

**APPLICATION OF MULTIDIMENSIONAL SCALING ANALYSIS IN MAPPING PRODUCT PREFERENCES ATTRIBUTE  
(CASE STUDY: CUSTOMER KECAP BANGO AND ABC)**

*APLIKASI ANALISA SKALA MULTIDIMENSIONAL DALAM PEMETAAN PREFERENSI PRODUK  
ATTRIBUT  
(STUDI KASUS: PELANGGAN KECAP BANGO DAN ABC)*

by  
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**Abstract:** This research analyzed by using a multidimensional scaling analysis. To get accurate results from this method that became the goal of the study, researchers analyzed the attribute perceptual mapping product soy sauce based on the 4 attributes; brand, price, labels and packaging. This study uses comparative quantitative approach, the population of this study are the people who buy and use soy sauce ABC and BANGO. The sample of this research is the 100 respondents with data obtained through questionnaires. The findings of this study indicate that the attribute labels have similarities between ABC and BANGO, but there were no significant effects for consumers because the location between quadrant is still far away and for a better recommendation for any manufacturer of soy sauce to pay more attention to product attributes that already exist in the product, soybean sauce because the product attribute has a huge effect on consumer preference.

**Keywords:** *product attribute, consumer preferences, multidimensional scaling*

**Abstrak:** Tujuan penelitian ini, untuk mengetahui perceptual mapping dari ke dua produk kecap yang terkenal. Penelitian ini dianalisis dengan menggunakan analisis skala multidimensi. Untuk mendapatkan hasil yang akurat dari metode ini yang menjadi tujuan penelitian, peneliti menganalisis produk pemetaan pemetaan kecap atribut berdasarkan 4 atribut; merek, harga, label, dan kemasan. Penelitian ini menggunakan pendekatan kuantitatif komparatif, populasi penelitian ini adalah orang-orang yang membeli dan menggunakan kecap ABC dan BANGO. Hasil temuan penelitian ini menunjukkan bahwa label atribut memiliki kesamaan antara ABC dan BANGO, tetapi tidak ada efek yang signifikan bagi konsumen karena lokasi antara kuadran masih jauh. Dan untuk rekomendasi yang lebih baik pada setiap produsen kecap untuk lebih memperhatikan atribut produk yang sudah ada dalam produk, kecap karena atribut produk memiliki pengaruh yang besar terhadap preferensi konsumen.

**Kata Kunci:** *atribut produk, preferensi konsumen, skala multidimensional*

## INTRODUCTION

### Research Background

The emergence of businesses in various sectors has provided an intense competition between companies. One of the ways to win the competition is to improve product quality according to consumer tastes and preferences. Whereas the producers should always make improvements and innovation of their products on an ongoing basis. Designing good product and marketing strategy becomes a thing related. This is because products are have been around so far vulnerable to changing needs and tastes from consumers, new technology, and increased competition. So the constant development of product will lead to increase the sales.

Indonesia's industrial sector is still the largest contributor to Indonesia's economic growth. The Industry Ministry said the industry sector in the third quarter was at 5.51% or above the Indonesian economic growth which was at 5.01%. The Central Bureau of Statistics (BPS) noted that the growth of non-oil / gas processing industry in quarter III / 2017 amounted to 5.49 percent or an increase compared to the period I quarter / 2017 which reached 4.76 percent and quarter II / 2017 about 3.89 percent. The achievement of non-oil / gas processing industry in quarter III / 2017 is also above from economic growth of 5.06 percent. The food and beverage industry sector has always been a mainstay to boost industry growth every year. Food and beverage industry led the growth of non-oil and gas processing industry in the last three months of 13.76% The three largest contributors to gross value added in quarter II-2016 were Food and Beverage Industry of Rp. 188.23 trillion or 6.10% of GDP. Meanwhile, the contribution of export value of food and beverage products including palm oil in January-September 2016 reached USD17, 86 billion.

The high competition in the business demands a competitive advantage that must be owned by every company, including the business competition of soy sauce. The demand for soy products from year to year is increasing according to the needs of the people of Indonesia. In addition, the price of sweet soy sauce can also reach all segments of society which is a huge market opportunities in the country.

**Table 1. Top Brand of Soy Sauce Products (Kecap) in Indonesia, Period 2012-2016**

Merek	2012	2013	2014	2015	2016
BANGO	43.3%	44.3%	47.9%	53.1%	55.2%
ABC	44.2%	44.0%	39.8%	39.8%	32.5%
SEDAP	4.5%	4.8%	4.6%	5%	6,1%

Source: [www.topbrand\\_award.com](http://www.topbrand_award.com)

Based on the Bango and ABC soy sauce brands as the top product seen from table 1, where the increase for the soy sauce bango, from 2010 to 2016 continued to experience an excellent improvement, and the most demand occurred in 2014 (47.9%) rose 5.2% in 2015 to 53.1%) until 2016 demand for soy sauce bango continues to rise. Companies in creating products will certainly pay attention to the product attributes that correspond to the tastes and needs of its customers. It is one of the keys to success in the marketing value of the product. This product attribute will differentiate between products offered by a company with similar products offered by other companies. This difference in attributes can then lead to differences in consumer preferences for the products offered by various companies so that it can ultimately influence consumers in the decision to buy. Consumers usually buy certain brands spontaneously without thinking because they see an attractive image. attached to a product and considered important by consumers. As for consumers buying products after seeing the features and designs found on the product. Products that have attractive product attributes will certainly generate consumer interest in making purchases. Product attributes will ultimately give positive results in the form of benefits to consumers. That's why product attributes are considered by consumers who are interested in a product and decide to buy the product.

### Research Objectives

In accordance with the research background and problem statement, the purpose of this research is:  
*To know the consumer perceptual mapping of soy sauce product according to the preference of consumers.*

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**THEORETICAL REVIEW****Marketing**

Marketing is an activity that meets the needs of consumers who generate profit for the company. as for the theory given by experts such as Marketing is a processes for creating, communicating and delivering value to customers and for managing customer relationships in ways that benefit the organization and its stakeholders (Kotler and Keller, 2016).

**Product Attribute**

Product attributes is one of the important things that need to be considered by the company. Manage product attributes is one of the most important ways to attract the interest of consumers of product purchasing decisions (Kotler and Armstrong, 2017). Meanwhile Product attributes is a factor considered by consumers in purchase decisions a product such as brands and product categories, which are attached to the product or be part of the product, which is composed of the price, brand, quality, packaging, the completeness functions and after-sales service (Simamora, 2014). According to Tjiptono (2008), product attributes are elements of products considered important by consumers and used as a basis for making purchasing decisions such as:

**a. Brand**

According to Tjiptono (2008), brand is the name, term, sign, symbol, design, color, motion, or combination of product attributes that are expected to give identity and differentiation to the competitor's product.

**b. Packaging**

Packaging is the activity of designing and producing a container or wrapping of the product. Packaging can be a main container products, secondary packaging discarded by the time the product is used, the packaging is devoted to saving, identify, and sending products (Setiadi, 2008).

**c. Label**

Labels is the simple markers affixed to the product especially on the packaging. labels indicate a product or brand, such as the name Sunkist listed on oranges. Labels can also describe some things about the product, who made it, where the product was made, when the product was made, its content, how the wearer, and how to use the product safely (Kotler and Armstrong, 2017).

**d. Price**

Price is an exchange rate which is equated with money or other goods for the benefits obtained as quoted below. The price is the amount of money charged to a product or service, or the sum of the value exchanged by the consumer in return for the benefits it has or uses for the product or service (Kotler and Armstrong, 2017).

**Preference of Consumer**

Consumer preference is someone's tendency to prefer something they like (Simamora in Sunarti 2015). Preference can be defined as an option for someone who likes or dislikes goods or services that can be consumed.

**Previous Research**

Andrews and Manrai (1999) with title MDS Maps for Product Attributes and Market Response: An Application to Scanner Panel Data In this study, we try to map the location of consumer preferences using attributes because of the empirical and theoretical theory that consumers have cognitive limitations so they cannot maintain preferences for each choice. In this study we combined the model preference class with (selection or engagement model) with latent multidimensional (MDS) multidimensional analysis. Thus the predictive performance of our model proved to be superior to the latent MDS class.

Konuk and Altuna (2009) discuss about Brand positioning through Multidimensional scaling case study (turkish shampoo market) In this study, The aim of this study is to reveal the position of seven shampoo brands that exist in the Turkish market.

Nigam and Kaushik (2011) is study about Attribute Based Perceptual Mapping of Prepaid Mobile Cellular Operators: An Empirical Investigation Among Management Graduates in Central Haryana. A comparison of consumer's perception regarding cellular mobile operators was done on five cellular operators in the prepaid segment.

## RESEARCH METHOD

### Research Approach

This study uses a quantitative approach According to Emzir (2009) is a research approach that primarily uses post positivie paradigm in developing science (such as thinking about causation, reduction to variables, hypotheses, and specific questions, using measurement and observation, and theory testing). Research such as experiments and survey that require statistical data. So in quantitative research, many are required to use numbers, ranging from the collection and interpretation of the data. Where the researcher tries to explain the comparison between equations and differences between two or more factual variables and object properties in detail based on the frame of thought.

### Population, Sample and Sampling Technique

The population is a whole series of elements that have a number of common characteristics, consists of areas that should be carefully Malhotra (2010), or the whole group of people, events, or items. The population in this study was the city of Manado on every consumer who buys and uses soy sauce products in. In this study researchers will take a sample of 100 people (who could potentially provide answers in accordance with the questions given about the use of sweet soy sauce). Manado one of the city in Indonesia famous for its delicious culinary cuisine.

### Data Collection Method

The data used in this research consist of two types of data, which is primary and secondary data. Primary data is data that refers to information obtained from first hand by researchers related to the variable of interest for the specific purpose of the research and Secondary data is data that refers to information collected from existing sources. In this study will use data from previous journals, and books and data BPS (statistics bodystatistics) for sale information of soybeans (Sekaran and Bougie, 2009).

### Measurement of Research Variable

As the measurement of the variable this research using Likert Scale. Definision of Likert scale is a scale used to measure attitudes, opinions, and perceptions of a person or group of people about events or social symptoms (Kriyantono, 2014).

### Data Analysis Method, Validity and Reliability

Validity test is need for a research to test the validity of the data gathered. According to Sekaran (2003), a test of validity described how thequestioner (question or item) are truly able to measure, what is measured based on theories and expert. From several analysis tools test validity that exists, researcher choose to use person correlation product moment to test the validity of the data obtained. Reliability test conducted to make sure that there no repetition. According to Sekaran (2003), reliability of a measure is achieved when it consistently and without bias, measure the concepts it is supposed to measure. Reliability is established either through test-re-test where the same test administered to the same respondent at different times obtains the same results or parallel from reliability when the same test with different wordings or sequence of question also results in the same date.

## RESULTS AND DISCUSSION

### Validity test

Validity test is aimed to test whether the question items or indicators are able to measure what is supposed to be measured. By comparing correlation index in Pearson Product Moment Correlation Coefficient to test the validity of variables, with significance level of 5% it can be seen valid or not a research instrument. If probability of correlation is less than 0.05 (5%) then the research instrument is stated as valid.

**Table 2. Validity test of soy sauce ABC product**

Indicator	Attributes	Corrected Item- Total Correlation	Status
Brand	Product Identity	0,869	VALID
	Controlling Market	0,894	VALID
	Leadership	0,895	VALID

Price	Affordability	0,907	VALID
	The flexibility	0,895	VALID
	Quality of product	0,884	VALID
Label	Product information	0.867	VALID
	As a communication	0.893	VALID
	Legality of product	0,889	VALID
Packaging	Product image	0.912	VALID
	Modern technology	0.898	VALID
	As a protector	0.884	VALID

Source: Data Processed (2018)

Table 2 shows the result of validity test that the correlation index is higher than 0.1654 and below the significance level of 5%. Thus, the data is considered valid.

**Table 3. Validity test of soy sauce BANGO product**

Indicator	Attributes	Corrected Item- Total Correlation	Status
Brand	Product Identity	0.763	VALID
	Controlling Market	0,889	VALID
	Leadership	0,874	VALID
Price	Affordability	0,789	VALID
	The flexibility	0,847	VALID
	Quality of product	0,758	VALID
Label	Product information	0,895	VALID
	As a communication	0,869	VALID
	Legality of product	0,894	VALID
Packaging	Product image	0.904	VALID
	Modern technology	0.853	VALID
	As a protector	0.901	VALID

Source: Data Processed (2018)

Table 3 shows the result of validity test that the correlation index is higher than 0.1654 and below the significance level of 5%. Thus, the data is considered valid.

### Reliability Test

Reliability test is to measure if one item of question tested several times would give consistent value. Reliability analysis was using the Alpha Cronbach Analysis. The interpretation of Alpha Cronbach (Sekaran, 2003).

- <0.6 Indicates unsatisfactory internal consistency or consider that the data unreliable.
- 0.7 indicates that data acceptable.
- > 0.8 indicates good internal consistency or consider that the data result is reliable.

**Table 4. Reliability Statistics ABC**

Cronbach's Alpha	N of Items
.894	12

Source: SPSS Output (2018)

Table 4 show that Alpha Cronbach is 0.898 which is the research instrument is reliable.

**Table 5. Reliability Statistics Bango**

Cronbach's Alpha	N of Items
.864	12

Source: SPSS Output (2018)

Table 5 show that Alpha Cronbach is 0.864 which is the research instrument is reliable.

**Multidimensional Scaling**

The questionnaires distributed by the researcher all amounted to 100 questionnaires and aimed at users of ABC and Bango soy sauce product.

**Preceptual Mapping**

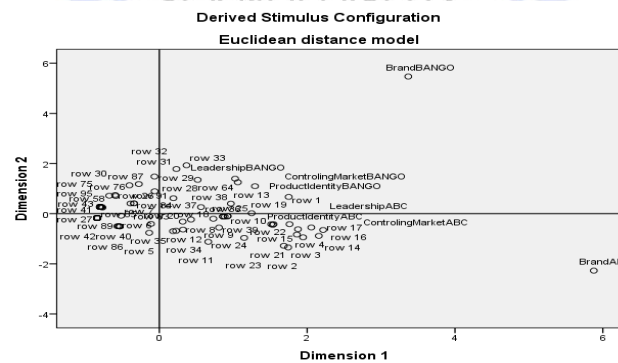
To analyze the mapping perception attribute product from ABC and Bango soy sauce using a Multidimensional Scaling Analysis (MDS) with indicator of brand, price, label, and packaging. A mapping perception product attributes from ABC and Bango soy sauce based on the indicator of the brand can be seen on the results of the calculation as follows:

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**able 6. Perceptual Mapping of Indicator/Attributes Brand**

Stimulus Coordinates		Dimension	
Stimulus Number	Stimulus Name	1	2
1.	ABC	5.8779	-2.2725
2.	BANGO	3.3673	5.4704

Source : Data Processed (2018)



**Figure 1. Perceptual Mapping of Indicator/Attributes Brand**

Source: Data Processed (2018)

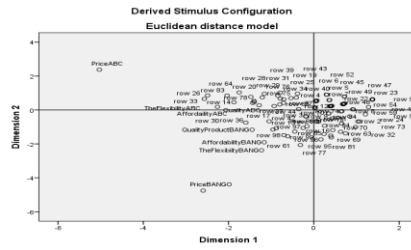
Based on the position above, there is difference in term of brand, such as :

1. Abc soy sauce products are in quadrant II, where Abc in dimension 1 (5.8779) and 2-dimensional (2.2725). That shows Abc has no resemblance with Bango in terms of brand and its location is a different quadrant with Bango soy sauce.
2. Bango soy sauce products located in quadrant III in dimension 1 (3.3673) and dimension 2 (5.4704). That means the Bango has no resemblance to Abc in terms of brand and its location is a different quadrant with Abc soy sauce products.
3. Mapping preference Abc and Bangos oy sauce product attributes and indicators based on Price, can be seen on the results of the calculation such as:

**Table 7. Perceptual Mapping of Indicator/Attribute Price**

Stimulus Coordinates		Dimension	
Stimulus Number	Stimulus Name	1	2
1.	ABC	-5.0305	2.3735
2.	BANGO	-2.5957	-4.7551

Source: Data Processed (2018)



**Figure 2. Perceptual Mapping of Indicator/Attribute Price**  
 Source : Data Processed (2018)

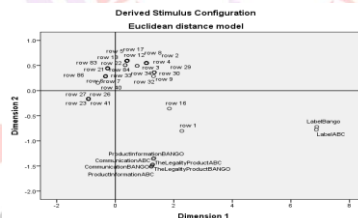
Based on the position of figure 2, there is a difference in terms of price, as follows:

1. Abc soy sauce products are in quadrant I, where Abc is in dimensions 1 (-5,0305) and dimension 2 (2,3735). So consumers give the perception that Abc has a difference in price with Bango soy sauce, where the Abc map is very far from Bango.
2. Bango soy sauce products are located in quadrant IV in dimensions 1 (-2,5957) and dimension 2 (-4,7551). Where is the Bango product map position very far from the position of Abc products. So it's not too influential.
3. The perceptual mapping of Abc and Bango soy sauce products based on price the indicators can be seen on the results of the calculation as follows:

**Table 8. Precptual Mapping of Indicator/Attribute Label**

Stimulus Coordinates	Stimulus Name	Dimension 1	Dimension 2
1.	ABC	6,8690	-0,7772
2.	BANGO	6,8822	-0,7223

Source : Data Proccesed (2018)



**Figure 3. Preceptual Mapping of Indicator/Attribute Label**  
 Source : Data Processed (2018)

Based on the position of figure 3, there is a difference in terms of Label, such as:

1. Abc soy sauce products are in quadrant III, where Abc is in Dimension 1 (-6.8690) and dimension 2 (-0.7772). This shows that Abc has a lot in common with the Bango object so the brand indicator is very influential
2. Bango soy sauce products are in quadrant III, where Bango is in dimension 1 (6,8822) and dimension 2 (-0,7223). So consumers give the perception that Bango soy sauce products have similarities in terms of labels with soy sauce Abc Where Bango and Abc map positions are in 1 quadrant and adjacent.
3. Mapping preference Abc and Bangosoy sauce product attributes and indicators based on Packaging, can be seen on the results of the calculation such as :

**Table 9. Perceptual Mapping of Indicator/Attribute Packaging**

Stimulus Coordinates	Stimulus Name	Dimension 1	Dimension 2
1.	ABC	-5,2704	1,5818
2.	BANGO	-2,0277	-5,9297

Source : Data Processed (2018)

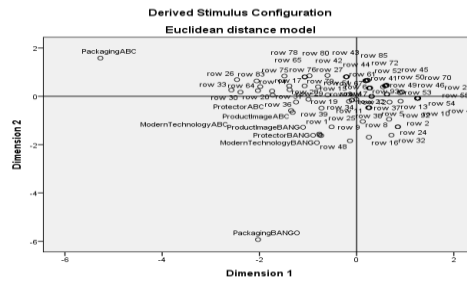


Figure 4. Perceptual Mapping of Indicator/Attribute Packaging

Source : Data Processed (2018)

Based on the position of figure 4, there is a difference in terms of Label, such as :

1. Abc soy sauce products are in quadrant I, where Abc is in dimensions 1 (-5,2704) and dimension 2 (1,5818). Where is the map position of Abc soy sauce product different from the position of Bango Ketchup product. So it's not too influential.
2. Bango soy sauce products are located in quadrant IV in dimensions 1 (-2,0277) and dimensions 2 (-5,9297). Where is the Bango soy sauce product position in terms of packaging very far from the position of Abc soy sauce products. So it's not too influential.

**Preference Analysis**

From tabulated data is selected based on the soy sauce products preference indicators offered by using the calculation of descriptive statistics (modus).

From the results of the table 10 shows that the calculation of the brand frequency of the Modus value indicates that soy sauce Abc, as a Product Identity 70 (I), Controlling Market 72 (I), Leadership 64 (I); and Bango soy sauce as Product Identity 69 (I), Controlling Market 55 (I), and as Bango 51 (I) leadership.

Table 10. Rankings Frequency of Price

Product	Attributes	Value					Total
		5	4	3	2	1	
Abc	Affordability	24	<b>33</b>	26	14	3	100
	TheFlexibility	23	<b>49</b>	20	8	0	100
	Quality	<b>64</b>	16	10	7	2	100
Bango	Affordability	26	<b>33</b>	26	14	1	100
	TheFlexibility	24	<b>49</b>	18	9	0	100
	Quality	37	<b>42</b>	18	3	0	100
Rangking		I	II	III	IV	V	100

Source: Data Processed (2018)

From the results of the table 11 shows that the calculation of the frequency value of the Modus value shows that soy sauce Abc in the attributes of Affordability 33 (II), The flexibility 49 (II), and quality 64 (I); Bango soy sauce attributes in Affordability 33 (II), The Flexibility 49 (II), and for quality 42 (II).

Table 11. Rankings Frequency of Label

Product	Attributes	Value					Total
		5	4	3	2	1	
Abc	ProductInformation	<b>69</b>	28	3	0	0	100
	Communication	<b>69</b>	27	4	0	0	100
	TheLegalityProduct	<b>61</b>	33	6	0	0	100
Bango	ProductInformation	<b>62</b>	32	5	1	0	100
	Communication	<b>69</b>	26	3	1	1	100



	TheLegalityProduct	<b>51</b>	27	18	4	0	100
Rangking		I	II	III	IV	V	100

Source: Data Processed (2018)

From the results of the table 12 shows that the frequency calculation of the Mode value label shows that Abc soy sauce in the Product Information attribute shows 69 (I), Communication 69 (I), The Legality Product shows 62 (I); Bango soy sauce in the Product Information attribute shows 62 (I), Communication 69 (I), shows The Product Legality 51 (I).

**Table 12. Rankings Frequency of Packaging**

Product	Attributes	Value					Total
		5	4	3	2	1	
Abc	ProductImage	<b>54</b>	26	9	7	4	100
	ModernTechnology	<b>42</b>	40	12	4	2	100
	Protector	<b>64</b>	16	10	7	2	100
	ProductImage	26	<b>33</b>	26	14	1	100
Bango	ModernTechnology	23	<b>49</b>	19	9	0	100
	Protector	37	<b>42</b>	18	3	0	100
Rangking		I	II	III	IV	V	100

Source: Data Processed (2018)

From the results of the table 13 shows that the calculation of the packaging frequency of the Modus value shows that Abc soy sauce is in the Product Image 54 (I), Modern Technology 42 (I), and Protector 64 (I) attributes; Bango soy sauce in Product Image 3 (II) attributes, Modern Technology 49 (II), 42 (II) Product Image.

## Discussion

The emergence of businesses in various sectors has provided an intense competition between companies. This research aim is to analyzed multidimensional scaling analysis of product preferences ABC and Bango soy souce.

### 1. ABC

Based on the research, consumer preference of ABC soy souce has highest ranked because consumers prefer a symbol or design that was used on ABC soy sauce in the attributes of the product identity and it's become an attraction for consumers, so the occupying the first rank. In consumer preference Price attribute, ABC soy sauce occupies is the first position in consumer prices because most like completes on schedule provided by ABC soy sauce according to the needs of consumers. Consumer preference for label attributes ABC soy sauce products are in the first position. The highest consumer preference is occupied by soy sauce ABC with the value of product information 69 (I), communication 69 (I), the legality product shows 61 (I). In the last attribute is packaging and ABC still in ranked 1 consumers needed the most.

### 2. BANGO

Based on questionnaire of 100 respondents Bango soy sauce is ranked second compare to ABC soy in term of brand, price, and packaging. In attribute of label Bango soy sauc shows that product information 62 (I), communication 69 (I), the legality product 51 (I). These results indicate that Abc became the brand of soy sauce the most preferred consumer compared to Bango. in this study found similarities between abc and bango attribute set in attribute labels, where according to the preference of the consumer label has a very significant similarities between abc and bango soy sauce. From the results of previous research Product packaging attributes' can influence consumers to buy while product sensory attributes' blend 'and can determine repeat purchases. Therefore, products must convey their sensory character with their rights and, thus, The expectations generated by the product will be fulfilled.

## CONCLUSION AND RECOMMENDATION

### Conclusion

Based on the results of the study obtained from the data processed, perceptual mapping of soy sauce products in preference product attributes.

### 1. ABC

Based on the results of data processing using Multidimensional Scaling Analysis (MDS), it can be seen that in terms of brands, prices and packaging, Abc soy sauce does not have similarities because the location on the perception map is in a different quadrant.

## 2. BANGO

Based on the results of data processing using Multidimensional Scaling (MDS) analysis. It can be seen that in the case of the Bango brand, price and packaging they have nothing in common with Abc, but in the case of the Abc soy sauce label similar to Bango soy sauce products.

## Recommendation

Here are some suggestions if it can provide input for the development of the company.

1. For BANGO Product which is ranked 2<sup>nd</sup> position, in most soy products Bango do new innovations in terms of brands, especially logos/symbols for more attractive and cheerful, impressed the price, should the price of soy sauce Bango complies with the quality provided, and design a better Packaging, soy sauce Bango is made more colourful in order to attract the attention of consumers, and create some very unique consumer interest.
2. For ABC soy sauce products in the first position, should maintain or improve quality and provide more innovation in product attributes so that it is more loyal to the products.

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