FOODSCITECH
Food Science and Technology Journal

Research and Development on Galengdowo Village's Tahu Walik Cracker Using Different Seasonings

Hadassah Elisha Karsten[1], Emre Omar Khaled[2], Oki Krisbianto[3*], Magnalia Isnina Madyaratri[4], Fika Fatimah[1]

[1]School of Communication Studies, Universitas Ciputra Surabaya
[2]School of Psychology, Universitas Ciputra Surabaya, CitraLand CBD Boulevard
[3] Food Technology Program, Universitas Ciputra Surabaya
[4] School of Tourism - Culinary Business, Universitas Ciputra Surabaya
CitraLand CBD Boulevard, Sambikerep, Surabaya, Indonesia
Corres Author Email: oki.krisbianto@ciputra.ac.id

ABSTRACT

Tahu walik is a snack product originating from Banyuwangi but has been developed in other areas such as Galengdowo Village, Jombang. To develop Galengdowo's tahu walik products that were able to compete inmarket, it was necessary to conduct research related to product sensory and consumer acceptance. The five sample variants used in this study were tahu walik without seasoning (T0), original seasoning (T1), balado seasoning (T2), salted pepper seasoning (T3), and commercial tahu walik (T4) for comparison. A total of 40 panelists conducted a hedonic analysis of the product's appearance in the packaging, shape, color, crispness, taste, and oily. The results showed that the highest purchase motivation was seen in T1 and T2, which were reddish, while the assessment of the packaging and sample's shape was not significantly different. The crispness value of T0 was the lowest compared to the other four samples which were not significantly different. Panelists most liked the taste of T3, T2, and T4 while T0 was the lowest, while the oily feeling was felt the most in sample T0 and the lowest in T2. Based on Simple Additive Weighting, T2 has the highest rank while T0 is the lowest. The difference in the type and color of the seasoning greatly influenced the panelists' preferences and their decision to buy tahu walik products. It can be concluded that the tahu walik processing industry in Galengdowo Village needs to develop its products to increase competitiveness in the market.

Keywords*: food industry; sensory; simple additive weighting; snack; tofu*

INTRODUCTION

The trend of tofu consumption in Indonesia tends to increase with the average annual consumption of 7.46 kg per capita from 2002 to 2020. During 2018-2020, the highest per capita consumption of tofu was in East Java (Pusat Data dan Sistem Informasi Pertanian, 2021). Therefore, tofu is often consumed as an alternative source of protein for Indonesian citizens (Yuliarti, 2020). The high public interest in consuming tofu has opened market opportunities for processed tofu products, one of which is *tahu walik* which is known as a processed tofu product from Banyuwangi (Pratisti et al., 2022; Wirahayu et al., 2019). *Tahu walik* has now been produced in various regions in Indonesia, especially in Java, and has many variations of processing (Augustian et al., 2019; Erliana & Wibowo, 2020; Prasasti & Santoso, 2022; Serawati & Putri, 2019).

Tahu walik is cooked by frying fresh tofu, removing its inside part, turning the hardened skin inside out, stuffing with meat mixture, then re-frying. One variant of *tahu walik* is *tahu walik crackers* (TWC), i.e. unstuffed *tahu walik* that is fried until crisp. TWC has been produced by various micro, small and medium enterprises or MSME, one of which is UD. Comot in Galengdowo Village, Jombang Regency, East Java. This household food industry had been producing TWC with one flavor variant using original seasoning. However, the marketing of its products was still underdeveloped. Therefore, research and development of flavor variants of TWC products produced by UD. Comot needs to be conducted. In food

ISSN 2622-1985 (print) | ISSN 2622-4127 (online)
DOI: http://dx.doi.org/10.25139/fst.vi.5238

product development, information related to consumer needs and desires is very vital to be known (Rebane, 2018). This research was designed to find the most preferred TWC flavor variant by consumers to increase the market expansion of UD. Comot. The development of MSMEs is one of the vital efforts in the economic development of rural communities which is the basis for the country's economic development, especially because it can create jobs opportunity and support the preservation of local wisdom along with sustainable innovation (Arifin et al., 2021; Prasasti & Santoso, 2022; Prasetyo, 2021).

This study used a mixed method with an embedded design. The quantitative data of the TWC hedonic test were further supported by qualitative data described by the panelists (Moser & Korstjens, 2018). The Simple Additive Weighting (SAW) method was used to determine the best TWC product variant (Quek et al., 2021).

METHODS

Material

Five sample variants used in this research were TWC without seasoning (T0), the original product of UD. Comot used original seasoning (T1), balado seasoning (T2), and salt and pepper seasoning (T3) all of which were produced by UD. Comot from Galengdowo Village, Wonosalam, Jombang Regency, East Java, as well as a commercial TWC product (T4). T1 and T4 variants have been commercialized, while T0, T2, and T3 were produced specifically for this research.

Tools

The sensory analysis form and sensory analysis set (trays, plates, and glasses) were used for the sensory analysis test. The sensory form along with the full instructions can be accessed at the following link: shorturl.at/uHLV3.

Descriptive data collection

Descriptive data collection was carried out from June to August 2022 to obtain valid data according to the urgency of the problems faced by UD. Comot. The primary source of data collection is the owner of UD. Comot who has direct access to the required data. The data was collected using interview and observation methods on 23 occasions. In addition, UD. Comot consumers were needed as a secondary source to validate data obtained from primary sources. UD. Comot consumers were interviewed three times on different occasions.

Interviews were conducted by using open-ended questions that had been prepared beforehand as well as spontaneously. Observations were conducted by directly observing the place and production process as well as the daily activities of laborers at UD. Comot (Moser & Korstjens, 2018). This method was used to validate interview data through close observation of activities using the five senses, both observations of the implementation of activities and available documents without exaggerating any data (Sukardi, 2021).

Sensory analysis

The sensory testing method was based on SNI 01 2346-2006 (Badan Standardisasi Nasional, 2006). The sampling method used was convenience sampling by selecting people who were around the testing laboratory when the analysis was carried out. A total of 40 people had given their consent as panelists with the demographics shown in Table 1.

FOODSCITECH, Vol. 6 No. 1 July 2023
ISSN 2622-1985 (print) | ISSN 2622-4127 (online)
DOI: http://dx.doi.org/10.25139/fst.vi.5238

Table 1. Demographics of panelists

Criteria		Percentage
Age	15-21 years old	35.0%
	22-40 years old	47.5%
	41-60 years old	15.0%
	>60 years old	2.5%
Gender	Female	60.0%
	Male	40.0%
Experience as a panelist	Never	42.5%
	Experienced but not attended training	32.5%
	Experienced and have attended training	25.0%

The total number of panelists is 40 people.

The sensory analysis used hedonic test and descriptions of the overall appearance of the products in the packaging which were associated with the buying motivation, the shape of the packaging, as well as the shape and color (based on eye observation), crispness (based on the first bite), flavor (based on taste on the tongue), and oily taste of the sample (based on the oily feeling in the mouth and throat). In the first three indicators, samples were provided in the form of ready-to-sell packaged products as shown in Figure 1. For the remaining indicators, samples were served in sensory serving plates. The assessment used a 5-point Likert scale from 1 (the most disliked) to 5 to indicate (the most liked). In addition, panelists were also asked to provide a commentary on the reasons for their assessment. SPSS Version 25 was used to process data using the ANOVA method and continued with Duncan's Multiple Range Test as a post hoc test.

Figure 1. Packaged TWC samples.

Best Treatment Selection

The selection of the best treatment for the five samples used the Simple Additive Weighting (SAW) test based on the method described by Quek et al (2021) using the following equation:

$$V_i = \sum_{j=1}^{n} w_j r_{ij}$$

where V_i was the overall score of the *i* sample variant, w_j was the weight of the *j*th variable, and r_{ij} was the rating value of the *i* sample variant in connection with the *j*th variable or also known as 'normalization'. The variables used were motivation to buy, color, crispness, seasoning flavor, and oily taste which have beneficial criteria (the higher the value means the more expected by the panelists), where each variable was given the same 20% weight. As for beneficial criteria, the equation for r_{ij} was $r_{ij} = x_{ij}/x_{ij(max)}$, where x_{ij} was the value of the *i* sample variant in connection with the *j*th variable and $x_{ij(max)}$ was the highest x_{ij} value of all sample variants for the *j*th variable.

RESULT AND DISCUSSIONS

Determination of UD. Comot Problems

The problems faced by UD. Comot were determined through three stages, i.e. interviews with primary sources, direct observation, and interviews with secondary sources. From the interviews with primary sources, lack of product marketing was the main issue raised. It was known from secondary sources that the appearance of the original TWC product was less attractive while the taste was distinctive but relatively bland. The interview summary is shown in Table 2.

Table 2. Interview Descriptive Data

Internal Constraints	Sales	The level of sales received had decreased from time to time. Allegedly the original TWC product was less able to compete in the market.
	Product Innovation	UD. Comot never innovated in the TWC product they sold. They only had one variant flavor, i.e. original flavor.
Consumer Feedback	Variant	There was only one type that has been commercialized by UD. Comot.
	Seasonings	Consumers suggested to improve the flavor because the original flavor was not as expected, less flavorful, less salty, and less savory.
	Texture	The texture was quite crunchy and not hard even though the skin was thicker than other TWC products in general.
	Oily Taste	The original TWC product had a bit of a greasy feel to the touch and chew.
	Shape	The product was square in shape and thicker on the skin, unlike other TWC products which were round and thin on the skin.
	Colors	The color was reddish yellow and was considered not very imposing, although other TWC products were usually yellowish brown in color because they had not been given colored seasoning.
	Packaging	The packaging was considered not very imposing and very common.

FOODSCITECH, Vol. 6 No. 1 July 2023
ISSN 2622-1985 (print) | ISSN 2622-4127 (online)
DOI: http://dx.doi.org/10.25139/fst.vi.5238

During the observation of the production process, sensory-related issues were identified. The improper seasoning process caused the color of the original TWC product of UD. Comot to become paler and the taste blander so that the sensory satisfaction felt by consumers was also less than optimal. This problem was suspected to be one of the causes of the limited marketing of UD. Comot's original TWC products. Two flavor variants were proposed to overcome this problem, based on the availability of ingredients that were accessible to UD. Comot, i.e., balado as well as salt and pepper seasonings.

Sensory Analysis Results

The results of the sensory analysis are shown in Table 3. Based on these data, the panelists' assessment of the shape of the packaging and the shape of the TWC product was not significantly different. Packaging and information contained in it play an important role in introducing products and producers to consumers (Erliana & Wibowo, 2020). However, panelists were indifferent to the packaging of all samples which were quite similar, simple, and well-received for snack packaging. On the other hand, UD. Comot's TWC has a unique shape compared to other brands in general, which was rather squared instead of rounded, unique, and made the product seem crisper.

Table 3. Sensory analysis data of TWC samples

Sample	Motivation to buy	Packaging	Shape	Color	Crispness	Seasoning flavor	Oily taste
T0	3.48 ± 0.75^{ab}	3.18 ± 0.78^{a}	3.65 ± 1.08^{a}	3.13 ± 1.09^{a}	3.70 ± 1.27^{a}	2.43 ± 1.13^{a}	3.15 ± 1.31^{a}
T1	3.90 ± 0.96^{b}	3.10 ± 0.84^{a}	3.48 ± 1.04^{a}	3.63 ± 0.87^{b}	4.30 ± 0.91^{b}	3.28 ± 0.91^{b}	3.95 ± 0.96^{bc}
T2	3.90 ± 1.19^{b}	3.33 ± 0.76^{a}	3.85 ± 0.98^{a}	4.15 ± 0.86^{c}	4.33 ± 0.83^{b}	4.23 ± 0.95^{c}	4.08 ± 1.02^{c}
T3	3.40 ± 0.93^{a}	3.13 ± 0.82^{a}	3.58 ± 1.11^{a}	3.85 ± 0.80^{bc}	4.43 ± 0.75^{b}	4.45 ± 0.82^{c}	3.95 ± 0.93^{bc}
T4	3.18 ± 1.04^{a}	3.38 ± 1.01^{a}	3.83 ± 0.71^{a}	3.58 ± 0.84^{b}	4.20 ± 0.76^{b}	4.00 ± 1.06^{c}	3.53 ± 1.13^{ab}

Data is shown in Mean ± SD. Different notations in the same column indicate a significant difference between treatments ($P<0.05$).

Packaged TWC samples' appearance generated different buying motivations, as stated by Bukhari et al. (2022) that purchase behavior was influenced by attractive packaging and information provided on the label. Samples T1 and T2 had the highest motivation values while T3 and T4 were the lowest. Presumably, the reddish color of the T1 and T4 affected the buying motivation as argued by the panelists in their commentaries, while T4 seemed pale and plain. Panelists have the opinion that the stronger the color, the stronger the taste would be.

According to Hutchings (2011), color was one of the determining factors for consumers in assessing the quality of food products that would be purchased or consumed. The color factor was often the first and foremost determining factor for consumer acceptance. As consumers go through a multi-stage decision-making process before deciding to buy, food color has an important influence on consumers in providing perceptions about the taste of the food to be purchased (Garber, Jr. et al., 2000). In this research, the samples' colors were affected by the seasoning added. The bright red color of T2 (balado) was the most preferred, which was not significantly different from the brownish color of T3 (salt and

pepper) but significantly different from the less reddish T1 (original) and the pale T4. On the commentaries, the bright red color of T2 gave the impression of a very hot flavor while the brownish color of T3 gave the impression of being pleasantly well-cooked. This was also in accordance with Maina (2018) who stated that consumers tend to associate certain colors with certain tastes and flavors.

The crispness of the samples were not significantly different except for T0 which was significantly less preferred. It was mentioned in the comments that T0 had a foam-like texture which gave a greasy feeling when bitten compared to other samples, thus it felt less crisp on the first bite due to the oily liquid in the mouth. This was also confirmed by Hamimi et al. (2011) that the greasiness would affect crispness. Based on the last observations during the trial of the oil-draining machine on TWC produced by UD. Comot, about 10-20 mL of oil can be extracted from one kilogram of product. It was suspected that the seasoning powders and salt absorbed the oil content of the other samples thereby reducing the greasy feeling as well as oily taste compared to the unseasoned T0.

The oily taste was described as the taste that remained in the mouth and throat after the panelists swallowed the sample. Less oily taste was more preferred by panelists and got a higher hedonic score than samples with more oily taste. T2 was the most preferred sample, followed by T1 and T3 which were not significantly different from each other.

The seasoning flavor of T2, T3, and T4 had the highest value ratings while T0 was the lowest. Panelists commented that T2, T3, and T4 each had a significantly strong flavor, T1 was less flavored, while T0 was significantly bland. Maina (2018) concluded that only after consumers consumed a food product could they decide whether they like or dislike it. Iffathurjanna & Harti (2021) stated that foods with strong taste characteristics and in accordance with consumer preferences would make consumers more interested in purchasing. Panelists described T2 as having a hot and umami taste (balado), T3 as having a salty and peppery taste like fried chicken seasoning, and T4 as having a balanced salty taste which was delicious.

Best Treatment Selection

The SAW test was used to select the sample that had the best assessment. The motivation to buy, sample color, sample crispness, seasoning taste, and oily taste were selected as benefit criteria with a weight of 20% each. The packaging and samples' shape were not included because they were not significantly different. The calculation is shown in Table 4.

Table 4. The Simple Additive Weighting Test Calculation

Sample	Normalization (r_{ij})					V_i	Rank
	Motivation to buy	Sample color	Sample crispness	Seasoning flavor	Oily taste		
T0	0.89	0.75	0.84	0.55	0.77	0.76	5
T1	1.00	0.87	0.97	0.74	0.97	0.91	3
T2	1.00	1.00	0.98	0.95	1.00	0.99	1
T3	0.87	0.93	1.00	1.00	0.97	0.95	2
T4	0.82	0.86	0.95	0.90	0.87	0.88	4

Vi= the overall score of samples.

ISSN 2622-1985 (print) | ISSN 2622-4127 (online)
DOI: http://dx.doi.org/10.25139/fst.vi.5238

Based on the calculation, T2 was ranked first, followed by T3, T1, T4, and T0. According to the panelists, T2 and T3 got high rankings due to their crispness, attractive colors, and taste. Those were supported by the statement of Duguma & Abebaw (2020) that the majority of customers tend to associate color with taste, safety, storage time, and nutrition, to a level of satisfaction, based on the fact that color was closely related to physical, chemical, and sensory assessment of the quality of food. Panelists' satisfaction was reduced for T1 which had a pale reddish color and a taste that was quite expectedly less strong than T2. T4 and T0 as controls were also less desirable because of their pale and unattractive color as well as insignificant taste other than fried tofu flavor.

CONCLUSION

The addition of balado seasoning and salt and pepper seasoning variations has the potential to expand UD. Comot's marketing. The difference in the spice variants affects the taste of TWC, the color and oily taste of the sample, and the consumer's motivation to buy. Although the salt and pepper seasoning had a lower purchase motivation value, this variant had the most preferred taste so it was expected to encourage consumers to buy the same product variant in the future.

ACKNOWLEDGMENTS

This research was funded by the Student Organization Capacity Building Program (PPK Ormawa) number 2741/E2/KM.09.00/2022. Thanks to the Food Technology Program Universitas Ciputra Surabaya for providing the analysis laboratories, to Christianus Jodi Yonathan and Natashya Evangeline Fiorelia for their assistance in conducting sensory testing, as well as to all members of the PPK Ormawa University of Ciputra, i.e. Christabel Vania, Pramesti Regista Cahyani, Anastasia Jesslyn, Theresia Nataniela Puspa Renata, Reviola Celly Sidharta, Susan Jaya Witama, I Made Mahotama Warmasuta, Naomi Aryandini Subagio, Viona Salindeho, Audrey Vivian Chandra, and Syifa Nurul Indraswari.

REFERENCES

Arifin, R., Ningsih, A. A. T., & Putri, A. K. (2021). The Important Role of MSMEs in Improving the Economy. *South East Asia Journal of Contemporary Business, Economics and Law*, 24(6), 52-59.

Augustian, B., Jessica, C. N., Enrico, C., Nasri, K., Utami, N. W., Hoetama, P., Widjaja, S., & Marchalina, L. (2019). Faktor-Faktor yang Mempengaruhi Konsumen dalam Pembelian Jajanan Tahu Walik di Kota Cianjur. *Jurnal Pemberdayaan masyarakat*, 1(2), 366-378.

Badan Standardisasi Nasional. (2006). *SNI 01 2346-2006: Petunjuk pengujian organoleptik dan atau sensori*. Badan Standardisasi Nasional.

Bukhari, S. F. H., Woodside, F. M., Hassan, R., Hussain, S., & Khurram, S. (2022). Exploring the motives behind the purchase of western imported food products. A phenomenological study from a Muslim-dominated region. *Journal of Islamic Marketing*, 13(2), 481-507.

Duguma, S., & Abebaw, G. (2020). Quality Assessment of Oil Used for Frying of Potato Chips: In the Case of Wolkite University Community. *American Journal of Bioscience and Bioengineering*, 8(5), 92-98.

Erliana, K., & Wibowo, R. (2020). Perancangan Kemasan Produk Tahu Walik Dengan Metode Quality Function Deployment (Studi Kasus Home Industry Tahu Walik Lawang). *Jurnal Penelitian dan Aplikasi Sistem & Teknik Industri*, 14(1), 96-104.

Garber, Jr., L. L., Hyatt, E. M., & Starr, Jr., R. G. (2000). The Effects of Food Color on Perceived Flavor. *Journal of Marketing Theory and Practice*, 8(4), 59-72.

Hamimi, Tamrin, dan Setyani, S. (2011). Uji Kinerja Mesin Peniris Minyak Goreng pada Pengolahan Keripik. *Jurnal Teknologi & Industri Hasil Pertanian*, 16(1), 91-100.

Hutchings, J. B. (2011). *Food Colour and Appearance* (2nd ed.). New York: Springer.

Iffathurjannah, M. I., & Harti, H. (2021). Pengaruh keamanan makanan, harga dan rasa terhadap keputusan pembelian. *AKUNTABEL*, 18(2), 235-246.

Maina, J. W. (2018). Analysis of the factors that determine food acceptability. *The Pharma Innovation Journal*, 7(5), 253-257.

Moser, A. & Korstjens, I. (2018). Series: Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis. *European Journal of General Practice*, 24(1), 9-18.

Prasasti, M. E. & Santoso, A. D. (2022). Upaya Meningkatkan Ekonomi Masyarakat Desa Sedang di Masa Pandemi Covid-19 melalui Inovasi Pembuatan Tahu Walik. *Jurnal QIEMA*, 8(1), 1-6.

Prasetyo, P. E. (2021). The Role of MSME on Unemployment in Indonesia. *Turkish Journal of Computer and Mathematics Education*, 12(13), 2519-2525.

Pratisti, C., Sari., N., Paramitasari, N., & Wahyuningsih, Y. (2002). Pelestarian dan Strategi Pemasaran Produk Wisata Tahu Walik Khas Banyuwangi dimasa Pandemi Covid 19. *Jurnal Mulia*, 1(2), 41-49.

Pusat Data dan Sistem Informasi Pertanian. (2021). *Buletin Konsumsi Pangan* (Vol. 12). Jakarta: Kementerian Pertanian.

Quek, M. C., Chin, N. L., & Tan, S. W. (2021). Optimum DNA Extraction Methods for Edible Bird's Nest Identification Using Simple Additive Weighting Technique. *Foods*, 10, 1086.

Rebane, T. (2018). *Complementarities in Performance between Product Innovation, Marketing Innovation and Cooperation with Clients*. Tartu: The University of Tartu.

Serawati, I. D. & Putri, D. O. (2019). Strategi Pemasaran Produk Kuliner Tahu Walik. *Journal of Industrial View*, 1(2), 14–21.

Sukardi, S. (2021). Analisa Minat Membaca Antara e-Book dengan Buku Cetak Mengunakan Metode Observasi Pada Politeknik Tri Mitra Karya Mandiri. *IKRAITH-EKONOMIKA*, *4*(2), 158-163.

Wirahayu, Y. A., Purwito, H., & Insani, N. (2019). Community-based tourism management in Santen Beach, Banyuwangi. *IOP Conf. Series: Earth and Environmental Science*, 243, 012059.

Yuliarti, O. (2020). Textural Characteristics of Indonesian Foods. In K. Nishinari (Ed.), *Textural Characteristics of World Foods* (pp. 137–150). West Sussex, UK: John Wiley & Sons.