

Utilization of Liquid Organic Fertilizer from Cow and Chicken Manure, Indigofera on Hydroponic Lettuce, and Consumer Perception

Pemanfaatan Pupuk Organik Cair dari Kotoran Sapi dan Ayam, Indigofera pada Selada Hidroponik, dan Persepsi Konsumen

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ABSTRACT

Lettuce (*Lactuca sativa* L.) is a horticultural plant with high nutritional and economic value and good development prospects in Indonesia. However, the high costs of hydroponic fertilizers drive research to find more economical alternatives, such as substitution with Liquid Organic Fertilizer (LOF). This study aims to analyze consumer perceptions of hydroponic lettuce using LOF substitution and understand consumer responses and purchasing behavior toward these products to identify the attributes influencing purchasing decisions for hydroponic lettuce with LOF substitution. The study employs a survey method with purposive sampling, involving 35 regular customers and 15 supermarket shoppers from PT ABA to collect primary data through questionnaires regarding consumer interest in hydroponic lettuce with LOF substitution. Additionally, proximate analysis and nutrient content testing are conducted in the laboratory. Data analysis uses conjoint and discriminant analysis with SPSS Statistics 24 to evaluate consumer responses and the most preferred product model based on nutritional attributes, price, and weight. The study successfully analyzes consumer perceptions of hydroponic lettuce with LOF substitution and finds that consumers have a positive view of this product, mainly due to its better nutritional content and the plant's ability to absorb nutrients optimally. These factors significantly influence purchasing decisions, with the main attributes being price, weight, and nutritional content.

Keywords: consumer perceptions, hydroponic lettuce, Indigofera, LOF, purchasing behavior

ABSTRAK

*Selada (*Lactuca sativa* L.) merupakan tanaman hortikultura bernilai gizi dan ekonomi tinggi dengan prospek pengembangan yang baik di Indonesia, namun tantangan biaya tinggi pupuk hidroponik mendorong penelitian untuk menemukan alternatif yang lebih ekonomis seperti substitusi dengan POC. Penelitian ini bertujuan untuk menganalisis persepsi konsumen terhadap selada hidroponik yang menggunakan substitusi pupuk organik cair (POC) serta memahami tanggapan dan perilaku pembelian konsumen terhadap produk tersebut, guna mengidentifikasi atribut-atribut yang mempengaruhi keputusan pembelian selada hidroponik dengan substitusi POC. Penelitian ini menggunakan metode survei dengan purposive sampling yang melibatkan 35 pelanggan tetap dan 15 pembeli swalayan dari PT ABA untuk mengumpulkan data primer melalui kuisioner mengenai minat konsumen terhadap selada hidroponik dengan substitusi POC, serta melakukan analisis proksimat dan uji kandungan nutrisi di laboratorium, sedangkan analisis data menggunakan analisis conjoint dan diskriminan dengan SPSS Statistics 24 untuk mengevaluasi tanggapan konsumen dan model produk yang paling diminati berdasarkan atribut nutrisi, harga, dan berat. Penelitian ini berhasil menganalisis persepsi konsumen terhadap selada hidroponik dengan substitusi pupuk organik cair (POC) dan menemukan bahwa konsumen memiliki pandangan positif terhadap produk ini, terutama karena kandungan gizinya yang lebih baik serta kemampuan tanaman untuk menyerap nutrisi secara optimal, yang secara signifikan mempengaruhi keputusan pembelian dengan atribut utama berupa harga, berat, dan kandungan nutrisi.*

Kata kunci: indigofera, perilaku pembelian, persepsi konsumen, POC, selada hidroponik

INTRODUCTION

Lettuce (*Lactuca sativa* L.) is a horticultural crop with high nutritional and economic value and promising development prospects (Islam et al., 2021). Along with the increasing population and awareness of food needs in Indonesia, the demand for vegetables, especially lettuce, has significantly increased (Nazaruddin, 2003). Data from the Central Statistics Agency shows that lettuce production in Indonesia from 2015 to 2018 increased gradually, namely 600,200 tons, 601,204 tons, 627,611 tons, and 630,500 tons (Badan Pusat Statistik, 2019). One way to sustainably increase lettuce production is by using a hydroponic system. Hydroponics is a method of growing plants without using soil but using water and nutrient solutions as the growing medium (Jan et al., 2020). The productivity and quality of hydroponic crops are generally higher than conventional farming results, making it widely applied in leafy vegetable cultivation. AB Mix chemical fertilizers are commonly used as nutrients in hydroponic systems because these fertilizers contain complete macro and micronutrients (Rusmayadi et al., 2023). However, the relatively high price of AB Mix fertilizers poses a challenge for small-scale and novice farmers. To address this, substituting inorganic fertilizers with liquid organic fertilizers (LOF) has been proposed as a more economical solution (Chew et al., 2019).

According to Ahmed et al. (2021), combining liquid organic fertilizers with inorganic fertilizers can increase the production and quality of lettuce in hydroponic systems. Liquid organic fertilizer (LOF) results from decomposing organic materials such as plant residues and animal manure, containing macro (nitrogen, phosphorus, potassium) and micronutrients. Macro nutrients are essential for plants, such as nitrogen (N), phosphorus (P), and potassium (K), which are important for plant tissues, root growth, and fruit formation (Bang et al., 2021). Dairy cow manure contains 0.25% N, 0.01% P, and 0.56% K while laying hen manure contains 2.79% N, 0.52% P, and 2.29% K (Anggraeni et al., 2023). Adding *Indigofera* leaves can increase the nutrient content of LOF to overcome deficiencies that may occur with it. *Indigofera* (*zolingiana*) is a leguminous plant that can symbiotically associate with *Rhizobium* sp. bacteria, enhancing nitrogen fixation from the air and reducing dependence on chemical fertilizers (Mng'ong'o et al., 2023). LOF enriched with *Indigofera* can address nutrient deficiencies, provide quick nutrients, and have beneficial binding agents for hydroponic plants (Gustiar et al., 2022).

This study shares similarities and differences with prior studies based on previous research examining various aspects of hydroponic vegetable production and perception. Study Manos & Xydis (2019) discusses the shift towards hydroponic cultivation methods in response to environmental issues faced by conventional agriculture. Similar to this study, the research views hydroponics as a solution to meet vegetable demand sustainably. Study Gilmour et al. (2019) explore consumer responses to hydroponic lettuce with LOF substitution. Study Holmes et al. (2019) evaluate heat-tolerant lettuce cultivars and their marketability, which relates to this study in assessing consumer preferences and purchasing behavior toward hydroponic lettuce. Despite the similarities, this study has significant differences from previous research. Study Manos & Xydis (2019) focuses on a systematic review and forecast related to the shift to hydroponics for environmental reasons without delving into consumer perceptions or purchasing behavior. In contrast, this study explicitly investigates consumer perceptions of hydroponic lettuce with LOF substitution. The survey by Gilmour et al. (2019) centers on organic certification and how provided information affects consumer preferences toward hydroponic products. In contrast, this study focuses on consumer responses to using liquid organic fertilizers in hydroponics and the factors influencing purchases. Study Holmes et al. (2019) is more technical in evaluating heat-tolerant lettuce cultivars and their sensory characteristics. In contrast, this study emphasizes the combination of organic fertilizers and consumer perceptions and behavior toward hydroponic products using LOF substitution.

This study offers novelty by combining technical and social aspects of hydroponic studies. Unlike previous research on the environment, organic certification, or cultivar selection, this study integrates liquid organic fertilizers (LOF) as a substitute for inorganic fertilizers in hydroponic systems. It examines consumer perceptions and purchasing behavior toward the resulting hydroponic lettuce. Therefore, this research aims to analyze consumer perceptions of hydroponic lettuce with LOF substitution, as well as understand consumer responses and purchasing behavior towards these products. Additionally, it aims to identify attributes that influence purchasing decisions of hydroponic lettuce with LOF substitution. Thus, this research offers a technical solution to the high cost of hydroponic fertilizers and provides deep insights into how LOF substitution affects consumer preferences and purchasing behavior. Moreover, this study contributes significantly to developing

more effective marketing strategies to enhance the competitiveness of hydroponic lettuce in the market through a thorough understanding of the factors influencing consumer decisions.

RESEARCH METHODS

The research was conducted in PT ABA RT.05/RW's greenhouse.02, Hambalang Village, Citeureup District, Bogor Regency, West Java Province. Consumer data was obtained through questionnaires filled out by vegetable consumers from PT ABA. Lettuce content testing was carried out at the PAU IPB laboratory and Saraswati laboratory. The research was conducted from December 2023 to May 2024.

This study uses a survey method to obtain primary data by conducting research on consumers. The survey method takes samples from the population and uses questionnaires as the main data collection tool.

Purposive sampling was used. The research respondents are adults responsible for household food shopping who buy hydroponic vegetables at PT ABA. A total of 35 regular customers who purchase hydroponic vegetables directly from the company and 15 who purchase hydroponic vegetables at supermarkets were recorded.

Data was collected through questionnaires filled out by vegetable consumers from PT ABA. This questionnaire is used to obtain primary data related to consumer interest and responses to hydroponic lettuce with LOF substitution. In addition, proximate analysis and nutritional content testing of hydroponic lettuce were carried out in the laboratory to measure various nutritional contents in the samples.

Liquid Organic Fertilizer (LOF) can be used as a substitute for inorganic fertilizers by utilizing dairy cow manure, laying hen manure, Indigofera, water, EM4, and molasses. The amount of LOF produced uses organic materials, including dairy cow manure, laying hen manure, and Indigofera. The Indigofera plants are crushed until fine. Next, the fine dairy cow manure, laying hen manure, and Indigofera, each 2.5 kg: 2.5 kg: 5 kg, are put into a bucket. 500 mL of EM4 and 1000 mL of molasses are added to the bucket. Clean water is added until the total volume reaches 22.5 liters, then the mixture is stirred until homogeneous and put into a jerry can. The jerry can is tightly closed without any air entering and stored in a shady place with a hose connected to a bottle filled with tightly closed water. Stirring is done every four days for 21 days. After 21 days, the LOF is ready to be harvested, characterized by a non-rotten smell (fermentation aroma), normal temperature, and pH of 4 to 9. During harvest, filtering is done to separate the pulp. LOF is used by taking 50 mL of the LOF solution and adding water until the volume reaches 1 liter.

This research continues the hydroponic lettuce product based on LOF from livestock manure. The proximate analysis measures protein, carbohydrates, water content, ash, fiber, and fat in the samples using drying methods, high-temperature burning, and fat extraction. The content of vitamins and minerals, such as vitamins A, K, and C, and minerals like iron, potassium, and calcium, is measured using spectrophotometry and high-performance liquid chromatography methods.

Data analysis is first done by processing the questionnaire results. Data analysis on hydroponic lettuce with LOF substitution uses multivariate marketing analysis. The multivariate analysis used is conjoint analysis, while the multivariate marketing analysis used to see respondents' responses to hydroponic lettuce with LOF substitution uses discriminant analysis. The discriminant analysis uses Software Product and Service Solutions (SPSS) Statistics 24. Conjoint analysis is used to see customers' most preferred product model based on the analysis of hydroponic lettuce attributes with LOF substitution in terms of nutrition, price, and weight. Conjoint analysis uses Software Product and Service Solutions (SPSS) Statistics 24. The conjoint analysis model:

$$U = b_0 + b_1X_1 + b_2X_2 + b_3X_3$$

Where:

U = conjoint score

X = predictor or independent variable

X₁ = represents weight

X₂ = independent variable

b = discriminant coefficient or weight

X₃ = represents price

Discriminant analysis is used in this study to see consumer interest responses to hydroponic lettuce with LOF substitution. The discriminant analysis model is an equation that shows a linear combination of various independent variables, namely:

$$D = b_0 + b_1X_1 + b_2X_2 + b_3X_3$$

Where:

- | | | | |
|----|--|----|---|
| D | = discriminant score | X2 | = willingness to try hydroponic lettuce after knowing the use of LOF from livestock manure |
| B | = discriminant coefficient or weight | | |
| X | = predictor or independent variable | X3 | = interest in buying hydroponic lettuce after trying products with LOF substitution from livestock manure |
| XI | = awareness of hydroponic lettuce products with LOF substitution from livestock manure | | |

RESULTS AND DISCUSSION

Characteristics of Lettuce with LOF Substitution

The characteristics of lettuce are one of the indicators that determine the quality of the lettuce and its benefits.

Table 1. Characteristics of hydroponic lettuce per 100 grams

Parameter	Lettuce with LOF Substitution	Inorganic Lettuce	Inorganic Lettuce according to Supriyati and Herlina (2014)
Water content (%)	96.82	95.66	94,80
Ash content (%)	0.90	0.91	-
Carbohydrate (%)	0.7	1.5	2.9
Protein content (%)	0.92	1.18	1.20
Fat content (%)	0.21	0.14	0.2
Crude fiber (%)	0.45	0.61	-
Vitamin B1 (mg)	0.07	0.07	0,04
Vitamin C (mg)	8.9	8.3	8
Vitamin K (mcg)	58.86	54.53	-
Calcium (mg)	142.73	124.80	22
Potassium (mg)	370.75	290.68	-
Iron (mg)	1.45	2.06	0.5

Source: Saraswanti Laboratory Testing and PAU (2024)

Table 1 shows the nutritional content of hydroponic lettuce with LOF (liquid organic fertilizer) substitution compared to hydroponic lettuce using inorganic fertilizer, and there are some significant differences. The calcium content in hydroponic lettuce with LOF substitution is approximately 14% higher compared to inorganic hydroponic lettuce, while the potassium content is 24% higher. This increase is due to the nutrients provided during the lettuce planting. The hydroponic system allows for easier regulation of nutrient supply, enabling the plants to absorb nutrients optimally. Lettuce grown with LOF substitution is more effective in absorbing nutrients contained in the nutrient solution. LOF can quickly address nutrient deficiencies, does not experience nutrient leaching problems, and can provide nutrients rapidly. Additionally, LOF contains binding agents that allow the fertilizer solution given to the water to be directly utilized by the hydroponic plants (Hadisuwito in Hanisar 2015). These advantages make LOF substitution in hydroponic systems more effective and efficient in providing the necessary nutrients for plants, resulting in healthier plants rich in nutritional content.

General Characteristics of Respondents

In this study, the observed characteristics of respondents cover various demographic and economic aspects. These aspects include gender, age, education level, type of occupation, average monthly income, average monthly expenditure, number of family members, average lettuce purchase, and

frequency of lettuce purchase. The data for these respondent characteristics are presented in Tables 2, 3, 4, and 5.

Table 2. Characteristics of Respondents Consuming Hydroponic Lettuce with Substitution of LOF

Characteristics	Description	Percentage (%)
Gender	Male	30
	Female	70
Age (Years)	13-18	6
	19-25	20
	26-30	20
	31-35	40
	> 35	14
Last Education	Junior High School/Equivalent	8
	Senior High School/Equivalent	60
	Diploma	18
	Bachelor's Degree	14
Occupation	Student	22
	Civil Servant	26
	Entrepreneur	28
	Housewife	24
Monthly Income (Rp)	< 500.000	0
	500.000 - 1.500.000	20
	1.500.000 - 2.500.000	16
	2.500.000 - 3.500.000	22
	3.500.000 - 4.500.000	30
	>4.500.000	12
Monthly Expenditure (Rp)	< 500.000	0
	500.000 - 1.500.000	20
	1.500.000 - 2.500.000	20
	2.500.000 - 3.500.000	36
	3.500.000 - 4.500.000	14
	>4.500.000	10

Note: Primary data obtained from the distribution of questionnaires.

Table 2 presents the characteristics of vegetable consumers from PT ABA. The research results show that most respondents are female, with a percentage of 70%. Most respondents are self-employed. In terms of education, most respondents have completed their last education at the high school level or equivalent. This indicates that this product attracts consumers with a secondary education background. The average monthly income of the respondents is in the range of Rp 3,500,000 to Rp 4,500,000. This figure shows that consumers favor hydroponic lettuce products by substituting LOF with middle-income levels. On the other hand, the respondents' average monthly expenditure ranges from Rp 2,500,000 to Rp 3,500,000, meaning that although they have sufficient income, they are also prudent in managing their monthly expenses. Thus, the characteristics of vegetable consumers from PT ABA are mostly women with a secondary education level who work as self-employed and have a middle monthly income, indicating that hydroponic lettuce products with LOF substitution appeal to consumers from this segment.

Table 3. Diversity of respondents based on the number of family members

Consumer Category	Number of Family Members									
	1	2	3	4	5	6	7	8	9	10
Greenhouse De Boekit Farm (Regular Consumers)	0	2	1	17	10	0	0	0	0	0
De Boekit Villas Restaurant (Manager/Chef)	0	1	2	2	0	0	0	0	0	0
ADA Supermarket (Consumers)	0	1	2	8	2	2	0	0	0	0
Total respondents	0	4	5	27	12	2	0	0	0	0

Note: Primary data obtained from the distribution of questionnaires

Table 3 shows the distribution of respondents based on the number of their family members. This data analysis provides significant insights into the demographics of consumers of PT ABA and can help understand their needs and preferences regarding the hydroponic lettuce products offered. Most respondents with families of 4 or 5 members indicate that the demand for hydroponic lettuce can be associated with more extensive household food needs. This is highly relevant to their high food needs, which implies consistent demand and significant purchase volumes for hydroponic lettuce products. This information allows PT ABA to develop more targeted marketing and sales strategies to meet and exceed their consumers' expectations.

Table 4. Diversity Based on Average Lettuce Purchases

Consumer Category	Average Lettuce Purchases (packs)									
	1	2	3	4	5	6	7	8	9	10
Greenhouse De Boekit Farm (Regular Customers)	3	10	7	5	0	0	0	0	0	5
Restaurant De Boekit Villas (Manager/Chef)	0	0	0	5	0	0	0	0	0	0
ADA Swalayan (Customers)	8	5	0	2	0	0	0	0	0	0
Total Respondents	11	10	7	12	0	0	0	0	0	0

Note: Primary data obtained from the distribution of questionnaires

Table 4 shows the diversity in the number of lettuce purchases. Consumers who buy directly from Greenhouse De Boekit Farm (Regular Customers) tend to purchase lettuce in 2 to 3 packs, indicating a preference for moderate purchases. The purchase of 10 packs by five consumers suggests a group that buys large quantities for special needs. Variations in purchases are also seen in quantities of 4 packs and one pack, reflecting diverse needs. Restaurant De Boekit Villas (Manager/Chef) consumers consistently purchase four packs of lettuce, indicating the regular need for a consistent quantity of raw materials. Consumers buying at ADA Swalayan tend to purchase in small amounts, with the majority buying one pack, indicating purchases for personal or small family consumption. The purchase of 2 packs by some consumers shows variation in purchase needs.

Table 5. Diversity Based on Lettuce Purchase Frequency

Consumer Category	Purchase frequency					
	Daily	Once a Week	2-3 Times a Week	Once a Month	Twice a Month	More than Twice a Month
Greenhouse De Boekit Farm (Regular Consumers)	0	11	12	5	2	0
Restaurant De Boekit Villas (Manager/Chef)	0	5	0	0	0	0
ADA Supermarket (Consumers)	0	11	2	0	2	0
Total Respondents	0	27	14	5	4	0

Note: Primary data obtained from the distribution of questionnaires

Table 5 shows the diversity in the frequency of lettuce purchases. Consumers who buy directly from Greenhouse De Boekit Farm (Regular Consumers) mostly purchase lettuce with a frequency of once a week or 2-3 times a week, reflecting regular needs and high purchase frequency. A few consumers buy lettuce with a frequency of once or twice a month. Consumers from the Restaurant De Boekit Villas (Manager/Chef) purchase lettuce with a frequency of once a week, indicating a consistent and routine need from the restaurant. Consumers who buy at ADA Supermarket tend to purchase lettuce with a frequency of once a week, reflecting purchases for regular consumption.

Table 6. Relative Importance Values of Hydroponic Lettuce Attributes with LOF Substitution

Hydroponic Lettuce Attributes with LOF Substitution	Importance values
Price	37.711
Weight	37.672
Nutrition	26.617

Note: Primary data processed in May 2024

Table 6 shows that price and weight are the most important attributes for respondents when choosing hydroponic lettuce with LOF substitution, with almost identical importance values of 37.711 for price and 37.672 for weight. On the other hand, nutrition has a lower importance value of 26.617. These results indicate that consumers prioritize the price and weight of lettuce over its nutritional value. Price is a key factor in purchasing decisions as it directly relates to consumers' purchasing power. Weight might be important because it relates to the quantity or volume obtained, often a significant consideration when buying fresh produce like vegetables.

Discriminant Analysis

The discriminant analysis results are used to predict whether consumers will purchase hydroponic lettuce with LOF substitution if it is produced.

Table 7. Discriminant Analysis Results

		Predicted Group Membership		Total
		No	Yes	
Original	Count	4	6	10
		44	46	90
	%	8	92	100.0
Cross-validated	Count	6	94	100.0
		4	6	10
	%	44	46	90
		8	92	100.0
		6	94	100.0

Note: Primary data processed in May 2024

The discriminant analysis results in Table 7 show that out of 50 respondents, 47 people will buy hydroponic lettuce with LOF substitution if marketed. Meanwhile, 3 people will not buy hydroponic lettuce with LOF substitution if marketed. Discriminant analysis model: $Y = - 6.109 + 1.371 X1 + 5.766 X2 + 1.094 X3$.

Conjoint Analysis

Conjoint analysis is very useful for identifying the attributes that influence consumers' purchase of hydroponic lettuce with LOF substitution.

Table 8. Conjoint Analysis Results

		Utilities	Utility Estimate	Std. Error
Weight (g)		200	0.000	0.204
		250	0.125	0.239
		500	-0.125	0.239
Price (Rp)		14000	0.025	0.265
		7500	-0.125	0.265
		8500	0.225	0.265
		9500	-0.125	0.265
Nutrition	Fertilizer Substitution		0.125	0.151
	Inorganic Fertilizer		0.025	0.151
(Constant)			1.375	0.161

Note: Primary data processed in May 2024

The conjoint analysis results in Table 8 indicate that consumers prefer hydroponic lettuce with LOF substitution weighing 250 grams and priced at Rp. 8,500. The utility estimate measures the average preference of respondents for a particular attribute. The utility value indicates the utility of each attribute/level. If the utility graph is positive, it means respondents prefer that attribute. Based on the utility estimate, 250 grams weight is the most preferred, with a utility estimate 125. For the nutrition attribute, consumers prefer lettuce with LOF substitution. The most preferred price attribute for consumers is Rp. 8,500, with a utility estimate of 225.

Discussion

The research results indicate that consumers perceive hydroponic lettuce positively using a substitution of Liquid Organic Fertilizer (LOF), primarily due to its better nutritional content and ability to absorb nutrients optimally. Consumers appreciate the health benefits and quality offered by hydroponic lettuce with LOF substitution and recognize the effectiveness of LOF usage in hydroponic systems. These findings are consistent with previous studies highlighting the advantages of hydroponic systems in enhancing plant nutrient absorption efficiency. Sathanarayana et al. (2022) revealed that hydroponically grown plants could absorb nutrients more efficiently than conventional planting methods, improving plant quality and nutritional content. Knuth et al. (2023) also found that LOF could increase plant nutrient content, positively impacting consumer perceptions of horticultural products. The theory supporting these findings includes the Consumer Perceived Value Theory, which states that consumers tend to place higher value on products offering better health benefits and quality. In the context of hydroponic lettuce with LOF substitution, consumers view this product as a healthier and higher-quality solution, enhancing their perceived value.

Regarding consumer responses and purchasing behavior towards hydroponic lettuce products using LOF substitution, there is an optimistic tendency to choose these products due to their perceived health and nutritional benefits. Most consumers are willing to purchase these products, reflecting good market acceptance. Consumers also prefer regular purchase frequency for household consumption and restaurant needs, indicating that these products can be relied upon as a consistent food source. These findings align with previous studies showing that consumers tend to choose agricultural products perceived as healthier and environmentally friendly. Baker et al. (2022) highlighted that modern consumers are increasingly interested in better health benefits and food safety products. Furthermore, these findings support consumer behavior theories, such as the Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM). According to TPB, the intention to purchase a product is significantly influenced by attitudes toward the product, subjective norms, and perceived behavioral control (Ajzen, 1991). Positive attitudes towards hydroponic lettuce, perceived as healthier and more nutritious, can increase purchase intentions and frequency. Additionally, this study aligns with Plasek et al. (2021), who identified that the purchase frequency of healthy food products tends to be higher due to perceived health benefits. Thus, consumer preferences for hydroponic lettuce with LOF substitution indicate strong potential in a market that is increasingly aware of health and sustainability.

The attributes influencing the purchase decision of hydroponic lettuce with LOF substitution include price, weight, and nutritional content. The price and weight of lettuce are major factors consumers consider, with a preference for affordable products and weights that meet their needs. Additionally, the better nutritional content of lettuce with LOF substitution is a significant factor influencing purchase decisions, as consumers are increasingly aware of the importance of nutrition in choosing food products. This research aligns with several theories and previous studies discussing factors influencing consumer purchase decisions in the context of food products. For instance, the extended Theory of Planned Behavior (TPB) shows that price and product quality significantly influence consumer purchase intentions and behavior (Ajzen, 1991).

Moreover, Iskanto (2020) demonstrated that consumer perceptions of product value, including price and benefits received, are key in purchasing decisions. In the context of hydroponic lettuce, this research reinforces the importance of price and weight as primary attributes considered by consumers. Consumers tend to choose products that offer the best value at an affordable price and appropriate weight. Furthermore, increasing consumer awareness of the importance of nutrition in food products supports the finding that better nutritional content of lettuce with LOF substitution is a crucial factor in purchase decisions. Previous studies also showed that factors such as trust in hydroponic technology and the health benefits of hydroponic products influence positive consumer attitudes toward these products (Eichhorn & Meixner, 2020). Therefore, enhancing information and education about the nutritional benefits of hydroponic lettuce with LOF substitution can further increase consumer interest and purchase decisions. Thus, this research confirms that price, weight, and nutritional content are important attributes influencing the purchase decisions of hydroponic lettuce with LOF substitution, and these findings are supported by theories and previous studies discussing factors affecting consumer purchase behavior.

The implications of these research findings suggest that to increase market competitiveness and demand for hydroponic lettuce with Liquid Organic Fertilizer (LOF) substitution, producers and

marketers should focus on aspects most valued by consumers: affordable prices, appropriate product weight, and better nutritional content. Educating consumers about the health benefits of the nutrients contained in hydroponic lettuce with LOF and the sustainability of hydroponic methods is also essential to enhance consumer perceived value and purchase intentions. Marketing strategies that emphasize the health and quality advantages of the product and ensure competitive pricing can help attract more health- and sustainability-conscious consumers. Thus, a better understanding of consumer preferences can drive producers to continue innovating in the use of LOF and hydroponic methods, as well as improve efficiency and effectiveness in producing and distributing these products in an increasingly competitive and health-conscious market.

CONCLUSION

This study indicates that consumers perceive hydroponic lettuce positively with Liquid Organic Fertilizer (LOF) substitution, appreciating its better nutritional content and ability to absorb nutrients optimally. This is reflected in a positive tendency to purchase these products regularly for both household consumption and restaurant needs. Additionally, this study identifies that price, weight, and nutritional content play a major role in influencing consumer purchasing decisions, with price and weight being the most dominant factors. These findings underscore the importance of marketing strategies that educate consumers about hydroponic lettuce's health benefits with LOF substitution and emphasize competitive pricing and product weight that meets market needs.

The limitations of this study include the restricted sample size, which may not fully represent the general population of hydroponic lettuce consumers in Indonesia, and the limited study duration of only six months, which may not capture seasonal variations in consumer preferences. Solutions for future research involve expanding the sample scope by involving more respondents from various regions and backgrounds and extending the study period to observe changes in consumer preferences throughout the year. Furthermore, future research could consider other factors, such as the environmental impact and sustainability of LOF usage in hydroponic systems, and conduct a more in-depth analysis of the effects of consumer education on perceptions and purchase intentions.

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