. All data analysis processes based on questionnaire responses were carried out using SPSS v.26.

2.2. Research Stages

The stages of this consumer preference study begin with determining the attributes and sub-attributes of the product. Next, validity and reliability tests are conducted on the defined attributes and sub-attributes to assess whether the questionnaire used is valid and reliable. The final stage involves conjoint analysis using six predetermined attributes: flavor, texture, composition, packaging, weight, and price. The purpose of conjoint analysis is to determine the utility values and importance values of each attribute, which can then be interpreted as consumer preferences for snack bar products.

2.3. Method

In this study, the data collection method used is a questionnaire or survey that has been carefully designed. This method involves gathering data from several respondents representing the target population. The data collection technique is conducted through both primary and secondary sources.

2.4. Analysis Procedure

Conjoint analysis follows several procedural stages, beginning with the determination of product attributes and sub-attributes. The attributes and sub-attributes used in this study include flavor (sweet and savory), texture (crispy and sticky), composition (cereal, dried fruit, and nuts), packaging (single pack and non-single pack), weight (25 grams and 35 grams), and price (<Rp. 10,000.00 and >Rp. 10,000.00).

The next step is the creation of stimuli based on the defined attributes. The combination of attributes and sub-attributes is referred to as stimuli. The stimuli were generated using the full-profile procedure, which evaluates all attributes comprehensively. To reduce the number of stimuli while maintaining accuracy, this study applied the fractional factorial design technique, which selects combinations that primarily measure the main effects.

The following stage involves data collection through questionnaires based on the generated stimuli combinations. Respondents evaluate each stimulus by assigning a score. The evaluation method follows a Likert scale with five categories, ranging from 1 (strongly dislike) to 5 (strongly like).

Finally, the conjoint data processing stage involves analyzing the collected responses to determine which attributes are most preferred by consumers. This process helps identify key attributes that influence consumer preferences for snack bar products.

3. RESULT AND DISCUSSION

3.1. Respondent Characteristics

The respondents in this study were individuals who had previously consumed snack bar products and resided in Surabaya. The study categorized respondents into four age groups: 17-20 years, 21-25 years, 26-30 years, and 31-35 years.

The highest number of respondents fell within the 17-20 age group, totaling 46 individuals (46%), followed by the 21-25 age group with 36 respondents (36%). The 31-35 age group included 11 respondents (11%), while the 26-30 age group had the lowest number of respondents, with only 7 individuals (7%).

Table 1. Number of Respondents by Age

Age (years)	Total (%)
17-20	46
21-25	36
26-30	7
31-35	11

The education level of respondents is divided into four categories: SMA/SMK, D1-D3, S1, and S2/S3. The distribution of respondents based on their education level is as follows: SMA/SMK: 69 respondents (69%) S1: 23 respondents (23%) D1-D3: 8 respondents (8%) S2/S3: 0 respondents (0%)

The highest number of respondents were those with an SMA/SMK education level (69%), followed by S1 graduates (23%), D1- D3 graduates (8%), and no respondents with an S2/S3 education level (0%).

Table 2. Number of Respondents by Education

Education	Total (%)
SMA/SMK	69
D1-D3	8
S1	23
S2/S3	0

3.2. Validity Test and Reliability Test

Validity testing is used to determine whether the statements in the distributed questionnaire are valid or not by applying statistical correlation techniques. A statement is considered valid if the calculated r-value (r count) > r table (significance level of 5%). If the r count ≥ r table, then the instrument or questionnaire items are significantly correlated with the total score and are deemed valid [4].

The validity test conducted on 100 respondents for the attributes of flavor, texture, composition, packaging, weight, and price showed that all statement items were valid, as the r count values were greater than the r table values.

Table 3. Validity Test Results

Attribute	**r table**	**r count**	**significance**	**information**
Taste Attribute				
P01	0.195	0.725	0.000	Valid
P02	0.195	0.292	0.003	Valid
Texture Attributes				
P03	0.195	0.555	0.000	Valid
P04	0.195	0.292	0.003	Valid
Composition Attributes				
P05	0.195	0.688	0.000	Valid
P06	0.195	0.524	0.000	Valid
P07	0.195	0.627	0.000	Valid
Attribute Packaging				
P08	0.195	0.374	0.000	Valid
P09	0.195	0.702	0.000	Valid
Packaging Attributes				
P10	0.195	0.591	0.009	Valid
P11	0.195	0.647	0.000	Valid
Price Attribute				
P12	0.195	0.283	0.004	Valid
P13	0.195	0.698	0.000	Valid

In Table 3, it can be seen that the validity test conducted on 100 respondents resulted in all statement items being declared valid, as the calculated r-value (r count) > r table, specifically for items P01 to P13.

Tabel 4. Reliability Test Results

Cronbach's Alpha	N Of Item	Information
0.803	13	Reliable

Based on the reliability test of the questionnaire conducted on 100 respondents for the attributes of taste, texture, composition, packaging, weight, and price, a reliability score of 0.803 was obtained. Since this value is greater than 0.6 and reaches 0.8, it is considered to have good reliability, meaning all questionnaire items are deemed reliable. A reliability score below 0.6 is considered poor, while a score of 0.7 is acceptable, and above 0.8 is considered good [5]. The results of the reliability test can be seen in Table 4.

3.3. Consumer Preferences

The first stage of consumer preference analysis is determining the attributes and attribute levels or sub-attributes to be used. The selection of attributes and attribute levels in this study was carried out by adjusting to the snack bar products available in the market. The attributes and levels used in this study can be seen in Table 5, which consists of six attributes and thirteen attribute levels, along with explanations of the assumed attribute levels.

Table 5. Snack Bar Product Attributes and Levels

No	Attribute	Level	Sub-attribute
1	Taste	1	Sweet
		2	Savory
2	Texture	1	Crispy
		2	Sticky
3	Composition	1	Cereal
		2	Fruit
		3	Nuts
4	Package	1	Single pack
		2	Non-single pack
5	Weight	1	25 gram
		2	35 gram
6	Price	1	<Rp.10.000.00
		2	>Rp.10.000.00

The total number of attribute and level combinations for the snack bar product is 96, which is obtained by multiplying the number of attribute levels for each attribute (2x2x3x2x2x2). Since the number of stimuli was too large, a stimuli reduction technique was applied. The result of the stimuli reduction using the orthogonal design resulted in 16 stimuli. The stimuli design for the snack bar product can be seen in Table 6.

Preference can be defined as a taste, a like or dislike choice for a product or service, which serves as a consideration in selecting or purchasing a product or service. Consumer preference can be identified by measuring the utility level of a product or service, where this utility level can be used to assess consumer satisfaction [6].

Consumer preference is defined as an individual's liking or disliking of a particular product or service they consume. It can be determined by measuring the utility value and the relative importance of each attribute present in a product [7].

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Table 6. Snack Bar Product Stimulus Design

Taste	Texture	Composition	Packaging	Weight	Price
Savory	Sticky	Fruit	Non-single pack	25 gram	>Rp. 10.000.00
Sweet	Crispy	Cereal	Single pack	35 gram	>Rp. 10.000.00
Sweet	Sticky	Cereal	Non-single pack	25 gram	>Rp. 10.000.00
Sweet	Sticky	Cereal	Non-single pack	35 gram	<Rp. 10.000.00
Sweet	Crispy	Fruit	Non-single pack	35 gram	<Rp. 10.000.00
Savoury	Crispy	Cereal	Non-single pack	25 gram	>Rp. 10.000.00
Sweet	Crispy	Nuts	Non-single pack	25 gram	>Rp. 10.000.00
Sweet	Sticky	Fruit	Single pack	35 gram	>Rp. 10.000.00
Savoury	Sticky	Nuts	Non-single pack	35 gram	<Rp. 10.000.00
Sweet	Crispy	Nuts	Single pack	35 gram	>Rp. 10.000.00
Savoury	Crispy	Cereal	Non-single pack	35 gram	<Rp. 10.000.00
Sweet	Sticky	Cereal	Non-single pack	25 gram	<Rp. 10.000.00
Savoury	Crispy	Nuts	Non-single pack	25 gram	<Rp. 10.000.00
Savoury	Crispy	Fruit	Non-single pack	25 gram	<Rp. 10.000.00
Savoury	Sticky	Cereal	Non-single pack	35 gram	>Rp. 10.000.00
Sweet	Crispy	Cereal	Non-single pack	25 gram	<Rp. 10.000.00

The snack bar product preferred by consumers is identified based on the highest utility value among the levels of each attribute. The results of this study, obtained using conjoint analysis, can be seen in Table 7.

Table 7. Snack Bar Conjoint Analysis Results

No	Atribute	Level/Sub Atributte	*Utility Values*	*Importance Values*
1	Taste	Sweet	0.320	20.198
		Savoury	-0.320	
2	Texture	Crispy	-0.531	28.594
		Sticky	0.531	
3	Composition	Cereal	0.312	21.338
		Fruit	-0.100	
		Nuts	-0.212	
4	Packaging	*Single pack*	0.205	13.253
		Non-single Pack	-0.205	
5	Weight	25 gram	0.035	9.061
		35 gram	-0.035	
6	Price	<Rp. 10.000.00	-0.095	7.557
		>Rp. 10.000.00	0.095	

Based on Table 7, the snack bar product preferred by consumers can be identified by the highest utility values among the levels of each attribute. According to the research findings, the most preferred snack bar product by consumers is as follows:

3.3.1. Flavor

From the table, it can be observed that the utility value for the flavor attribute is highest for sweet-flavored snack bars, with a value of 0.320. The highest utility value is for the sweet variant (0.320), while the lowest utility value is for the savory variant (-0.320). Based on this, it can be concluded that consumer preference for the flavor attribute is the sweet variant.

Respondents preferred sweet-flavored snack bars because sweetness is associated with ingredients such as chocolate, caramel, or dried fruits. According to research [8], the taste of a product is also influenced by other supporting ingredients. Sweet snack bars are also favored as an alternative energy source during busy activities. This aligns with the statement in [9] that snack bars can serve as a snack, a hunger suppressant, or even a breakfast substitute. These snack bars are convenient, making them an ideal nutritious and practical snack choice.

3.3.2. Texture

For the texture attribute, respondents preferred snack bars with a sticky texture as they are more appealing, provide a dense energy sensation, are easy to consume, and do not produce crumbs. The texture of a snack bar is influenced by the use of cereal as the main ingredient, along with binding agents such as sugar and honey, which help increase stability and volume, improve texture, and contribute to color and aroma formation. Additionally, the texture of snack bars falls within the acceptable range for consumers, as it is firm yet still well-received.

It can be observed that the highest utility value for the texture attribute is for sticky-textured snack bars, with a value of 0.531, whereas the lowest utility value is for crunchy-textured snack bars, with a value of -0.531. Based on this, it can be concluded that the consumer preference for the texture attribute is a sticky texture. This aligns with the statement that the physical characteristics of snack bars include uniform shape and dense texture, making them more desirable among consumers (Table 7).

3.3.3. Composition

For the composition attribute, respondents preferred cereal-based snack bars over those made with fruits or nuts. This preference is due to the perception that cereal-based compositions provide higher nutritional value and are ideal as a daily alternative energy source. This aligns with the findings in [10], which state that cereal contains 73% carbohydrates, 3.5% fat, 10% protein, 2.0 g of crude fiber, and an energy content of 329 kcal.

It can be observed that the highest utility value for the composition attribute is for cereal-based snack bars, with a value of 0.312. The second highest utility value is for fruit-based composition, with a value of -0.100, while the lowest utility value is for nut-based composition, with a value of -0.212 (Table 7).

Based on this, it can be concluded that consumer preference for the composition attribute is cereal-based snack bars, as they are perceived to offer better nutritional benefits and an optimal energy boost.

3.3.4. Packaging

For the packaging attribute, respondents preferred snack bars with single-pack packaging, as it is more convenient for single-use consumption, making it compact and easy to carry while traveling.

From Table 7, it can be observed that the highest utility value for the packaging attribute is for single-pack snack bars, with a value of 0.205, while the lowest utility value is for non-single-pack packaging, with a value of -0.205.

Based on this, it can be concluded that consumer preference for the packaging attribute is single-pack snack bars, as they offer practicality and ease of use.

3.3.5. Weight

From the Table 7, it can be observed that the highest utility value for the weight attribute is for snack bars weighing 25 grams, with a value of 0.035, while the lowest utility value is for snack bars weighing 35 grams, with a value of -0.035.

Based on this, it can be concluded that consumer preference for the weight attribute is snack bars with a weight of 25 grams. The main reason respondents preferred 25-gram snack bars is the practicality of consumption, as they are more convenient and easier to carry.

3.3.6. Price

For the price attribute, respondents tended to prefer snack bars priced above Rp. 10,000.00 rather than those priced below Rp. 10,000.00. This is because higher-priced products are perceived to have better quality, including better ingredients and taste.

The most important factor in pricing is not the objective price itself but rather the subjective price, which is how customers perceive the product's value. In other words, customers may view higher-priced products as higher quality, making it reasonable for them to pay a higher amount.

From the table, it can be observed that the highest utility value for the price attribute is for snack bars priced above Rp. 10,000.00, with a value of 0.095, while the lowest utility value is for snack bars priced below Rp. 10,000.00, with a value of -0.095.

Based on this, it can be concluded that consumer preference for the price attribute is snack bars priced above Rp. 10,000.00, as they are perceived to have higher quality and better ingredients.

Table 8. Snack Bar Attribute Importance Value

No	Attribute	Importance Values
1	Texture	28.594
2	Composition	21.338
3	Taste	20.198
4	Packaging	13.253
5	Weight	9.061
6	Price	7.557

The importance level of attributes represents the significance derived from the entire conjoint analysis process, which explains consumer preferences. The highest importance value indicates that the attribute is a major consideration for consumers in choosing a product or service. This aligns with the statement in [11] that importance values reflect which attributes of a snack bar product are the most crucial, showing that these attributes receive

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greater attention from consumers compared to others, thereby influencing their purchasing preferences. The importance values of snack bar attributes can be seen in Table 8.

From the results of the conjoint analysis, the most important attribute for respondents when selecting a snack bar is texture, with an importance value of 28.594. This is followed by composition (21.338), flavor (20.198), packaging type (13.253), and weight (9.061). Finally, the least important factor in purchasing decisions is price, with an importance value of 7.557.

In conclusion, texture is the most critical factor influencing consumer purchasing decisions for snack bars, while price is the least important consideration.

Table 9. Conjoint Analysis Correlation Value

Correlation		
	Value	*Sig.*
Pearson's R	0.935	0.000
Kendall's tau	0.700	0.000

In Table 9, it can be seen that the correlation values obtained are quite high, with a Pearson's correlation value of 0.935 and Kendall's Tau value of 0.700, indicating the high accuracy of the conjoint analysis process for snack bar products. The significance level is considered high if the p-value < 0.05. In this case, the correlation significance value is 0.000, which is less than 0.05, leading to the conclusion that the predictive accuracy of the conjoint analysis process is very high.

Furthermore, to determine whether the conjoint process using the sample can be applied to the population, the results were tested using holdout stimuli. The holdout stimuli generated with SPSS were used to validate the findings. If the obtained significance value is 0.000 (less than 0.05), it can be concluded that the conjoint process applied to the sample aligns well with the population [12].

4. CONCLUSION

The highest utility value for each attribute indicates consumer preferences. Based on consumer preferences for snack bar products, the most preferred characteristics include a sticky texture, a cereal-based composition, a sweet flavor, single-pack packaging, a weight of 25 grams, and a price above Rp. 10,000.00. The importance ranking of attributes, based on the highest values, is as follows: Texture (28.594), composition (21.338), flavor (20.198), packaging type (13.253), weight (9.061), and price (7.557). This means that the most important factor consumers consider when selecting a snack bar is texture, while the least important factor is price.

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