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THE INFLUENCE OF TEA TYPES IN MAKING KOMBUCHA ON THE TASTE AND PREFERENCE OF HOTELIERS IN BATAM

Rizhon[1*], Siska Amelia Maldin[2]
Batam Tourism Polytechnic, Indonesia
Email: Rizhonkun45@gmail.com[1], siskamaldin@btp.ac.id[2]

*Correspondence

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ABSTRACT

Kombucha is a popular drink with its benefits for human health. This tea-based drink is very famous in the world of tourism for its sour and refreshing taste. Kombucha is generally made using green tea or black tea. However, many types of tea can be used, such as white tea, oolong tea, and so on. Usually, kombucha is made using tea, sugar, and water, then given bacteria and fungi to ferment for around 7 – 15 days. This research aims to see how the use of tea as a basic ingredient affects the taste and preferences of hoteliers in Batam, where 15 panelists carried out organoleptic tests on 8 samples of kombucha that have been prepared, where the only differentiating variable is the type of tea used, the results found that kombucha that is made from green tea is most liked by the panelists, meanwhile, the kombucha that is made from black tea is least liked.

Introduction

In the world of tourism, kombucha drink is a drink whose popularity is on the rise. Its increasing popularity is based on its benefits in improving digestive health for diets. In addition, kombucha can also help metabolism for the body to work better (Baijuan & Zhang, 2021).

Kombucha is a fermented tea drink, made from tea, sugar, bacteria, and yeast. The bacteria used in the kombucha manufacturing process are called SCOBY which stands for Symbiotic Culture of Bacteria and Yeast. SCOBY works by using the sugar contained in tea and turning it into a refreshing and carbonated sour drink (Jakubczyk, Kałduńska, Kochman, & Janda, 2020).

Kombucha is generally made with two types of tea, green tea and black tea. Both teas are considered the best types of tea to use in making kombucha. However, is it true that kombucha made using this type of tea is the best?

In this study, researchers wanted to examine how eight types of tea affect the flavor produced in kombucha. Then which type of tea is most preferred by hoteliers in Batam? Each kombucha will be produced with the same ingredients. exact recipe, fermentation time, and fermentation conditions. The type of tea is the only factor that affects the taste (Dewi et al., 2022).

TEA

According to (Khan &; Mukhtar, 2013) Tea is a very famous drink in the world. The popularity of tea is due to its taste and aroma which is very enjoyed by the world community. Tea is consumed by about two-thirds of the world's population or more than

three billion people in the world. Tea is made from the camellia sinensis plant. There are many types of tea available but the main types of tea are green tea, black tea, and oolong tea (Tiantian Zhao, Li, Wang, & Song, 2022).

Tea is the healthiest drink that originated in China more than 4000 - 5,000 years ago and has been used as an herbal medicine for various health benefits (Zhen jun Zhao et al., 2018). Although originating from China, the largest tea production in the world is in India with 28% of the world's production, and the most widely produced type of tea is the type of black tea as much as 78%. While green tea where the main producers are in Japan and China produces as much as 20% of world production, and oolong tea as much as 2% of tea production, which is increasing tea production over time, sees the number of needs that exist. All types of tea have different ways of making ranging from drying, fermentation, and steaming which can produce different flavors (Utama, 2010).

Tea has been scientifically proven to be very beneficial for the body, as it contains high antioxidants that are very beneficial for the body, ranging from reducing the risk of cancer, lowering blood sugar levels, reducing the risk of cardiovascular disease, and even fighting many types of bacteria such as Escherichia coli, bacillus cereus, staphylococcus aureus, and so on (Safitri & Irdawati, 2020).

In addition to fighting various diseases. Tea also contains caffeine which is beneficial for increasing energy. The level of caffeine contained in tea is in the range of 2-5% depending on the age of the tea leaves drunk (Ratnani & Malik, 2022).

KOMBUCHA

Kombucha is a fermented beverage made from fermented tea and sugar using SCOBY or Symbiotic culture of bacteria and yeast (Abaci, Deniz, & Orhan, 2022).

Kombucha is also known by other names, such as Mu-GO in Russian, Kombuchaschwamm in German, and Finkochinese in Italian (Zhen jun Zhao et al., 2018). It is thought to have originated in Northeast China during the time of the Tsin dynasty in 220 BC and spread to the world through various trade routes, and became popular in Russia and Europe in the 20th century and now kombucha has spread throughout the world (de Miranda et al., 2022).

Kombucha has many health benefits if drunk, which helps improve digestion with probiotics, helps increase metabolism, and increases endurance with antioxidants, but kombucha is a drink to help diet and is not used as a medical drug, although we cannot ignore that kombucha can help improve our health (Abaci et al., 2022).

In the kombucha fermentation process, there is a change from complex compounds to simple compounds, one of the changes is a decrease in Ph levels and an increase in acidity levels, a decrease in sugar levels, and an increase in probiotic levels (Hafsari & Farida, 2021).

The kombucha fermentation process is usually carried out for 7-15 days, because the longer the kombucha is fermented, the alcohol content will also increase, and also the acidity level (Mahadi, Sayuti, & Habibah, 2016).

Research on the influence of tea types had been done previously by Putri Ardila Sari, in her research the author made 4 kombucha samples which were then presented to

10 panelists, based on research with 3 factors, namely color, taste, and smell, the author concluded that the most preferred type of kombucha is made from white tea (Sari & Irdawati, 2019).

There is no mention of in more detail how other factors influence, the favorability profile of each kombucha with different types of tea, and there are also 4 types of tea used which are generalized into 4 main, white tea, green tea, black tea, and oolong tea.

Similar research has also been conducted by (Abdatilah, 2022). Ketut Ita Purnami from Udayana University, in her research, the author examined 4 types of tea, namely white tea, green tea, black tea, and mixed tea. Researchers fermented kombucha and measured antioxidant capacity, total acid, and Ph. In addition, the author also conducted a sensory evaluation with a hedonic test, where the results of the test showed that the most preferred type of kombucha was kombucha using mixed tea, while the least preferred was kombucha made using black tea (Abdatilah, 2022). In this study, researchers wanted to gather more details about how the type of tea affects taste, acidity levels, kombucha's flavor profile, and how acidity levels are produced.

Research Methods

Place and Time of Research

This research was carried out at the Mixology Laboratory, Dish Management Study Program, Batam Tourism Polytechnic in July – September 2023

Tools and Materials

The tools used in this research process are Glass jars, cloth jar covers, scales, water cookers, food tongs, teapots, glass bottles, spoons, filters, funnels, rubber bands, and electric pH meters.

In addition, there are also ingredients needed in conducting this research including Black tea, white tea, green tea, oolong tea, white peony tea, sencha tea, milky oolong tea, gyokuro tea, sugar, SCOBY local gallon water, for the type of tea used is a type of loose leaf tea, which is obtained from brewing.

Research Design/Method

In this study the researcher is an experimental study with a Complete Randomized Design (RAL) which includes 8 different treatments with 2 repetitions, the treatment is as follows, S1: Black Tea 8 grams, S2: Green Tea 8 grams, S3: Oolong Tea 8 grams, S4: White Peony Tea 8 grams, S5: Sencha Tea 8 grams, S6: Milky Oolong Tea 8 grams, S7: Gyokuro Tea 8 grams, S8: White Tea. So 8 experimental samples were then carried out Hedonic tests on tourism actors in Batam.

Observed Variables

The variables observed by researchers in this study are, Body, or the level of taste thickness, Acidity, or acidity level, Sweetness, or sweetness level, Balance, the level of balance of the previous 3 factors, Taste profile (If any), and also the level of overall liking.

Preparation of tools and materials

The first stage of making kombucha is the preparation of tools and ingredients, all tools used, including spoons, glass jars, and filters, must be dispensed using boiling water, which is then sprayed with disinfectant which is a mixture of vinegar and boiled water.

Next is the preparation of ingredients, the ingredients used are, tea with a dose of 8 grams each, for 8 grams of tea, 100 grams of sugar are used, 300 ml of kombucha starter, and 700 ml of water.

Kombucha tea making

Tea that has been measured is put into a tea pot, then boiling water as much as 700 ml, then let stand for a few minutes, after that the tea water is filtered into a glass jar, then added sugar as much as 100 grams and stirred, covered using a covering cloth, left until the solution cools, after the tea solution is cold, a starter of 300 ml is added and also SCOBY, The glass jar is covered using a cloth and tied with a rubber band, then left in a room that has air circulation and left for fermentation.

Fermentation Process

The fermentation process carried out by researchers lasted for 2 weeks, where kombucha was monitored every few days, to see the development of scoby.

Figure 1 Kombucha Fermentation Process

Kombucha Harvesting Process

In the process of harvesting kombucha, the first thing to prepare is tools, such as food tongs, bottles, filters, and funnels, all equipment prepared must be sanitized using boiling water and vinegar and water solutions. The finished kombucha is opened and filtered into sanitary bottles, then stored in the refrigerator. And kombucha is ready to be tested after cooling

Organoleptic Test

In this study, organoleptic tests were carried out with hedonic tests. The variables observed during the test were body, acidity, sweetness, balance, flavor profile, and the overall level of liking, and also the panelists were asked to give their opinions about kombucha that had been tested, where the panelists used as many as 15 people with the condition that the panelists were people who were involved in the world of tourism.

Results and Discussion

1. **`Uji Organoleptic**

The results of the kombucha organoleptic test using different types of tea for 15 panelists can be seen in the following table.

Table 1
Black Tea Organoleptic Test Results (S1)

	Black Tea (S1)				
Panelists	*Body*	*Acidity*	*Sweetness*	*Balance*	*Overall*
1	2	10	5	3	4
2	2	7	2	6	7
3	7	8	2	7	8.5
4	3	6	3	3	5
5	5	7	7	5	5
6	5	7	2	4	5
7	3	8	5	6	4
8	4	3	6	6	9
9	10	10	5	8	7
10	5	7	6	6	7
11	3	8	3	3	4
12	4	7	4	3	4
13	6	6	4	7	9
14	5	6	4	8	6
15	5	7	3	4	5
Average	4.6	7.13	4.06	5.26	5.96

From the results of the black tea organoleptic test, we can see that black tea has an assessment level of 5.96 where the highest favorability value is in panelists 8 and panelists 13 in number 9.

Table 2
Green Tea Organoleptic Test Results (S2)

	Green Tea (S2)				
Panelists	*Body*	*Acidity*	*Sweetness*	*Balance*	*Overall*
1	5	3	9	10	10
2	4	5	7	8	9
3	5	2	8	9	9.5
4	6	3	5	7	9
5	3	3	9	4	8
6	3	5	7	10	8
7	3	5	8	8	8
8	4	2	8	5	10
9	9	9	7	8	9
10	6	6	7	8	8
11	2	3	5	5	7
12	2	4	6	3	7
13	4	4	4	7	6
14	3	4	7	8	9
15	7	8	8	8	9
Average	4.4	4.4	7	7.2	8.43

Based on Table 2, we can see that green tea has a favorability level of 8.43 where the highest scores are obtained from panelists 1 and 8 at number 10.

Table 3
Organoleptic Test Results of oolong tea (S3)

	Oolong Tea (S3)				
Panelists	*Body*	*Acidity*	*Sweetness*	*Balance*	*Overall*
1	3	7	5	5	6
2	6	6	3	5	8
3	5	1	9	9	9.5
4	7	6	4	7	6
5	5	3	10	5	10
6	5	5	6	9	10
7	2	4	7	8	6
8	2	3	3	7	9
9	10	5	6	10	9
10	5	6	8	7	7
11	4	3	6	7	7
12	2	2	5	5	7
13	3	2	5	6	5
14	6	7	6	7	7
15	7	5	7	6	7
Average	4.8	4.33	6	6.86	7.56

Based on Table 3, it was found that the level of liking for kombucha with oolong tea was 7.56 where the highest scores were obtained from panelists 5 and 6 at number 10.

Table 4
Organoleptic Test Results of White Peony Tea (S4)

	White Peony (S4)				
Panelists	*Body*	*Acidity*	*Sweetness*	*Balance*	*Overall*
1	2	8	5	5	5
2	5	7	4	6	7
3	6	3.5	6	7	7.5
4	6	5	4	7	9
5	3	5	9	4	7
6	7	6	6	8	8
7	2	3	5	9	9.5
8	4	3	5	5	8
9	8	6	7	9	8
10	4	7	7	7	8
11	1	2	7	8	8
12	1	2	5	6	6
13	4	3	4	7	6
14	4	5	7	8	8
15	5	5	7	5	8
Average	4.13	4.7	5.86	6.73	7.53

Based on Table 4, we can see that the favorability level of kombucha white peony tea is at 7.53 where the highest value is 9.5 given by panelist 7.

Table 5
Sencha Tea Organoleptic Test Results (S5)

	Sencha (S5)				
Panelists	*Body*	*Acidity*	*Sweetness*	*Balance*	*Overall*
1	2	5	8	5	7
2	3	5	6	7	8
3	5	6.5	7	7.5	6.5
4	5	6	2	7	7
5	5	7	7	7	7
6	4	6	5	5	7
7	4	8	7	8	7
8	3	4	3	5	9
9	9	7	7	9	8
10	4	5	6	7	6
11	4	6	4	4	5
12	8	6	5	6	6
13	2	3	2	4	4
14	4	8	4	5	4
15	4	5	6	6	7
Average	4.4	5.83	5.26	6.16	6.56

Based on Table 5, the favorability value of kombucha sencha tea is 6.56 where the highest value is given by panelist 8 at number 9.

Table 6
Organoleptic Test Results of Milky Oolong Tea (S6)

	Milky Oolong Tea (S6)				
Panelists	*Body*	*Acidity*	*Sweetness*	*Balance*	*Overall*
1	1	4	7	9	7
2	4	6	5	6	8
3	6	7	5.5	8	8
4	8	4	6	8	9
5	5	7	7	5	8
6	5	5	6	7	8
7	3	6	6	9.5	10
8	4	4	5	6	9
9	9	9	7	9	8
10	5	7	6	7	7
11	3	5	5	6	6
12	5	5	4	3	5
13	6	6	4	6	8
14	5	4	6	7	6
15	4	5	6	6	7
Average	4.86	5.6	5.7	6.83	7.6

Based on Table 6, it was found that the favorability value of kombucha with milky oolong tea had a favorability value of 7.6 with the highest value of 10 given by panelist 7.

Table 7
Organoleptic Test Results of Gyokuro Tea (S7)

	Gyokuro tea (S7)				
Panelists	*Body*	*Acidity*	*Sweetness*	*Balance*	*Overall*
1	1	3	8	10	9
2	3	4	6	8	6
3	6	4.5	8	7.5	7.5
4	7	5	6	8	8
5	1	3	3	4	10
6	6	6	5	6	7
7	2	5	4	9	9
8	3	2	2	4	9
9	8	6	7	9	7
10	4	5	6	7	7
11	2	2	5	7	9
12	1	1	5	10	9
13	4	4	3	5	5
14	2	2	4	9	9
15	3	3	8	8	8
Average	3.53	3.7	5.33	7.43	7.96

Based on Table 7, the panelists' favorability score for kombucha with gyokuro-based ingredients was 7.96 with the highest score of 10 given by panelist 5.

Table 8
White tea organoleptic test results (S8).

	White Tea (S8)				
Panelists	*Body*	*Acidity*	*Sweetness*	*Balance*	*Overall*
1	3	5	5	5	6
2	3	6	4	6	7
3	7	8	4	5	4.5
4	7	6	7	4	6
5	5	7	3	4	7
6	3	5	4	5	7
7	5	4	7	8.5	8.5
8	3	3	4	5	8
9	9	8	7	9	8
10	4	6	7	6	6
11	4	2	7	8	9
12	6	6	4	2	4
13	5	3	3	5	4
14	3	4	7	8	7
15	4	4	7	7	9
Average	4.73	5.13	5.33	5.83	6.73

From Table 8, we can find that the favorability value for kombucha with white tea is 6.73 with the highest value of 9 given by panelist 11.

Table 9
Average Organoleptic Test Results on taste in kombucha.

No	Variable	Average							
		S1	S2	S3	S4	S5	S6	S7	S8
1	Body	4.6	4.4	4.8	4.13	4.4	4.86	3.53	4.73
2	Acidity	7.13	4.4	4.33	4.7	5.83	5.6	3.7	5.13
3	Sweetness	4.06	7	6	5.86	5.26	5.7	5.33	5.33
4	Balance	5.26	7.2	6.86	6.73	6.16	6.83	7.43	5.83
5	Overall	5.96	8.43	7.56	7.53	6.56	7.6	7.96	6.73

Table 9 is the average result of organoleptic tests that have been performed on 15 panelists, using variables of body, acidity, sweetness, balance, and overall favorability. Each result is explained as follows

Body

Based on the results of organoleptic tests that have been carried out kombucha which has the highest body is kombucha made using milky oolong tea, which means panelists assess that kombucha has a heavier taste, this is due to the taste characteristics of milky oolong tea which has butter and vanilla properties. While kombucha that has the lowest body is kombucha made from gyokuro tea, which means this kombucha has a mild taste in the mouth compared to other kombucha.

Acidity

Based on the results of organoleptic tests that have been carried out, kombucha that has the highest acidity is kombucha made using black tea, which means panelists judge that kombucha has the highest acidity, while kombucha that has the lowest acidity is kombucha made using gyokuro tea, which means kombucha has the lowest acidity compared to another kombucha.

Sweetness

Based on the results of organoleptic tests that have been carried out, kombucha that has the highest level of sweetness is kombucha made using green tea, which means panelists assess that kombucha has the highest level of sweetness, while kombucha that has the lowest level of sweetness is kombucha made using black tea.

Balance

Based on the results of organoleptic tests that have been carried out kombucha which has the highest level of taste balance in kombucha is kombucha made using gyokuro tea, which means panelists judged that kombucha is kombucha that has the best balance, which means it is not too sweet, not too sour, and not too heavy in the mouth,

while kombucha that has the lowest level of taste balance is kombucha made using black tea.

Flavor Profile

Based on the results of organoleptic tests, several panelists can provide information on the taste profile in each given sample where the average results are as follows. In kombucha using black tea, panelists get fruity taste characteristics, with notes of green apple and passion fruit. Next on green tea kombucha panelists found floral and fruity characteristics, with peach and apple flavor notes.

Furthermore, on kombucha oolong tea, panelists found taste characteristics without detailed notes. Then for kombucha tea white peony, panelists found floral taste characteristics without more detail. Next to kombucha sencha tea, panelists found fruity and floral flavor characteristics with peach flavor notes. Furthermore, for kombucha with oolong tea base ingredients, panelists found fruity and milky taste characteristics with white pear taste characteristics. Furthermore, for kombucha with your tea base, panelists found floral flavor characteristics with jasmine notes. Finally, for kombucha with a white tea base, panelists found earthy taste characteristics with herbal and smoky notes.

Favorite

Based on the results of organoleptic tests conducted on 15 panelists, it can be seen that the most preferred kombucha is kombucha made from Green Tea, this is due to its acidity that is not too high, and also due to the characteristics of floral and fruity taste. Kombucha tea that is not liked by panelists is kombucha made using black tea where the same results are also obtained in organoleptic tests conducted by (Abdatilah, 2022), this is due to the high acidity level compared to kombucha made with other teas.

Conclusion

Based on the results of organoleptic tests on kombucha made from different types of tea, we can conclude that, the kombucha fermentation process using different types of tea also produces different results, for example we can find that kombucha made using black tea has a higher acidity than kombucha using other types of tea, while we can find kombucha using green tea, The highest degree of sweetness. We also find that each kombucha has different taste characteristics, ranging from milky oolong which has milky taste characteristics, white tea which has earthy characteristics, and green tea which has fruity taste characteristics. And also the most important where we can also see that the kombucha most liked by the panelists is kombucha made from green tea, it is because the acidity level is not too high and the taste characteristics are fruity and floral with peach and apple notes, while less liked by the panelists is kombucha with black tea ingredients, This is due to the highest level of acidity.

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