Consumer study of Indonesian coffee leaves tea as traditional drinks

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Abstract. Coffee leaf tea is a traditional drink obtained by processing coffee leaves and served as tea. Coffee leaf tea is often found in West Sumatra, known as kawa daun. However, coffee leaves have not been widely known in the general public so that coffee leaf tea consumers are rarely encountered. In this study, an analysis was carried out to see consumer preferences for coffee leaf tea. Coffee leaves as a by-product have been declared as a novel food by EU Commission in 2020. Thus, coffee leaf tea products have potential economic value that can be promoted. To determine consumer preferences of Indonesian coffee leaves tea, a descriptive analysis of the consumer using online questionnaire was conducted, followed by conjoint analysis and one-way ANOVA test. As resulted from conjoint analysis, the preferences of Indonesian coffee leaves tea consumer were sequentially driven by level of sweetness, darkness of the colour, and the strength of fragrant. It was observed that gender strongly affected the preference on coffee leaves tea (p-value<0.05).

1. Introduction
Apart from *Camellia sinensis* leaves, other types of leaves such as coffee leaves can be made into tea by going through the same process as tea processing in general or using a special process for coffee leaf tea. Coffee leaf tea in West Sumatra is called *kawa daun*. The processing of coffee leaves is normally conducted by drying selected coffee leaves obtained from regular pruning. The European Union (EU) Commission has promoted that coffee leaves as a by-product have been declared as a novel food in the European Union. Thus, coffee leaves tea products pose an economic potential to be further explored [2].

*Kawa daun* or coffee leaf tea that has a distinctive aroma can be made by traditional fumigation process using bamboo stick and placed near a fireplace for several days until dry and can be easily crushed into powder [3]. The beverage can also be added with palm sugar or coconut sugar, it can also be mixed with ginger, milk, eggs, and honey, or consumed without adding any mixture depending on consumer’s preference [1].

Consumer preference is the level of consumer preference for a product that is consumed. There was no previous study specifically about coffee leaves consumer analysis, thus to determine consumer preferences for coffee leaf tea, an analysis of consumer preferences was carried out. Also, to find the variable that effect on the sensory attributes tested. Analysis of consumer preferences
observed from coffee leaf tea includes three sensory attributes, namely flavour, aroma, and colour. In the attribute of flavour, there are categories of sweet, bitter, astringent, sour. In the aroma attribute, namely non-fragrant, slightly fragrant, and very fragrant, and in the colour attribute, namely darkness, yellowness and redness. According to the study of Lanfer [11] gender is related to taste preferences. The purpose of this study was to identify consumer preference about coffee leaf tea attributes they like. This study is expected to be reference for kedai kawa to produce and develop coffee leaf tea drinks that liked by consumer the most.

2. Material and methods
The survey involved 150 Padangnese respondents who live in West Sumatera. Data was collected online through google form. The sensory attributes included aroma, flavour and visual colour were asked. All respondents were previously selected through interview session, to understand the respondents’ knowledge about coffee leaves tea drinks. Collected data were processed with conjoint analysis method, followed by one-way ANOVA (Analysis of Variance) on SPSS ver. 23. Conjoint analysis method is used to presents an overall evaluation of all respondents while one-way test is done to identify the sensory attributes affecting coffee leaves tea drinks consumer preference. An interview was also conducted to coffee leaves tea café owner in Jakarta and West Sumatera to obtain general picture of coffee leaves tea consumption.

3. Results and discussion

3.1. Conjoint analysis
Flavour attributes have the highest importance value; means that flavour attributes are very considered for coffee leaf tea consumers. Importance value is a test in conjoint analysis to normalize the attributes under study to ensure their relative importance with other attributes. The highest importance value when compared to other attributes means the most considered attributes and most important main factor in consuming coffee leaf tea [4]. The results obtained from the relative importance of attributes, namely for the taste attribute have the highest value of 56.27%. This shows that the taste attribute was the most important attribute considered by consumers for consuming coffee leaf tea. Similar to the previous report, it was also suggested that taste is the most considered attribute in tea consumption because consumers want to enjoy the taste [6,9]. It was suggested that the taste attribute is the most important factor and has the highest importance value [9]. It shows that consumers are more concerned with flavour and aroma, but do not really consider colour attributes.

The utility value is a test in conjoint analysis to determine the utility value of an attribute under study. The utility value describes the level of choice between levels in an attribute, if the utility value of an attribute level is positive and has a higher value when compared to the level in another attribute, then the attribute level is considered by consumers [4].

From the data that has been processed using SPSS version 23. Data shows that there are four flavour attributes; sweetness, bitterness, astringency, and sourness. Of the four levels in the taste attribute, sweetness has the highest value, which indicates that most consumers consider sweetness in consuming coffee leaf tea. The sweet flavour of coffee leaf tea is obtained from the formulation of making coffee leaf tea by adding sweeteners. The sweetener that is usually added can be in the form of granulated sugar, palm sugar, condensed milk, or cinnamon. Respondents who like sweet flavour are respondents in the age group of 21-25 years, which is the age group that dominates in this study with 94 respondents. Meanwhile, for the older age group (>35 years), they like the original taste of coffee leaf tea, which is bitter without the addition of sweeteners. In addition, flavour is also influenced by raw materials processing and the process of making coffee leaf tea, such as temperature of the water when brewing coffee leaf tea. The content of theaflavin and the arabiginin will affect the flavour of tea. The bitter taste of tea can be affected by the content of catechins, which give the tea a bitter and chewy taste [5].
For the colour attribute, darkness has the highest value, which then indicates that the blackish brown colour is considered by most consumers in consuming coffee leaf tea. The colour level of darkness was contributed by drying processing of coffee leaves [3,5]. Therefore, the brewed coffee leaves tea tended to be darker as black tea.

For the aroma attribute, slightly fragrant aroma has the highest value and therefore this attribute was preferable by most of the respondents. According to most respondents, the aroma that is recognized in coffee leaf tea is grassy or leaf-like aroma. The formation of aroma can be influenced by the volatile essential oils in tea [6,7]. An aroma such as a leaf or green aroma dominates in the steeping of coffee leaf tea with raw materials of young coffee leaves (3 weeks). In addition, the processing that goes through such as processing raw materials and manufacturing processes also affects the aroma of coffee leaf tea [8]. Details for the conjoint analysis are presented in Table 1.

| Attributes       | Level     | Utilities | Importance Value |
|------------------|-----------|-----------|------------------|
| Flavour and mouth-feel | Sweetness | 1.872     |                  |
|                  | Bitterness| 1.278     |                  |
|                  | Astringency| 0.030     | 56.279%          |
|                  | Sourness  | -3.180    |                  |
| Colour           | Darkness  | 0.389     |                  |
|                  | Yellowness| -0.026    | 19.443%          |
|                  | Redness   | -0.363    |                  |
| Aroma            | Slightly Fragrant | 0.519 |                  |
|                  | Very Fragrant | 0.503 | 24.278%          |
|                  | Non Fragrant | -1.022 |                  |

3.2. One-way ANOVA

| Sensory Attribute | Variable                  | Significance Level |
|-------------------|---------------------------|--------------------|
| Sweet             | Consumption time          | 0.014              |
|                   | Age                       | 0.009              |
|                   | Gender                    | 0.012              |
| Astringent        | Consumption situation     | 0.017              |
| Sour              | Consumption reason        | 0.001              |
|                   | Monthly income            | 0.032              |
|                   | Gender                    | 0.006              |
| Non Fragrant      | Consumption location      | 0.028              |
|                   | Gender                    | 0.020              |
| Slightly Fragrant | Consumption situation     | 0.025              |
|                   | Consumption location      | 0.007              |
| Yellowness        | Consumption situation     | 0.022              |
|                   | Gender                    | 0.032              |
| Redness           | Consumption situation     | 0.034              |
| Darkness          | Consumption situation     | 0.007              |
|                   | Consumption time          | 0.032              |
|                   | Gender                    | 0.034              |

One-way ANOVA testing was conducted to determine the effect of gender on the sensory attributes tested. The test results showed that gender had a significant effect (p-value<0.05) on the astringency (p-value=0.012), yellowness (p-value=0.020), and darkness (p-value=0.034). As suggested, the number of papillae in men and women is different, women have more papillae than men [12]. A person who has a large number of papillae will be more sensitive to taste. Papillae are the receptors on the tongue for taste [13]. Based on the results of the one-way ANOVA test, female respondents are
more sensitive to feeling of separateness. The feeling of tightness on the tongue begins with the formation of protein-tannin aggregates from food or drinks containing tannins and produces grittiness, then disruption occurs in the salivary layer, so that salivary lubrication decreases and is detected by receptor cells. The astringent taste of foods or drinks high in tannins is due to the interaction of tannins with salivary proteins to form protein-tannin aggregates in the mouth [14]. Furthermore, gender has a significant effect on yellowish and blackish brown colour, based on the one-way ANOVA test results, men have a high value for yellowish colour and women have a high value for blackish brown colour, from this data it can be said that men are more sensitive to the colour that is bright like yellowish when compared to women. Sensitivity is different from liking, sensitivity is a natural thing based on human physiological conditions, while liking is the preference of each individual. It was suggested that, men tend to pay more attention to the light axis, rather than the red-green axis. There are more red-green cones in the retina of the eye in women with a female preference for red and green colours [15]. Physiologically, there are no more red-green cones in men than women so that men prefer colours like black and blue in general. This occurs because the genes in the red-green cone cells are present on the X chromosome, and women have two X chromosomes. One physiological factor that may underlie this difference is the sexual dimorphism in the genes encoding the wavelength-sensitive photo-pigments of the cone cells in the retina. More than 95% of all variations in human colour vision involve red-green receptors. In addition, women can consistently name several similar colours than men, which means that women can describe colours more and can see a wider range of colours.

4. Conclusions
Result shows that flavour and mouth-feel were considered as important attributes for coffee leaves consumers. Most of the consumers defined the ideal coffee leaves tea as characterized by sweet in flavour, astringent mouth-feel, dark-brown colour, and slightly fragrant. These attributes were significantly affected by gender differences (p-value<0.05). To some extent, several attributes related to the consumption pattern such as location and time of consumption were also observed affecting respondents’ preferences.

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