Sensory Profile of Commercial Coffee Products using QDA (*Quantitative Descriptive Analysis*), Flash Profile, and CATA (*Check-All-That-Apply*) Methods

Dase Hunaefi[1,2], Windi Khairunnisa[1], Zen Fauzan Sholehuddin[3] and Dede R. Adawiyah[1,2]
[1]*Department of Food Science and Technology, IPB University (Bogor Agricultural University), Indonesia*
[2]*SEAFAST Center, IPB University, Indonesia*
[3]*Sensory Department, Mane, Indonesia*

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Abstract: This research was conducted to get sensory profile of eleven commercial coffee samples using the QDA (Quantitative Descriptive Analysis) method with expert panelists and Flash Profile and CATA (Check-All-That-Apply) methods using consumer panelists, then comparing the results of the three methods. Results of the three methods were analyzed using XLSTAT software. The four RTD coffee samples have nearly identical sensory profiles based on the QDA method by expert panelists. The four samples tend to have vanilla, creamy, caramel, and milky dominant profiles. The other one RTD coffee sample have dominant in bean attribute. IPD commercial coffee samples have more dominant in coconut, bitter, and roasted sensory profile than RTD coffee. Sensory profiles of commercial coffee obtained using the consumer panel on both methods CATA and flash profile giving quite different results. CATA and flash profile methods can't replace the QDA method in terms of testing which required high sensitivity. However, if a quick sensory product profile determination is required, then it is better to apply CATA method. Expert panelists are selected panelists with sensory sensitivity who have gone through training and have experience in sensory testing, which is able to provide consistent and repeated sensory assessments of various products. This study investigates how consumer panelists performing in flash profile and CATA method, compare to expert panelists using QDA method to determine sensory profile of a product. This study aims to find alternative methods that can be used if expert panelists are not available and rapid determination of sensory profile is needed. This sensory evaluation can be used for various purposes, for example is for product development.

1 INTRODUCTION

Coffee is a major tropical commodity traded throughout the world with a contribution of half of the total tropical commodity exports. The popularity and attractiveness of the world towards coffee is mainly due to its unique taste and is supported by historical, traditional, social and economic interests (Triyanti, 2016). Coffee drinks, beverages made from coffee bean extract, are one of the most famous types of drinks. In addition to its benefits, coffee also popular because it has a distinctive taste and aroma (Farida et al., 2013).

Coffee is a drink that contains caffeine. Many benefits can be obtained by consuming coffee. Caffeine in the coffee can increase the body's metabolic rate. For some people with routines that require them to be active at night, coffee can be a good alternative to drinks because the caffeine content can overcome drowsiness (Panggabean, 2011). Coffee can be useful as an antioxidant, stimulates brain performance and as an anticancer substance (Farida et al., 2013). Coffee can also reduce fatigue, increase freshness, and make you feel more excited (Towaha et al., 2012).

Indonesia is the fourth largest producer and exporter of coffee in the world after Brazil, Vietnam and Colombia. In 2016 to 2020, Indonesian coffee production is expected to increase with an average growth of 2.25% per year (Triyanti, 2016). Data from the International Coffee Organization (ICO) shows that Indonesia's coffee consumption in the period 2000-2016 experienced an upward trend. In 2000, Indonesian coffee consumption only reached 1.68 million bags (packs) @ 60 kg, but in 2016 had

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reached 4.6 million bags @ 60 kg. Even from 2011 to 2016, Indonesian coffee consumption has always experienced growth (ICO, 2018). There are various forms of coffee in the market, including instant coffee and ready to drink coffee. Instant coffee is a dry product that is easily soluble in water, obtained by extracting roasted and ground coffee beans. Instant coffee can also be made with the composition of coffee, sugar, cream, milk or by adding flavor (Dewi et al., 2009). Ready to drink coffee are drinks made from a mixture of coffee extracts and drinking water with or without the addition of other food ingredients and food additives that are permitted, hermetically packaged. Habits or lifestyles of people who want practicality lead to increased public consumption of coffee in the form of instant coffee and ready to drink coffee.

A description of the product's sensory characteristics has become an integral part of food and beverage companies. Information obtained from the description of the sensory characteristics of the product allows the company to make more informed business decisions, becoming a reference in development of ideal products according to consumers, knowing the effects of changes in formulas and processes, and useful for quality control purposes (Varela & Ares, 2012). Description tests are used to identify important sensory characteristics in a product and provide information about the intensity of these characteristics (Poste et al., 2011). One of the description test methods commonly used is Quantitative Descriptive Analysis (QDA). The QDA method is carried out based on the principle of the ability of train panelists to measure specific attributes of a product to obtain a comprehensive quantitative product description (Chapman et al., 2001).

The availability of trained panelists to carry out the description test is quite limited because it is obtained through a training process with relatively expensive costs, depending on the complexity of the sample (Varela & Ares, 2012). According to ISO 8586 (2012), sensory panels are "measuring instruments", where the results obtained are highly dependent on the performance of its members. ISO 8586 classifies sensory panels into 3: (1) sensory assessors or untrained sensory panels; (2) selected assessors or sensory panels that pass the selection process; (3) expert sensory assessors or sensory panels that have passed performance testing. The high cost, length of time, and availability of trained panelists or limited expert panelists led to the need for faster and more flexible sensory methods using untrained panelists (Varela & Ares, 2012).

Previous studies have been conducted to compare sensory evaluation methods using trained panelists and sensory profiling methods using consumer panelists. Based on the results of Bruzzone et al. (2015) which compares the intensity scales test using trained panelists and CATA using consumer panelists, the result shows that the two methods provide the same information and the CATA method can be an alternative way to obtain information about consumer perceptions of the product sensory characteristics. The CATA method has some advantages including simpler, faster, and easier. The CATA method consists of a list of words describing the sample, where panelists can choose sensory attributes which can describe the sample. One important thing in the CATA test is in determining the attributes used in the list, because it can determine the accuracy of the important attributes of the product. Determination of attributes used in the list can be obtained through several ways, such as by trained panelists, by consumers during testing (modification of free choice profiling), and through Focus Group Discussion (FGD) (Dooley et al., 2010).

According to Moussaoui & Varela (2010), the flash profile method is an accurate method to create sensory mapping and provide relevant results. This method is comparable to the results of QDA method using trained panelists. Flash profile method is a method that can be used to obtain quick product profiling when there are no trained panelists available. Flash Profile method is a combination of Free Choice Profiling and ranking test, where each subject chooses and use they own words to evaluate a whole set of products (Dairou & Siefferman, 2002). This method does not require prior training to panelists, so it can reduce the analysis time (Montanuci et al., 2015).

2 MATERIAL AND METHOD

2.1 Samples

11 brands of Indonesian commercial coffee in the form of instant and Ready to Drink (RTD) coffee.

2.2 Sample Preparation

Samples in the form of RTD coffee are removed from the packaging and poured into containers, while samples in the form of instant coffee are dissolved in hot water first in accordance with the serving instructions on the packaging. All samples are then

served at the same temperature as room temperature to avoid bias. Samples were presented as much as 20 mL in a small 30 mL plastic cup that had been given a random three-digit number code. Mineral water is given to the panelists as neutralizers.

2.3 Procedure of QDA Method

The QDA test was conducted by 12 expert panelists. Before the QDA test is conducted, expert panelists do a description of the sample attributes to determine the sensory attributes of the sample. Furthermore, QDA testing is done by assessing the intensity of each sensory attribute found in commercial coffee samples. All attributes are evaluated using a 10 cm scale (Papetti & Carelli, 2013). The testing is carried out in stages, which is to assess two sensory attributes for all samples in each test.

2.4 Procedure of Flash Profile Method

This method used 30 panelists who were coffee consumers, both instant coffee and RTD coffee. Each sample of commercial coffee products is presented as much as 20 mL with mineral water as a neutralizer. The panelist tasted the sample and wrote down the sensory attributes which were contained in the sample according to their opinion, without any instructions or without being guided by the panel leader. After panelists wrote down the list of attributes, they were asked to sort the intensity of each attribute from the entire sample (Dairou & Sieffermann, 2002).

2.5 Procedure of CATA Method

In the CATA (Check-All-That-Apply) method, there is an ideal perception profiling according to consumers. The panelist used was the same as the panelist on the flash profile test, which was 30 consumer panelists with the same sample presentation. Before tasting the sample, panelists were asked to fill in the ideal coffee criteria column first. Then the panelist tasted the sample and assessed what sensory attributes were felt in the sample by giving a check mark to the sensory attributes which could describe the sample (Dooley et al., 2010). Panelists were also asked to give an intensity rating of hedonic preference.

2.6 Data Analysis

QDA method data was analyzed using XLSTAT 2016 software with PCA (Principle Component Analysis) tools and Microsoft Excel 2016 software with spider web tools. PCA is used to get a biplot map which shows the correlation between commercial coffee samples and the sensory attributes. Spider web are used to show all profiles of the sensory attributes of a sample. Spider web can also identify profile of samples that are significantly different from other samples (Rahmawati et al., 2015).

Analysis of flash profile data using XLSTAT software with the Generalized Procrustes Analysis (GPA) tool. Data analysis of the CATA (Check-All-That-Apply) method using XLSTAT software with CATA Analysis tools. Analysis of the data generated in the form of Cochran's Q test, correspondence analysis, Principal Coordinate Analysis (PCoA), and penalty analysis.

3 RESULTS AND DISCUSSION

3.1 Panelists Profile

The panelists used in the QDA test were 12 expert panelists. According to ISO 8586 (2012), the expert sensory panel is the selected panelist with sensory sensitivity who has passed training and has experience in sensory testing, which is able to provide a consistent and repeated sensory assessment of various products.

The panelists used in the flash profile and CATA methods were 30 consumer panelists with a ratio of 50% men and 50% women. All the panelists are consumers of coffee products, which is instant coffee, ready to drink coffee, or both. Panelists generally consume coffee in the morning (37%) with different frequency of coffee consumption. Most of panelists consume coffee as much as 3-4 times a week. The frequency of panelists consuming coffee can be seen in Figure 1.

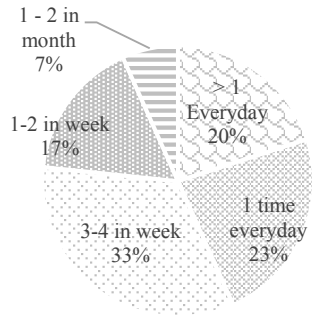

Figure 1: Aroma profile of 4 groups of cured vanilla bean.

3.2 Sensory Profile using QDA Method

Sensory attributes that were evaluated in the QDA method consist of 14 attributes obtained from the Focus Group Discussion (FGD) with expert panelists. These attributes consist of roasted, smoky, bean, caramel, vanilla, chocolate, milky, coconut, creamy, bitter, butter, sweet, cocoa, and salty. The results obtained from the testing of commercial coffee samples using the QDA method are in the form of spider web charts that can be used to know the overall sensory sample profile. Based on the spider web graph in Figure 2, products that have the strongest sweet, butter, vanilla, caramel, and salty attributes is Nescafe Smoovlatte RTD. Products that have the strongest roasted, smoky and bean attributes is ABC White Coffee IPD. The strongest milky and creamy attribute is the Luwak White Koffie RTD product, while the Luwak White Koffie IPD product has a stronger bitter attribute compared to other products. Products that the chocolate attributes are more dominant is ABC Exo RTD, while there are no products that dominant in cocoa and coconut attributes.

Other results that can be obtained from testing commercial coffee samples with the QDA method are the correlation between attributes with attributes and attributes with samples on the PCA curve. Based on PCA curve in Figure 3, the sensory attributes of sweet, butter, salty, chocolate, creamy, milky, vanilla, cocoa, and caramel are positively correlated with each other, but negatively correlated with four other attributes, such as bitter, smoky, roasted, and bean because of its opposite location. Coconut attributes have a low correlation to other attributes, because the location is far apart and contradicts all other sensory attributes.

The correlation between attributes and the sample in Figure 3 can show the dominant characteristics of each product. Nescafe Smoovlatte RTD has a dominant vanilla attribute with a score of 5.79, while ABC Exo RTD has dominant attributes of creamy, chocolate, and milky (5.55, 4.46, 4.23). Good Day Moccacino RTD has dominant characteristics of vanilla (5.03) and caramel (4.73), while Good Day Moccacino IPD has dominant characteristics of bitter (3.31) and coconut (3.27). Luwak White Koffie RTD has the characteristics of creamy, milky, and vanilla (6.25, 5.55, 3.77), while Luwak White Koffie IPD has a different dominant characteristic, which is bitter (5.90). Kopiko 78 RTD is dominant in bean attributes (5.20) and Nescafe IPD dominant in roasted attributes (5.16). Indocafe Coffeemix IPD coffee has the characteristics of bitter (3.61) and coconut (3.34). Torabika Cappuccino IPD is not adjacent to any sensory attribute on the PCA curve but has dominant creamy attribute with a score of 5.28.

3.3 Sensory Profile using Flash Profile Method

Flash profile method using 30 consumer panelists and generate a total of 22 different sensory attributes. Sensory attributes obtained are roasted, creamy, milky, sweet, bitter, caramel, coffee, viscosity, sour, nutty, vanilla, chemical, floral, coconut, honey, fruity, smoky, rum, chocolate, color, mocca, and mouthfeel.

The results are processed using GPA, including the PCA curve which can be seen in Figure 4. If all attributes of the flash profile test are used to process the data, many attributes accumulate on the PCA curve and it is difficult to determine the exact sensory characteristics for each sample. Therefore, the data processing is done by using sensory attributes which are widely used by panelists in describing samples, those are creamy, milky, sweet, bitter, caramel, and coffee. The six attributes are analyzed using GPA tools on XLSTAT with the results of PCA curve which shows the correlation between the six selected attributes with the commercial coffee sample. In the first quadrant there were 3 commercial coffee samples, which are Indocafe Coffeemix IPD, ABC White Coffee IPD, and Nescafe IPD which had strong coffee characters. In the second quadrant there were only 2 samples, namely ABC Exo RTD and Good Day Moccacino RTD which had the characteristics of sweet, caramel, and milky. The third quadrant consisted of Luwak White Koffie IPD, Good Day Moccacino IPD, Kopiko 78 RTD, and Torabika Cappuccino IPD which had sensory characteristics of bitter. Luwak White Koffie RTD and Nescafe Smoovlatte RTD are in the fourth quadrant with creamy sensory characteristics. The correlation between sensory attributes and samples tested with the flash profile method can be seen in Figure 5.

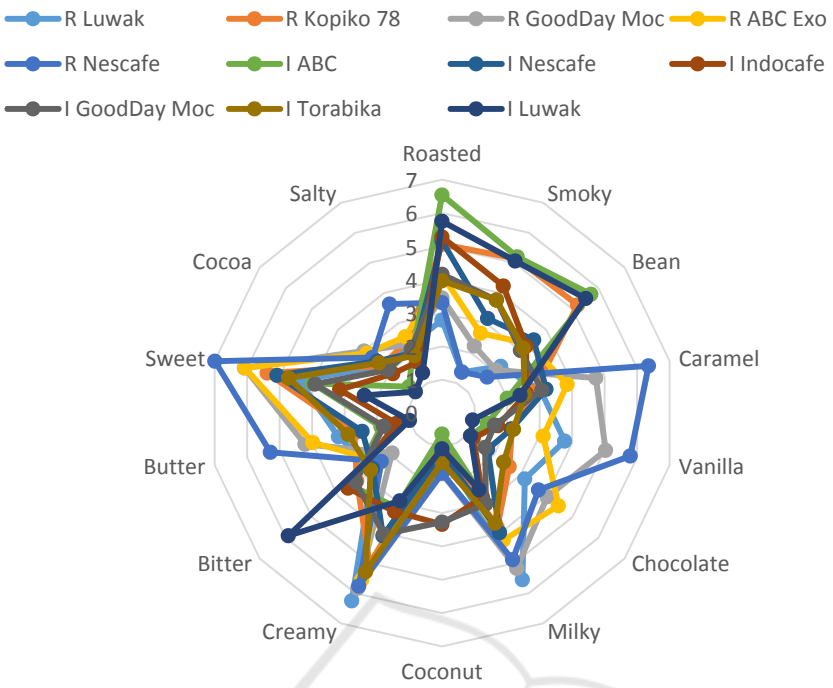

Figure 2: Spider web sensory attributes of commercial coffee sample.

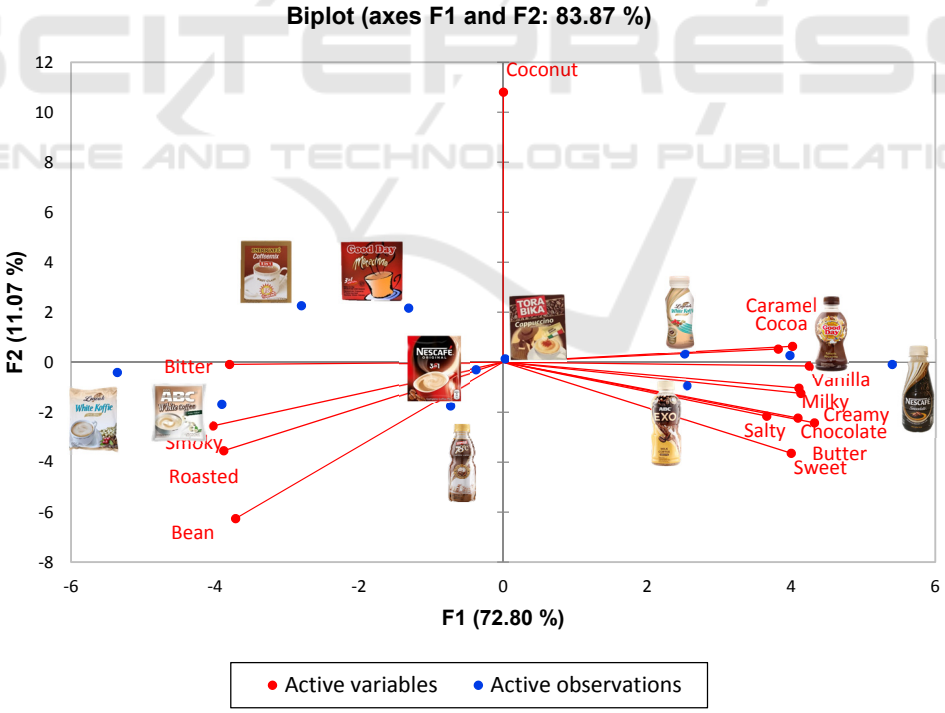

Figure 3: PCA curve of QDA method.

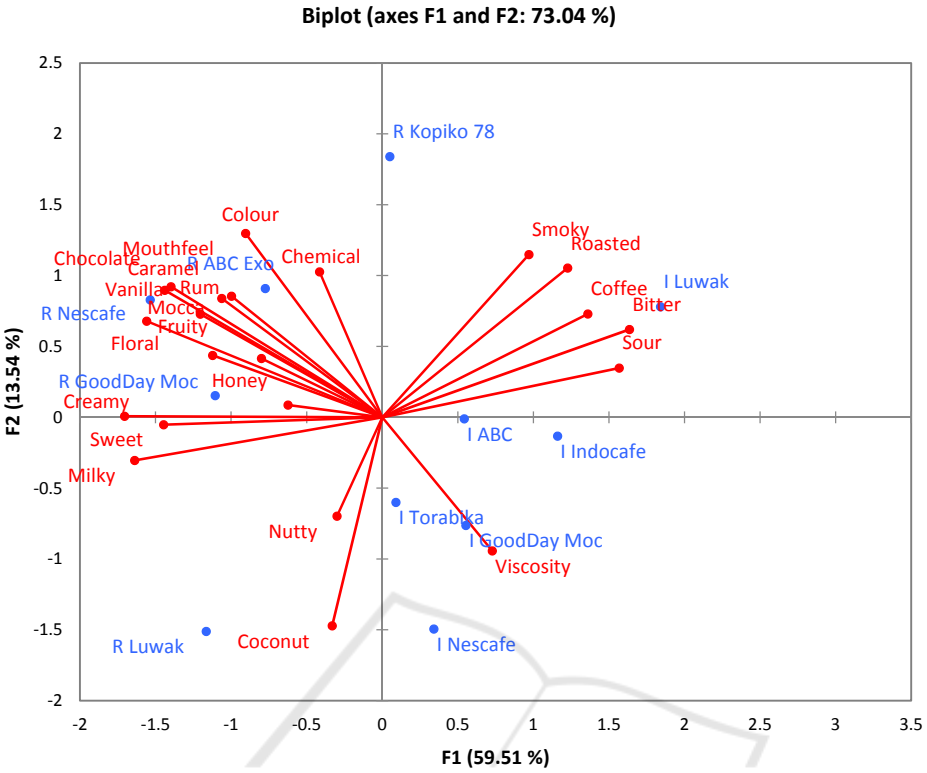

Figure 4: PCA curve all attributes from flash profile method.

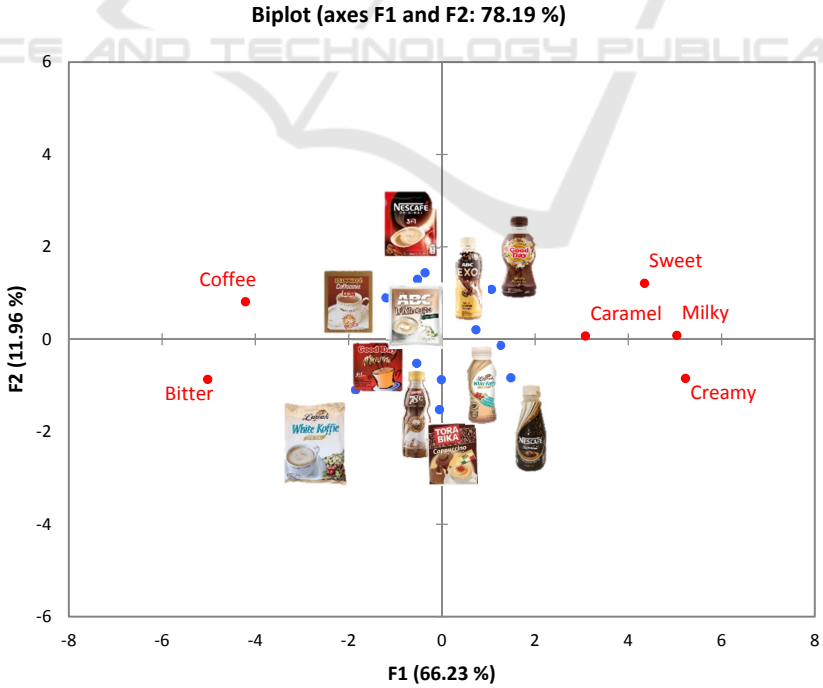

Figure 5: PCA curve of flash profile method.

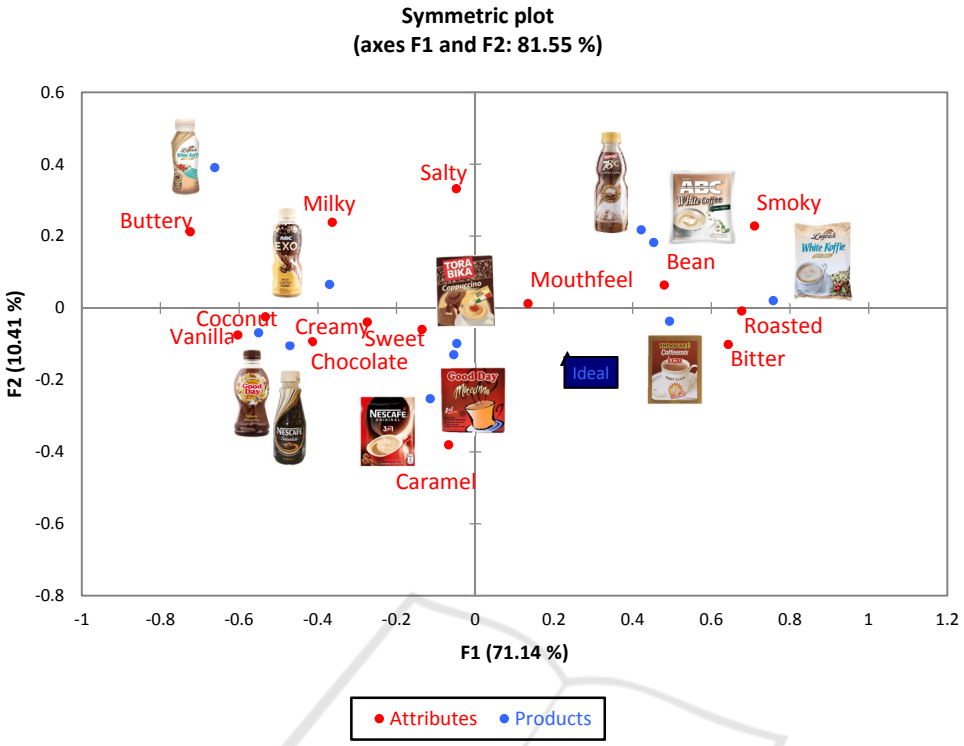

Figure 6: Ideal characteristic of RTD and IPD coffee.

3.4 Sensory Profile using CATA Method

The results of the Cochran's Q test with multiple pairwise comparisons *Marascuilo* compare each sensory attribute in each sample with a significance level of 5%. The results of Cochran's Q test show that all sensory attributes were significantly different in each sample at a 5% significance level, except for mouthfeel attributes. The results of the Correspondence analysis, which is obtained by the biplot map that represents the profile of commercial coffee and ideal coffee, are in accordance with appropriate sensory attributes (Ares et al., 2014). Biplot maps that illustrate the correlation between samples, ideal coffee products, and sensory attributes tested can be seen in Figure 6.

Based on the results of the Correspondence analysis in Figure 6, ideal coffee products according to the panelists should have strong bitter, roasted and mouthfeel attributes. The sample closest to the ideal coffee product is Indocafe coffemix IPD. Luwak White Koffie IPD also approaches the ideal coffee product because it has strong roasted and bitter attributes, but it is located in a different quadrant. ABC White Coffee IPD and Kopiko 78 RTD have dominant bean and smoky attributes. Torabika Cappuccino IPD and Good Day Moccacino IPD have the same dominant attributes, sweet and creamy because they are very close to the biplot map, while Nescafe IPD has the dominant caramel attribute. Good Day Moccacino RTD has the dominant attributes of vanilla and coconut, while Nescafe Smoovlatte RTD is dominant in chocolate attributes. ABC Exo RTD has a milky dominant attribute, while Luwak White Koffie RTD that located in the same quadrant has milky dominant attributes and buttery. Luwak White Koffie RTD has the smallest bitter and roasted attribute value compared to other samples, so the position is the farthest from the ideal.

Based on the results of CATA Analysis, there is a Principal Coordinate Analysis (PCoA) graph which illustrates the correlation between sensory attributes and panelists preference for commercial coffee samples. The results of PCoA analysis in Figure 7 show that the dominant attributes that positively influence panelists preference are the attributes of mouthfeel, caramel, chocolate, and sweet with the correlation between attributes with liking respectively 0.072, 0.147, 0.063 and 0.132. This is not in accordance with ideal coffee according to panelists who are close to the bitter, roasted and mouthfeel attributes. Only the mouthfeel attribute is close to the ideal and also has a positive effect on preference.

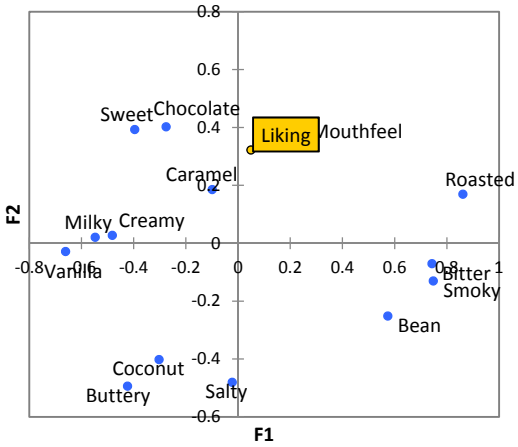

Figure 7: Correlation map between sensory attribute and consumer preference.

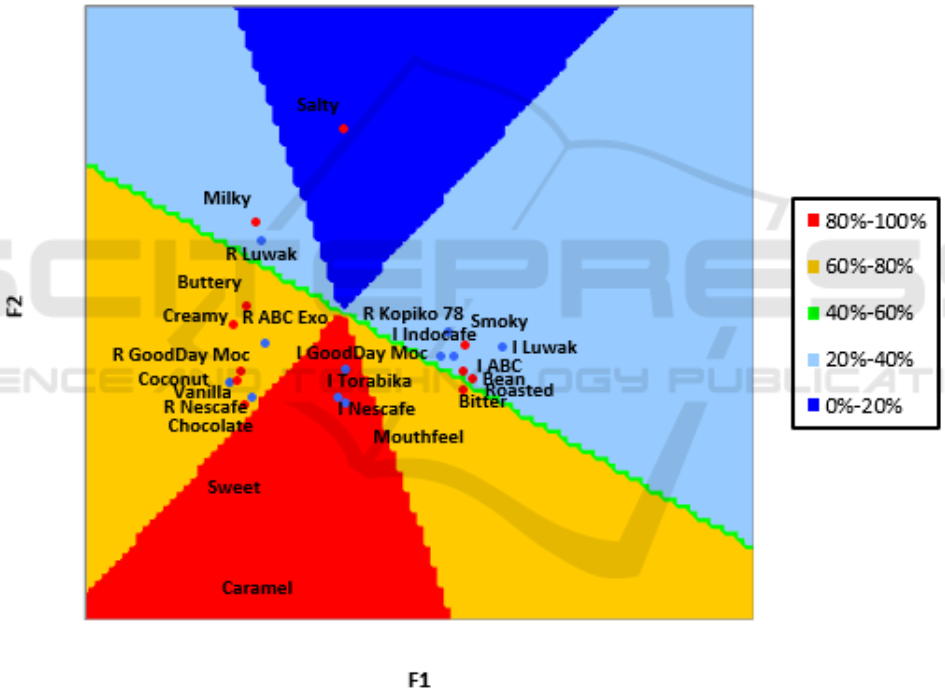

Figure 8: Consumer preference map towards commercial coffee.

Preference mapping is a technique that connects consumer acceptance data (hedonic data) with sensory characteristics of the product (descriptive data) to find out product characteristics that influence consumer preferences (Martinez et al., 2002). Contour plot is one part of preference mapping that have functions to show the number of clusters that have a level of preference above the average. The level of preference of each cluster is expressed in terms of percent (%) and with different percentage of each color (Manik et al., 2016). The results of preference mapping can be seen in Figure 8.

The red area on the contour plot shows the highest percentage of 80 - 100%. All panelists (100%) gave the preference values above average for products located in red areas, which are Good Day Moccacino IPD, Torabika Cappuccino IPD, and Nescafe IPD. While, 67% of panelists gave the preference values above average on ABC Exo RTD products, Good Day Moccacino RTD, and Nescafe Smoovlatte RTD, which are located in yellow areas. In the light blue

area, 33% of the panelists gave score above-average on Luwak White Koffie RTD, Indocafe Coffemix IPD, ABC White Coffee IPD, Luwak White Koffie IPD, and Kopiko 78 RTD.

The attributes that most desired by panelists for commercial coffee products are sweet, caramel, and mouthfeel attributes. This is in accordance with the graph (PCoA) above which states that the three attributes have a positive effect on panelists preferences. The attributes rather desired by panelists are bitter, buttery, creamy, coconut, vanilla, and chocolate, while the attributes that panelists don't really want to be present in the product are milky, smoky, bean, and roasted. The most unwanted attribute for the product is the salty attribute.

Penalty analysis based on the CATA method can be done if there are hedonic data and data about ideal product (Meyners et al., 2013). Based on the results of the penalty analysis on XLSTAT software, there are five categories of sensory attribute, which are must have, nice to have, must not have, does not harm, and does not influence. A sensory attribute can be grouped as a must have if the attribute is desired for the ideal product, but not found in the real product. The *must have* attribute analysis can be determined if the liking score for both the ideal product and the real product (1.1) is greater than when the attribute is chosen for the ideal product, but not for the real product (1.0). *Must not have* attribute is the opposite of the *must have* attribute, that is, sensory attributes found on real products but not on ideal products. Analysis of *must not have* attributes can be determined if the liking score of attributes that are not selected both on the ideal product and the real product (0,0) is greater than when the attribute absent on the ideal product, but found in the real product (0,1) (Meyners et al., 2013).

Nice to have attribute can be determined if the liking score of attributes found only in the real product (0.1) is greater than when the attribute is not found either on the ideal product or on the real product (0.0). If the liking score of the attribute that is not selected for both the ideal product and the real product (0,0) is almost the same as when the attribute is not chosen for the ideal product, but present in the real product (0,1), the attribute is classified as does not harm (Meyners et al., 2013).

There are 3 attributes that categorized as *must have*, which are bitter, sweet, and creamy. Attributes included in this category are attributes that must be found in commercial coffee products according to panelists and have a positive impact on preferences. *Nice to have* attributes are attributes that do not have to exist in commercial coffee products, but have a positive impact on the liking score, while the *must not have* attribute is an unwanted attribute found in the product and has a negative impact on the liking score (Meyners et al., 2013). Based on the analysis results, there are no attributes that categorized as *nice to have* and *must not have*. Salty, chocolate, vanilla, smoky, coconut, bean, buttery and mouthfeel attributes categorized as *does not harm* and caramel and roasted attributes are categorized as *does not influence*. A summary analysis of the sensory attributes of commercial coffee products based on penalty analysis can be seen in Table 1.

Table 1: Sensory attribute category based on CATA analysis.

Must have	*Nice to have*	*Does not influence*	*Does not harm*	*Must not have*
Bitter	-	*Caramel*	*Salty*	-
Sweet		*Roasted*	*Chocolate*	
Creamy			*Vanilla*	
			Smoky	
			Coconut	
			Bean	
			Buttery	
			Mouthfeel	

3.5 Comparison of Analysis Results of QDA, Flash Profile, and CATA Methods

QDA, flash profile, and CATA methods have several differences in practice and also the results obtained. The QDA method requires trained panelists or expert panelists in the testing. Flash profile and CATA methods can be done using consumer panelists, but with a different approach. Although they have differences, the three methods can be used to obtain a sensory profile of the sample, which is commercial coffee.

To find out the differences in the results of the three methods, it can be seen through the dominant attributes that describe each sample. The dominant attribute can be known from the PCA curve generated in each method. To determine the dominant attributes of the QDA method, spiderweb graphs can also be

used as a consideration. Table 2 shows a summary comparison of the three methods in determining the dominant attributes of commercial coffee samples.

Based on Table 2, it can be seen that there are several sensory attributes that can be identified equally in the three methods. For example, milky attribute in ABC Exo RTD and bitter attribute in White Koffie IPD that can be identified by the panelists on the CATA, flash profile, and QDA methods. Some attributes can be identified equally in the CATA and QDA methods, but not found on the flash profile method. The sensory attributes are vanilla attributes in Good Day Moccacino RTD and Nescafe Smoovlatte RTD, bean attributes in Kopiko 78 RT, milky attributes in Luwak White Koffie RTD, smoky attributes in ABC White Coffee IPD, and creamy attributes in Torabika Cappuccino IPD. Only two attributes that can be identified the same as the flash profile and QDA methods but not found in the CATA method, including the caramel attribute on Good Day Moccacino RTD and creamy attribute on Luwak White Koffie RTD. For Good Day Moccacino IPD, Indocafe Coffeemix IPD, and Nescafe IPD, there were no sensory attributes in the QDA test which were also identified in the CATA and flash profile methods.

There are several attributes that identified as dominant attributes by expert panelists but cannot be identified by consumer panelists. Nevertheless, the attributes that included in "must have" category of the CATA test, which are bitter and creamy, can be well identified by consumer panelists. It can be seen in Luwak White Koffie IPD sample which was identified as having bitter attributes on the three methods. The same with creamy attributes in the Luwak White Koffie RTD and Torabika Cappuccino IPD which can also be identified by consumer panelists. This shows that consumer panelists are quite good at identifying attributes that have a positive effect on preferences.

QDA, flash profile, and CATA method have their own advantages and disadvantages depending on the objectives to be obtained. The QDA method can provide more accurate results because using trained panelists or expert panelists. However, trained panelists or expert panelists are not always available in the company and usually to obtain a trained panelist takes a longer time. This method can be used to describe products, detect changes in formulations, determine the effect of storage and packaging duration, and quality control (Rahmawati et al., 2015).

CATA and flash profile methods can be done by using consumer panelists, so it is more flexible and shorter the time needed. The advantages of the CATA method for use by companies are they can provide information about the sensory attributes of the sample quickly and know the relationship to the acceptance and preferences of consumers. The CATA method can also provide information about the characteristics of ideal products according to consumers, which can be useful in product development. The flash profile method has the advantage of being able to give the panelists the freedom to describe the sample and determine the intensity of each attribute, so that consumer perceptions can be quickly detected. But this method can be considered impractical because if the panelists determine their own attributes on the sample, then each attribute must be interpreted and then combined with similar attributes (Dooley et al., 2010).

Based on the results of this research, sensory attributes obtained from the analysis of the CATA method have more in common with the QDA method. This can be caused the panelist in CATA method only need to select the attributes contained in the sample, so that it is easier to do. In addition, the flash profile method gives the panelists the freedom to determine the sensory attributes of the sample, so that the results obtained are broader and less consistent with the results obtained in the QDA method. The CATA method and flash profile cannot replace the QDA method in terms of testing that requires high sensitivity. But if it's necessary to determine the product's sensory profile quickly, then the CATA method is better to do.

4 CONCLUSIONS

Four RTD coffee samples, Nescafe, ABC Exo, Good Day Moccacino, and Luwak White Koffie have almost the same sensory profile based on the QDA method by expert panelists. The four samples tend to have the dominant profile of vanilla, creamy, caramel, and milky. One other RTD coffee sample, Kopiko 78, is dominant in bean attributes. Commercial IPD coffee samples have coconut, bitter, and roasted sensory profiles that are more dominant than RTD coffee.

The sensory profile of commercial coffee obtained using the consumer panel in the two methods, CATA and flash profile, gave quite different results. The results of the CATA method analysis have more in common with the QDA method. This can be caused because the CATA method is easier to do. In addition, the flash profile method gives the panelists the freedom to determine

the sensory attributes of the sample, so that the results obtained are broader and less consistent with the results obtained in the QDA method. Compared to flash profiles, the CATA method can provide more accurate results and can be used if no trained panelists are available or needed to determine the sensory profile of the product quickly.

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