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Analysis of fast food restaurant competition based on consumer perception using multidimensional scaling (MDS) (case study in Malang City, East Java, Indonesia)

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Abstract. Currently, the fast food restaurant has become a lifestyle and an attribute of modern society. In Malang, fast food restaurant is growing very rapidly. This can be seen from the existence of several fast food restaurants that are famous in Indonesia, including KFC, Mc Donald's, A & W and CFC. The tight competition makes these restaurants should be able to determine the right strategy in order to win the market. This can be done by looking at the map of the position of competition between fast food restaurants. This study aimed to determine the position of the competition of fast food restaurants based on consumer perceptions in Malang City using Multidimensional Scaling (MDS) method. The sampling technique used was Accidental sampling. Data were collected using questionnaires distributed to 80 respondents. The result of this study demonstrated that Mc Donald's was a market leader or superior among other fast food restaurants. Then, the second rank (market challenger) was KFC, tight competitor of Mc Donald's. The third rank was occupied by AW and the last rank was occupied by CFC. The two restaurants, AW and CFC, were a market follower.

1. Introduction
One of the globalization effect and modernization that is most evident is the change in the Indonesian people's diet. People prefer practical products like fast food [1]. Some companies included in the fast food industry in Indonesia are PT Fast Food Indonesia Tbk with the trade name KFC, PT Rekso Nasional Food under the trade name Mc Donald's, Yum! Brand Inc. with AW restaurant, PT California Pioneer Chicken with the trade name CFC and many others. In Malang, the business of fast food restaurants (fast food) makes the competition to become very tight, triggering the restaurants to identify their position whitin the fast food market. Consumer's perceptions of the brand restaurants can help to determine the competitive position of the restaurant business. Consumers' perception of quality is measured as an essential determinant of product choice. Directly or indirectly, consumers will give an assessment for services that will be purchased or that have been consumed [2].

The number of fast food restaurants that exist today is causing intense competition to get consumers. In marketing communication an easy and flexible approach is needed, one of which is the marketing mix. The 7P marketing mix is an improvement of the traditional marketing mix concept, where the traditional marketing mix concept has only 4 factors, namely product, price, promotion and

place. Currently, the marketing mix develops into 7 factors where 3 additional factors are people, physical evidence and process [3].

Consumer perceptions of restaurant brands will greatly help determine the position of the restaurant business competition. Perception is related to someone's recognition and interpretation of a stimulus. Perception can also be interpreted as the first impression that individual draw and on the basis of it select, and interpret information to form a meaningful picture of the world [4]. Competitive analysis of a product or brand can be done using the MDS analysis method. MDS is an exploratory data analysis technique that attains this aim by condensing large amounts of data into a relatively simple spatial map that relays important relationships in the most economical manner [5]. The technique was also applied to represent multidimensional data, especially images in a low-dimensional space for visualization [6]. The results of this study are expected to provide a map of the position of competition between fast-food restaurant brands (fast food) based on consumer's perceptions in Malang City and can provide information for restaurant companies about what steps should be taken to maintain position in the market.

2. Research Methods

2.1. Population and sample

The population in this study were fast food restaurant consumers (KFC, Mc Donalds, AW, and CFC) in Malang City with an age range between 17 until 45 years old. Since the numbers of customers for fast food restaurants are unknown, the accidental sampling method was chosen to determine the amount of respondents needed. Following the equation from Sari [7] below, 80 respondents were statistically acceptable:

$$n = \frac{T - t_0}{t_i} \tag{1}$$

Where:

n = Number of samples selected t_0= Time used to conduct research (hours)

T = Time available for research (hours) t_i= Time used by each respondent to fill out the questionnaire (hour)

Accidental sampling is a sampling method based on anyone encountered by researchers accidentally where the sample fits the characteristics of the population so that it is considered suitable as a data source [9].

2.2. Research variables

Variables used in this study include product (taste, product freshness, variety of restaurant menus, product popularity, and packaging of product), price (affordable price, prices are according to quality, restaurant promo price, and package price), place (restaurant location is easy to find, the restaurant location is easy to reach, strategic location and spacious restaurant parking area), promotion (media promotion on TV, frequency of the appearance of advertisements on television, and interesting slogan or tagline), people (employee friendliness, employee appearance, employee skills in serving, employee communication skills), processes (restaurant service speed, the accuracy of restaurant services, availability of delivery services, cashier sufficiency, and ease of payment process, and physical evidence (completeness of restaurant facilities such as sink, hand dryer and toilet, attractive interior design, restaurant comfort, restaurant cleanliness, a neat layout and restaurant area).

2.3. Research instruments

This study used two questionnaires. The first questionnaire was used to determine the effect of product attributes on purchasing decisions and product selection of fast food restaurant brands using factor analysis method and the second questionnaire was used to determine consumer perceptions of fast

food restaurant brands using MDS method. The next step is testing the research questionnaire. The research questionnaire was tested for its validity and reliability.

2.4. Data analysis
2.4.1 Analysis factor method
Factor analysis in this study used to determine the level of significance or weight value of each attribute of each variable. The results of the formation of new factors from this factor analysis will be used as a basis for filling dimensions in MDS analysis. Factor analysis was utilized to determine the dominant service quality dimensions. The data used in this factor analysis are data from the first questionnaire. The stages of factor analysis are as follows: 1) selecting attributes that are feasible to be included in the factor analysis; 2) summarize a number of selected attributes based on variables and 3) rotating factors to clarify significant differences between the factors formed and other factors.

2.4.2Multidimensional scalling (MDS)
Data analysis method used was MDS. MDS provides a visual representation of dissimilarities (or similarities) among objects, cases or, more broadly, observations. In other words, the technique attempts to find structure in data by rescaling a set of dissimilarities measurements into distances assigned to specific locations in a spatial configuration [9][9]. The stages of the MDS method are: 1) Determine the number of pairs of fast food restaurant brands; 2) Determine data input; 3) Data processing. In general, MDS has a two-dimensional map (X axis and Y axis). Giving the dimension name is based on the assessment by the respondent on the attributes selected in each variable in the results of factor analysis. Two highest weighting factor can be used for naming dimension 1 and dimension 2 on a map of the perception that has been formed; 4) Establish stress value and RSQ. Stress value used in this study was 0.005. If the value obtained is greater than 0.005 then declared fit. At the larger RSQ value, it will indicate that the model used is fit; and 5) Data interpretation. The results of the analysis will produce 7 perception maps related to products, prices, promotions, places, employees, processes, and physical evidence. Each map describes the brand positioning of fast food restaurants on every variable based on consumer perception.

3. Results and Discussion
3.1. Validity testing results
Validity testing results showed that all question items from all variables have a calculated r value greater than the value of r table; it can be "Valid". A condition that is used to determine the validity of a research instrument that is by Pearson Correlation. Values are considered to be eligible if the significance value of r table is smaller than r count (2-sided test with 0.05 Sig) then the instrument could be valid [10].

3.2. Reliability testing results
Reliability refers to the degree of consistency or dependability of an instrument including stability, internal consistency, and equivalence [11]. Reliability testing results showed that all the variables in the questionnaire had a Cronbach Alpha value of more than 0.60, so that the variable product, price, promotion, place, people, processes and physical evidence are "Reliable".For an exploratory or pilot study, it is suggested that reliability should be equal to or above 0.60 [12].

3.3. Factor analysis
The primary purpose of factor analysis is to define the underlying structure among the variables in the analysis. As a multivariate technique, it provides the tools for analyzing the structure of the interrelationship among a large number of variables by defining sets of variables that are highly interrelated, known as factors [13].This value is obtained by looking at the results of the existing loading factor in the rotated component matrix. The adequacy of the sample is measured by Kaiser MeyerOlkin (KMO) in SPSS.

The results of factor analysis for variables of product, prices, promotions, places, peoples, processes, and physical evidence obtained by the value of KMO of 0.566 with a value of Sig 0.000. The sampling is adequate or sufficient if the value of KMO is larger than 0.5 [14]. The value of KMO is 0.6 and above [15]. The value between 0.5 and 0.7 are mediocre, a value between 0.7 and 0.8 are good, a value between 0.8 and 0.9 are great and value between 0.9 and above are superb [16]. The factor loading value of variables is shown in Table 1.

**Table 1.** Factor loading value of variables.

Variables	Atribute	Component		Variables	Attribute	Component	
		1	2			1	2
Product	Taste	**0.871**	-0.156	People	Employee friendliness	0.164	**0.743**
	Product freshness	**0.841**	0.002		Employee appearance	**0.864**	-0.010
	Variety of restaurant menus	-0.183	**0.778**		Employee skills in serving	**0.868**	-0.005
	Product popularity	**0.570**	0.246		Employee communication skills	0.150	**0.761**
	Packaging of product	-0.216	**0.652**				
Price	Affordable prices	**0.840**	-0.033	Process	Restaurant service speed	**0.854**	-0.027
	Prices are according to quality	**0.744**	-0.147		The accuracy of restaurant services	**0.831**	-0.199
	Restaurant promo prices	**0.675**	0.271		Availability of delivery service	0.258	**0.802**
	Package price	-0.009	**0.965**		Cashier sufficiency	**0.589**	0.299
					Ease of payment process	-0.259	**0.551**
Place	Restaurant location is easy to find	0.164	-0.735	Physical Evidence	Completeness of restaurant facilities	**0.868**	0.060
	Restaurant location is easy to reach	**0.864**	0.031		Attractive interior design	0.065	**0.772**
	Strategic restaurant location	**0.860**	0.010		Restaurant comfort	**0.862**	0.203
	Spacious restaurant parking area	0.144	**0.759**		Restaurant cleanliness	**0.883**	0.046
					A neat layout	**0.838**	0.128
					Restaurant area	0.115	**0.719**
Promotion	Media promotion on TV	**0.753**	0.344				
	The Frequency of appearances on TV	0.000	**0.939**				
	Interesting slogan or tagline	**0.819**	-0.251				

Table 1 shows that the taste attribute, product freshness, product popularity, affordable prices, prices are according to quality, restaurant promo prices, restaurant location is easy to reach, strategic restaurant location, media promotion on television, interesting slogan or tagline, employee appearance,

employee skills in serving, restaurant service speed, the accuracy of restaurant services, cashier sufficiency, completeness of restaurant facilities such as sink, hand dryer and toilet, restaurant comfort, restaurant cleanliness and a neat layout or layout have the highest factor loading value on factor 1 so this attributes are included in factor 1, while the variety of restaurant menus, packaging of product, package price, spacious restaurant parking area, frequency of appearances on TV, employee friendliness, employee communication skills, availability of delivery service, ease of payment process, attractive interior design and restaurant area have the highest factor loading value at factor 2 so that this attributes are included in factor 2.
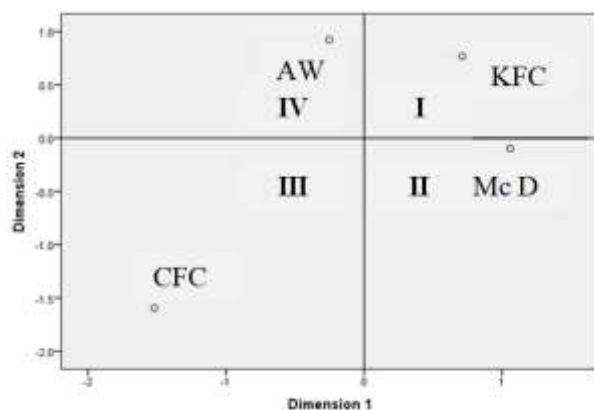
3.4. Position mapping with MDS

Comparison of fast food restaurant brands, namely (1) KFC, (2) Mc Donalds, (3) AW and (4) CFCs are based on product, price, place, promotion, people, process, and physical evidence variables. The position configuration of each brand is presented in the following perception map.
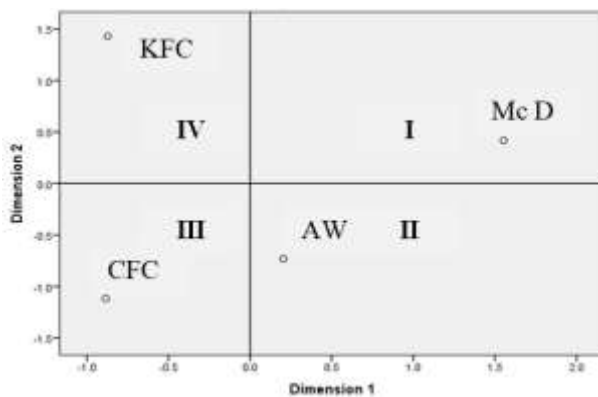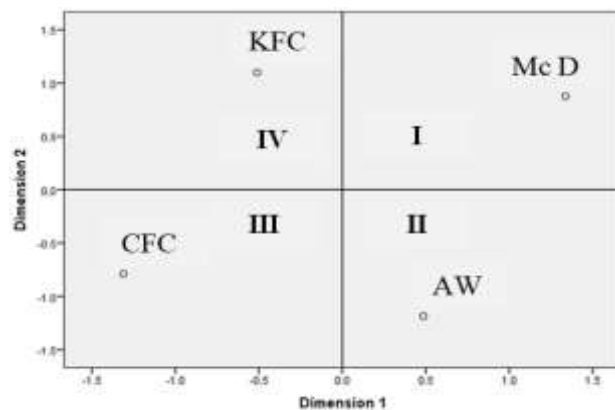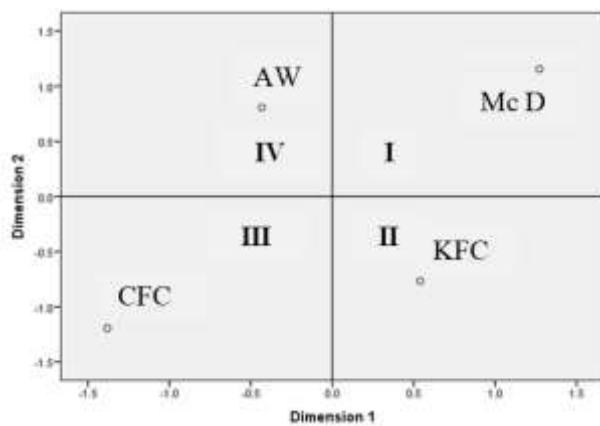

Figure 1. Product perception map.
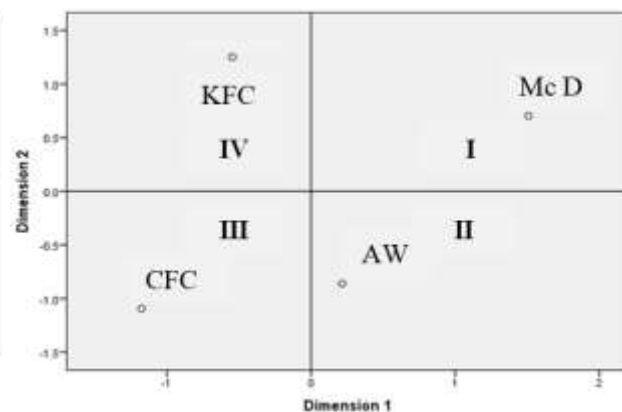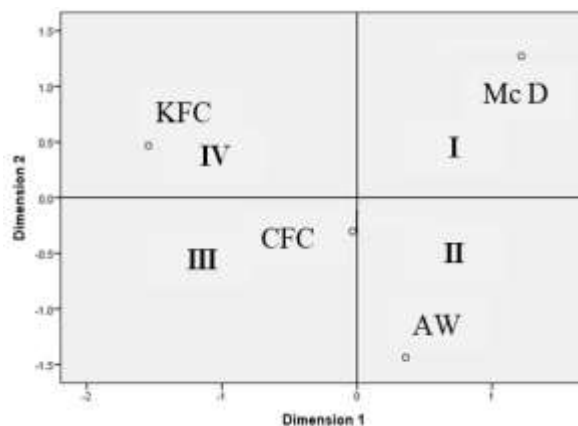

Figure 2. Price perception map.

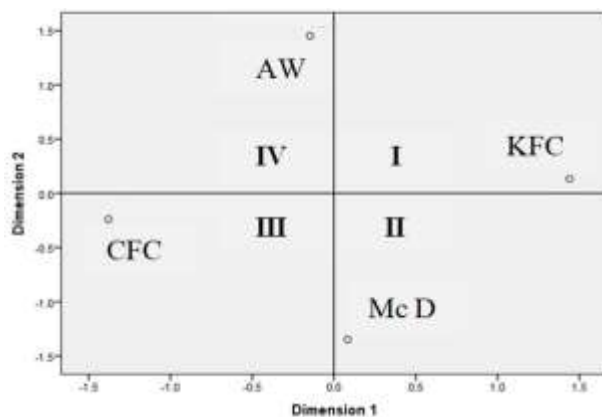**Figure 3.** Place perception map.

Figure 4. Promotion perception map.

Figure 5. People perception map.

Figure 6. Process perception map.

Figure 7. Physical evidence perception map.

Figures aboved show that Mc Donald is in quadrant 1 for a product, price, promotion, people, and process variables. This shows that Mc Donald has the greatest advantage in terms of products, prices, promotions, people, and processes compared to other brands both in dimension 1 and dimension 2. Whereas for place variables and physical evidence, Mc Donald is in quadrant 2 that means Mc Donald has great power only on the attributes that are in dimension 1. KFC is in quadrant 1 for place variables and physical evidence. This shows that KFC has the greatest advantage in terms of place and physical evidence compared to other brands both in dimension 1 and dimension 2. Meanwhile, KFC is also in quadrant 2 for process variables, which means that KFC has great power only on attributes that are in dimension 1. While for product, price, promotion and process variables, KFC is in quadrant 4 which means that KFC has a weakness in dimension 1 and strength in dimension 2.

AW is in quadrant 2 for product, price and promotion variables. This shows that AW has great strength only in the attributes that are in dimension 1. While for the place, people, process and physical evidence variables, AW is in quadrant 4 which means that AW has weaknesses in dimension 1 and strength in dimension 2. CFC is in quadrant 3 for all variables. This shows that the CFC has the smallest value in both dimensions. Then it can be interpreted that the brand has many weaknesses. Among the perceptual mapping techniques used in marketing, MDS technique that is based on the attribute data and attributes ratings is used in this study. When using MDS, mostly two or maximum three dimensions are preferred in order to ease the visual interpretation of the map [17].

3.5. Competitive strategy

Based on the perception map, the rank of each restaurant brand is as follows.

Table 2. Fast food restaurant rating.

Variable	Dimension	Attribute	Rank			
			McD	KFC	AW	CFC
Product	1	• Taste, product freshness, and product popularity	1	2	3	4
	2	• Variety of restaurant menus and packaging of a product	2	1	3	4
Price	1	• Affordable prices, prices according to quality, and restaurant promo prices	1	2	3	4
	2	• Package price	2	1	3	4
Place	1	• Restaurant location is easy to find, easy to reach and strategic	1	2	3	4
	2	• Spacious restaurant parking area	3	2	1	4
Promotion	1	• Media promotions on TV and interesting slogans or taglines	1	3	2	4
	2	• Frequency of appearances on TV	2	1	4	3
People	1	• Employee appearance and service skills	1	2	3	4
	2	• Employee friendliness and employee communication skills	1	2	3	4
Process	1	• Restaurant service speed, the accuracy of restaurant services, and cashiers sufficiency	1	4	2	3
	2	• Availability of delivery service and easy of a payment process	1	2	4	3
Physical Evidence	1	• Completeness of restaurant facilities restaurant comfort, restaurant cleanliness, neat layout	2	1	3	4
	2	• Attractive interior design and spacious restaurant area	1	2	3	4

Table 2 shows that Mc Donald's restaurant brand as a market leader or the most superior to other brands. Mc Donald's superior in terms of product, price, people, processes and physical evidence. Furthermore, as a market challenger, the KFC restaurant where the restaurant is a tight competitor of Mc Donald's. KFC is in terms of product, price, promotion, and physical evidence. The third rank is AW restaurant which excels in terms of products, prices, and promotions. The last rating is occupied by CFC restaurants which have a lot of weaknesses. Both restaurants are AW and CFC as market followers. For the organization, the value of positioning lies in the link it provides between the analyses of the internal corporate and external competitive environments. This is fundamental to the definitions of strategic marketing, which point to the matching of internal resources with environmental opportunities [18].

4. Conclusion

The results of the consumer perception map using MDS showed that the Mc Donald's restaurant brand as a market leader or the most superior to other brands. The second rank as a market challenger is KFC, third place is AW and the last rank is CFC which has a lot of weaknesses, where both restaurants are market followers. Mc Donald's has the advantage of almost all attributes. The strategy

that can be done by Mc Donald is maintaining the position as a market leader and monitoring the closest competitor. Competitive strategies that can be done by KFC are improving product quality, price suitability and improving promotional facilities. The competitive strategies that AW can do are increasing the variety of restaurant menu, increasing the number of restaurants, increasing promotion, setting standards for dress, providing training for employees, adding toilet facilities and rearranging restaurant layouts. CFC needs to make improvements in all variables to be able to compete with other brands.

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