

Public Perception of the Palm Oil Industry in Banda Aceh: Insights into Environmental, Social, and Sustainability Issues

Zahriatul Aini^{1*}, Desy Puspita², Indra Akbar³, Agustina⁴, Azlina⁵

^{1,3} Office Administration Department, ² Public Sector Financial Management Department, ^{4,5} Financial Analysis Department, Politeknik Kutaraja

*Corresponding author's email: zahriatulaini@poltekkutaraja.ac.id

Abstract: Indonesia is the world's largest producer of palm oil, a vital contributor to its economy, employment, and renewable energy goals. However, the industry faces growing scrutiny due to its environmental and social impacts, such as deforestation, biodiversity loss, and land conflicts with indigenous communities. This study investigates public perception of the palm oil industry in Banda Aceh, with a focus on sustainability and the role of sustainable marketing. Using a quantitative survey of 190 respondents and binary logistic regression analysis, the research finds that demographic variables—such as age, education, and region—do not significantly influence perception. Instead, factors like knowledge of the industry, perceived environmental and social impacts, and trust in sustainable marketing (e.g., RSPO/ISPO certification) strongly affect public attitudes. These results suggest that enhancing public awareness and implementing transparent, sustainable marketing strategies are crucial for reshaping public perception. The study offers strategic recommendations for industry stakeholders, government, and the public, while acknowledging limitations in regional scope and the need for further qualitative and longitudinal research.

Keywords: Public Perception, Palm Oil Industry, Banda Aceh, Sustainability, Environmental Concerns, Social Aspects

1.0 INTRODUCTION

The palm oil industry is one of the main pillars of the Indonesian economy. With plantation areas exceeding 16 million hectares, Indonesia accounts for nearly 60% of global palm oil production. This sector contributes significantly to the national Gross Domestic Product (GDP) and employs more than 16 million workers, particularly in rural areas (Saleh & Haniy, 2024). It also supports national energy policies through biodiesel programs such as the mandatory B30, which aims to reduce reliance on fossil fuels (LPEM, 2020).

However, the industry faces serious challenges regarding environmental and social sustainability. Deforestation caused by plantation expansion has led to biodiversity loss and increased greenhouse gas emissions (Abram et al., 2017; Austin et al., 2017). Between 2001 and 2016, around 23% of deforestation in Indonesia was due to land conversion to oil palm plantations (Christina, 2024). Despite the government's moratorium on new permits since 2019, deforestation persists, particularly in the Papua region, leading to conflict with indigenous communities.

These environmental issues have influenced public perception of the palm oil industry, both nationally and internationally. Campaigns from environmental organizations and global media have contributed to a negative image of palm oil-based products, which has affected market demand and international trade. The European Union, for example, has introduced strict deforestation-related regulations that could impact Indonesian palm oil exports (Krustiyati et al., 2020). The consequences of these policies are also felt by major producing countries such as Indonesia and Malaysia. Both countries have called on the EU to reconsider the regulations, arguing that they could harm small-scale farmers and local economies (Milko, 2024).

At the national level, consumer awareness about sustainable palm oil remains relatively low. A study reported that only 11% of Indonesian consumers recognized the RSPO logo, and just 27% were willing to buy sustainable palm oil even at a higher price (RSPO, 2015). This gap between industry initiatives and consumer awareness remains a challenge. These conditions raise important questions about the formation of public perception and its influence on palm oil marketing strategies. Promoting sustainable marketing is essential for improving the industry's image, increasing consumer engagement,

and boosting demand for sustainable products. Yet, the communication of sustainability values remains a key obstacle in the domestic market.

Therefore, this study aims to analyze public perception of the palm oil industry in Indonesia, identify challenges and opportunities related to sustainability, and formulate strategic implications for developing sustainable marketing. The findings are expected to contribute to more effective marketing and communication strategies and support the industry's transition to more sustainable practices.

2.0 LITERATURE REVIEWS

2.1 Public perception

Public perception of the palm oil industry is the result of an individual's cognitive process in interpreting information received through the five senses, which is influenced by knowledge, experience, and values. In the context of the palm oil industry, this perception is formed through public interaction with various information related to the economic, social, and environmental impacts of palm oil plantation and processing activities. Perception theory explains how individuals process information and form views about an object or phenomenon. In the context of the palm oil industry, public perception is influenced by factors such as environmental information, media campaigns, and personal experiences. A study by Machová et al. (2022) shows that consumer perceptions of palm oil-based products are greatly influenced by green marketing campaigns and available sustainability information. According to Helviani et al. (2021), perception is the result of an individual's interpretation of the stimulus received through the five senses, which is influenced by each person's background knowledge, experience, and frame of mind. In the context of the palm oil industry, public perception is formed from various sources of information—whether through the media, direct experience, or developing social narratives. Although the objects observed are similar, namely the palm oil industry and its derivative products, the perceptions that emerge can differ between individuals. This reflects those perceptions of the palm oil industry are not only objective but also influenced by complex social and psychological constructions. Research by Pratama & Nasution (2023) in Darul Makmur District shows that the community has a more dominant negative perception of the existence of PT. SPS 2 palm oil plantations and factories, with a ratio of 14.2:25. This is due to concerns about environmental impacts and the lack of socialization from the company to the surrounding community. Meanwhile, a study by Hobbs et al. (2022) in the UK revealed that despite awareness of the importance of sustainable palm oil, public knowledge about certification and sustainable practices is still low. This lack of understanding can influence consumer choices and create negative perceptions of palm oil-based products.

2.2 Sustainable marketing in the palm oil industry

Sustainable marketing is a strategic approach that integrates environmental, social, and economic aspects into a company's marketing activities. The goal is to create long-term value for the company, consumers, and the environment. In the context of the palm oil industry, sustainable marketing aims to promote products produced through environmentally friendly and socially responsible practices. This theory emphasizes the importance of transparency, ethics, and social responsibility in building long-term relationships with consumers. Research by Machová et al. (2022) highlighted that marketing strategies that emphasize sustainability can increase consumer trust and encourage environmentally friendly purchasing behavior. According to Limaho et al. (2022), the Indonesian palm oil industry faces global pressures related to deforestation, biodiversity loss, and human rights violations. To overcome these challenges, an effective green marketing strategy is needed to convey sustainability commitments to consumers and other stakeholders.

Implementation of sustainable marketing in the palm oil industry involves several strategies, including:

- i. Sustainability certification: adopting certifications such as RSPO (Roundtable on Sustainable Palm Oil) and ISPO (Indonesian Sustainable Palm Oil) to ensure responsible production practices and increase consumer confidence (Indrapraja, 2018).

- ii. Transparency and communication: conveying transparent information about production processes, raw material sources, and environmental impacts to consumers to build a positive company image (Toha et al., 2023).
- iii. Consumer education: conducting educational campaigns to increase consumer awareness about the importance of choosing sustainable palm oil products. A survey by Media Perkebunan (2021) shows that 82% of consumers are willing to switch to products that use sustainable palm oil if available.
- iv. Product innovation: Developing palm oil derivative products that meet sustainability standards and meet the needs of the growing market (Sulastri & Andika, 2024).

A study by Yunus (2019) also emphasized that the implementation of green marketing management in the palm oil industry can help companies maintain their business sustainability. However, the success of this strategy depends on a strong relationship between business actors and other stakeholders.

2.3 Challenges and opportunities

Despite various efforts to implement sustainable marketing, the palm oil industry still faces challenges, such as:

- i. Negative perception: (Saputra & Hoesein, 2025) stated that negative campaigns from environmental organizations and global media have created a negative image of palm oil-based products, which has impacted market demand and international trade policies;
- ii. Lack of consumer awareness: study by (Wassmann et al., 2023) shows that Swiss consumers' understanding of the impacts of palm oil on the environment and society is still low. However, there is great potential to increase this awareness through targeted awareness and knowledge-raising interventions and effective marketing;
- iii. The need for collaboration: (Limaho et al., 2022) highlights the importance of collaboration between various stakeholders, including companies, governments and NGOs, to create sustainable marketing strategies that are effective and accepted by the global market.

Various studies have examined public perceptions of the palm oil industry and its implications for consumer behavior:

- i. (Machová et al., 2022) found that green marketing has a significant impact on consumer behavior in the palm oil product market, with consumers showing a preference for products marketed as sustainable;
- ii. Research by (Sundaraja et al., 2023) highlights the gap between consumer intention and behavior in purchasing sustainable palm oil products. Although consumers have the intention to purchase sustainable products, factors such as product availability, label readability, and perceptions of sustainability influence actual purchasing decisions;
- iii. (Efriani et al., 2020) in his study found that independent oil palm farmers have limited understanding of sustainable plantation practices, indicating the need for further socialization and mentoring.

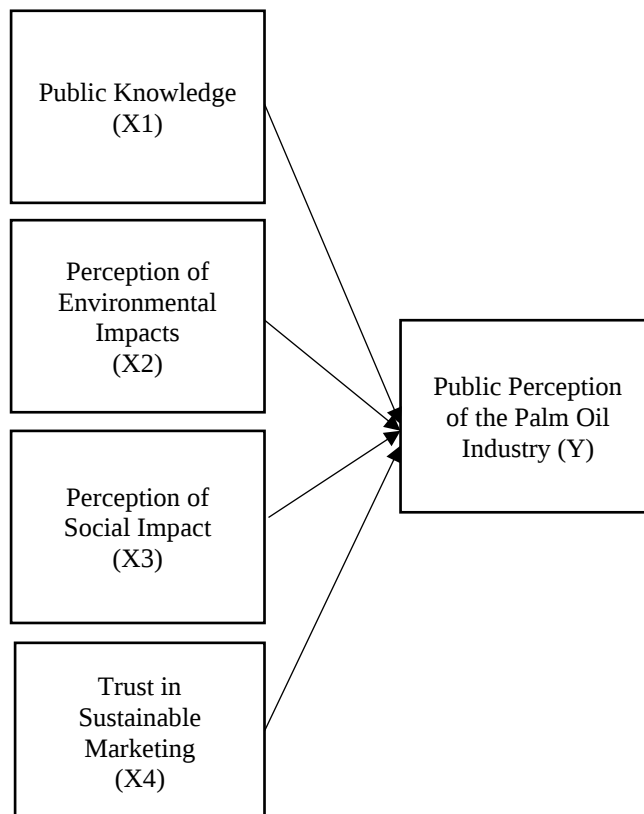
Although there are a number of studies examining public perceptions of the palm oil industry, there are gaps in the related literature:

- i. Integration of public perception and marketing strategy: there is little research that directly links public perceptions of the palm oil industry to its implications for effective sustainable marketing strategies.
- ii. Local Indonesian context: most studies focus on the global context or other countries, while in-depth research in the context of Indonesia, as a major producer of palm oil, is still limited.
- iii. The role of education and information: there is a lack of research exploring how education and information provision can change negative perceptions and encourage more sustainable consumer behavior.

This study aims to fill this gap by analyzing how public perception in Indonesia towards the palm oil industry influences sustainable marketing strategies, as well as providing practical recommendations for industry players and policy makers.

Based on the literature reviewed, this study conceptualizes the relationship between public knowledge, environmental and social concerns, and public perception of the palm oil industry, which ultimately affects the effectiveness of sustainable marketing strategies. The conceptual framework presented below illustrates these relationships.

Figure 1. Conceptual Framework



Source: Developed by the author based on a literature review

3.0 METHODOLOGY

This study employs a quantitative approach with a survey design aimed at identifying and analyzing public perceptions of the palm oil industry, particularly in the context of sustainability and its implications for marketing strategies. A quantitative approach was chosen to obtain objective, measurable data that can be statistically analyzed to systematically and comprehensively describe the phenomenon.

The population of this study comprises residents of Banda Aceh who are directly or indirectly associated with the palm oil industry. Such associations may include residing in areas close to palm oil production zones, utilizing palm oil-based products in daily life, or engaging with sustainability-related issues concerning the industry.

A total of 190 respondents were selected using a random sampling technique from among Banda Aceh residents. While this sample size does not represent the entire Indonesian population, it is considered adequate for binary logistic regression analysis, particularly for exploratory studies involving multiple predictor variables. Respondent selection also considered demographic diversity—such as age, gender, and education level—to capture a wide range of perspectives within the study area.

Therefore, the findings are expected to offer an initial overview of public perception toward the palm oil industry in a local context.

Data collection was conducted through a structured questionnaire comprising several main sections: (1) respondent identity, (2) knowledge and awareness of the palm oil industry, (3) perceptions of sustainability issues, and (4) preferences for sustainable palm oil products. The instrument included various types of questions, such as multiple-choice, dichotomous (yes/no), and scale-based items. Thus, the instrument did not solely rely on a five-point Likert scale, but was tailored to suit the characteristics of each indicator under study. The questionnaire was developed based on literature reviews and previous relevant studies. It was carefully constructed to align with the characteristics of the variables being studied and underwent a limited pilot test to ensure clarity and readability of the items. In alignment with best practices in social research, limited pre-testing was conducted to assess clarity and content validity. Although formal reliability testing (e.g., Cronbach's Alpha) was not conducted, this approach remains acceptable for exploratory studies under logistical constraints (Creswell, 2009; Dillman et al., 2014; Hosmer et al., 2013; Saunders et al., 2023).

To ensure that the study accurately measures each construct within the conceptual framework, the variables were operationalized based on relevant literature. Each latent variable was translated into measurable indicators, which were then developed into questionnaire items using appropriate measurement scales. This approach allows for statistical analysis of the relationship between public knowledge, perceptions, and attitudes toward the palm oil industry. The operational definitions, indicators, and measurement scales used for each variable are summarized in Table 1.

Table 1
Variable Operationalization

Variable	Operational Definition	Indicators	Measurement Scale	Key References
Public Knowledge	The extent of respondent understanding about palm oil production and sustainability practices.	Awareness of RSPO/ISPO certification, production process knowledge, sustainability awareness.	Dichotomous (Yes/No); Multiple choice	(Abram et al., 2017; Efriani et al., 2020; Hobbs et al., 2022; Lange & Coremans, 2020)
Perceived Environmental Impact	Respondent evaluation of how the palm oil industry affects the environment.	Deforestation, pollution, biodiversity loss, carbon emissions.	5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree)	(Abram et al., 2017; Austin et al., 2017; Machová et al., 2022; Saari et al., 2021)
Perceived Social Impact	Respondent perception of how the palm oil industry affects local communities and social structures.	Land conflicts, employment, economic inequality, community well-being.	5-point Likert scale	(Abram et al., 2017; Helviani et al., 2021; Pratama & Nasution, 2023; Sulastri &

Trust in Sustainable Marketing	Level of trust in sustainability claims and marketing communication by palm oil producers.	Trust in certification labels (RSPO/ISPO), perceived transparency, credibility of sustainability messages.	5-point Likert scale	Andika, 2024) (Lieke et al., 2024; Limaho et al., 2022; Machová et al., 2022; Toha et al., 2023; Yunus, 2019) (Chamhuri et al., 2024; Hobbs et al., 2022; Kumo, 2023)
Public Perception (Dependent Variable)	Overall judgment or attitude of the respondent toward the palm oil industry.	General sentiment toward the industry's environmental and social role.	Binary (0 = Positive; 1 = Negative)	

Source: Processed and developed by the researchers based on relevant literature.

The dependent variable—public perception of the palm oil industry—was operationalized as a binary construct: “positive” (0) and “negative” (1). This categorization was derived from aggregated scores of several perception-related items. Respondents scoring above the median were classified as having a positive perception, while those scoring below were categorized as negative. This binary approach facilitates the use of logistic regression analysis and aligns with common practices in survey-based perception studies (Hosmer et al., 2013).

The collected data were first analyzed using descriptive statistics to provide an overview of respondent characteristics and general trends in public perception of the palm oil industry. This initial stage aimed to understand the data distribution and identify preliminary patterns before conducting further analysis.

Subsequently, binary logistic regression analysis was employed, as the dependent variable in this study is dichotomous, categorizing public perception of the palm oil industry into two groups: "positive" (0) and "negative" (1). Binary logistic regression is an appropriate statistical method for modeling the relationship between a binary dependent variable and one or more independent variables, which may be measured on ordinal, interval, or ratio scales—including those derived from instruments not entirely based on Likert-type scales.

The use of binary logistic regression enables the estimation of the likelihood of a specific response occurring based on a combination of predictor variables. This method also identifies the contribution of each independent variable, both jointly and individually, in influencing public perception. Moreover, binary logistic regression does not require assumptions of residual normality or linear relationships between independent and dependent variables, making it well-suited for social research involving complex and often non-normally distributed perception data. The interpretation of the analysis results is based on the significance values (p-values), regression coefficients (β), and odds ratios ($\text{Exp}(\beta)$) to understand the strength and direction of the influence of each variable.

4.0 DATA ANALYSIS AND FINDINGS

A total of 190 respondent data were utilized in this analysis, with no missing cases, thereby meeting the minimum sample size requirement for logistic regression models involving multiple predictor variables.

Table 2. Sample Size

Case Processing Summary			
Unweighted Cases ^a		N	Percent
Selected Cases	Included in Analysis	190	100.0
	Missing Cases	0	.0
	Total	190	100.0
Unselected Cases		0	.0
Total		190	100.0

a. If weight is in effect, see classification table for the total number of cases.

Source: Primary data analysis using SPSS, 2025.

The dependent variable in this study is public perception of the palm oil industry, which is categorized into two groups: "positive" (0) and "negative" (1). This categorization enables the use of a binary logistic regression model to analyze the influence of independent variables on this perception.

Table 3. Categorization of the Dependent Variable

Dependent Variable Encoding	
Original Value	Internal Value
Ya	0
Tidak	1

Source: Primary data analysis using SPSS, 2025.

Table 4. Initial Model Feasibility Test Results (Without Independent Variables)

Block 0: Beginning Block

Iteration History ^{a,b,c}			
Iteration		-2 Log likelihood	Coefficients Constant
Step 0	1	246.657	-.589
	2	246.643	-.607
	3	246.643	-.607

a. Constant is included in the model.

b. Initial -2 Log Likelihood: 246.643

c. Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-.607	.152	16.007	1	.000	.545

Source: Primary data analysis using SPSS, 2025.

The parameter estimation process indicated that the iteration stopped at the third step with a parameter change of less than 0.001, suggesting that the model converged normally. The initial -2 Log Likelihood value was 246.643, which serves as a baseline for assessing model fit in the subsequent stage (Block 1). The results of the initial model feasibility test (null model) indicate that the model without predictors does not yet provide a good fit to the data. This is evidenced by the constant (intercept) value of $B = -0.607$, with a Wald statistic of 16.007 and a significance level of 0.000. Although the constant is statistically significant, this model alone is insufficient to explain the variation in public perception of the palm oil industry. Therefore, a subsequent model that includes predictor variables is necessary to achieve a more accurate and meaningful explanation.

Table 5. Model Fit Test After Inclusion of Independent Variables

Block 1: Method = Enter

Iteration History ^{a,b,c,d}									
		Coefficients							
Iteration		-2 Log likelihood	Constant	Usia	Pendidikan	Wilayah	Pengetahuan	Persepsi Dampak Lingkungan	Persepsi Dampak Sosial
Step 1	1	221.993	-.119	-.227	-.153	-.149	-.297	-.027	.399
	2	221.184	-.086	-.287	-.165	-.190	-.360	-.027	.465
	3	221.181	-.083	-.292	-.165	-.194	-.364	-.026	.469
	4	221.181	-.083	-.292	-.165	-.194	-.364	-.026	.469

a. Method: Enter

b. Constant is included in the model.

c. Initial -2 Log Likelihood: 246.643

d. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Source: Primary data analysis using SPSS, 2025.

The initial logistic regression model, which included only the constant (intercept), yielded a -2 Log Likelihood (LL) value of 246.643. This value serves as the baseline for assessing model improvement following the inclusion of independent variables. When compared to the critical chi-square value at a 5% significance level with 189 degrees of freedom (df), the initial -2LL is considerably higher, indicating that the null model (without predictors) does not significantly explain the variation in the data. In other words, the model containing only the constant is not a good fit for the data on public perception.

Upon the inclusion of seven independent variables—namely age, education, region, knowledge, perception of environmental impact, perception of social impact, and perception of marketing and sustainability—the -2LL value decreased to 221.181. The degrees of freedom were adjusted to 182, calculated as the total number of respondents (190) minus the number of estimated parameters (7 variables + 1 constant = 8).

Although the final -2LL value (221.181) remains slightly above the critical chi-square value at $df = 182$ (approximately 214.477 at $\alpha = 0.05$), the substantial reduction from the initial -2LL suggests an improvement in model fit. The decline of 25.462 in the -2LL value indicates that the addition of independent variables has enhanced the model's ability to explain the dependent variable—public perception of the palm oil industry.

Therefore, the logistic regression model incorporating the seven independent variables is considered to better approximate a fit condition. In the context of social research, particularly studies involving subjective and complex public perceptions, a -2LL value approaching the critical threshold may still be deemed acceptable. This supports the conclusion that the model is progressing in the right direction, even if not yet optimal.

Table 6. Results of the Simultaneous Significance Test (Likelihood Ratio Test)

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	25.462	7	.001
	Block	25.462	7	.001
	Model	25.462	7	.001

Source: Primary data analysis using SPSS, 2025.

The Likelihood Ratio Test yielded a significance value of $p = 0.001$ ($p < 0.05$), indicating that all the independent variables tested have a statistically significant effect on public perception when considered simultaneously. In other words, variables such as age, education, region, knowledge, and perceptions of various aspects of the palm oil industry collectively explain the differences in public perception. This result demonstrates that the overall logistic regression model is valid for analyzing the determinants of perception, and that the combination of these factors is relevant in shaping public attitudes toward the palm oil industry.

Table 7. Coefficient of Determination (Nagelkerke R Square)

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	221.181 ^a	.125	.173

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Source: Primary data analysis using SPSS, 2025.

In the context of this study, the Nagelkerke R Square value of 0.173 indicates that the logistic regression model can explain approximately 17.3% of the variation in public perception of the palm oil industry. Although this value is relatively low in absolute terms, it is often considered adequate and realistic in social research, where R-square values in the range of 10–20% are commonly accepted.

This interpretation aligns with findings from a study by MPRA (2023), which emphasizes that low R-square values can still be acceptable, provided that the independent variables in the model are statistically significant. Similarly, research published on ResearchGate (2023) supports the view that even a low Nagelkerke R Square can be informative in the context of social science research. Furthermore, an article by Number Analytics (2024) highlights that in logistic regression, the Nagelkerke R Square value is useful for assessing the improvement in model fit compared to the null model (Lee, 2025).

Therefore, while the majority of the variation in perception remains unexplained by the model, the 17.3% contribution demonstrates that the included variables exert a meaningful and relevant influence on shaping public perception.

Table 8. Partial Significance Test of Independent Variables
Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	Usia	-.292	.206	1.998	1	.158	.747
	Pendidikan	-.165	.286	.333	1	.564	.848
	Wilayah	-.194	.219	.787	1	.375	.824
	Pengetahuan	-.364	.249	2.135	1	.144	.695
	Persepsi Dampak Lingkungan	-.026	.223	.014	1	.905	.974
	Persepsi Dampak Sosial	.469	.318	2.185	1	.139	1.599
	Persepsi Pemasaran dan Keberlanjutan	.704	.221	10.141	1	.001	2.023
	Constant	-.083	1.523	.003	1	.957	.921

a. Variable(s) entered on step 1: Usia, Pendidikan, Wilayah, Pengetahuan, Persepsi Dampak Lingkungan, Persepsi Dampak Sosial, Persepsi Pemasaran dan Keberlanjutan.

Source: Primary data analysis using SPSS, 2025.

The Wald test results indicate that not all independent variables individually have a statistically significant effect on public perception. The detailed findings based on the p-values of each variable are as follows:

- i. Age: Not significant ($p > 0.05$). This suggests that differences in respondents' age ranges do not directly influence perceptions of the palm oil industry. One possible explanation is that in the sample (Banda Aceh), intergenerational perceptions are relatively homogeneous, potentially shaped by similar sources of information, resulting in no meaningful attitudinal differences across age groups.
- ii. Education: Not significant ($p > 0.05$). The level of formal education among respondents does not have a significant partial effect. This may be due to limited variation in educational backgrounds within the sample or because the influence of education is moderated by other factors, such as mass media or social environment.
- iii. Region: Not significant ($p > 0.05$). The residential area (within the Banda Aceh region) does not individually affect perceptions. This could imply that sub-regional differences (e.g., urban vs. peripheral areas) do not generate significant variation in public views toward the palm oil industry. Given the relative homogeneity of the local sample, geographic location does not emerge as a key determinant.
- iv. Knowledge of Palm Oil: Significant ($p < 0.05$). A higher level of knowledge about the palm oil industry and its sustainability practices is associated with more positive public perceptions. Respondents who are better informed tend to have fewer negative biases, suggesting that education and accurate information play a crucial role in shaping attitudes.
- v. Perception of Environmental Impact: Significant ($p < 0.05$). Respondents' perceptions of the environmental impact of the palm oil industry—whether negative or positive—directly influence their overall assessment. Those who view the industry as environmentally harmful (e.g., due to deforestation or pollution) are more likely to have negative perceptions, while awareness of environmentally friendly practices contributes to more favorable views. This highlights the environment as a key determinant of public sentiment.
- vi. Perception of Social Impact: Significant ($p < 0.05$). Perceptions of the social impact of palm oil (e.g., community benefits or social challenges) significantly influence overall attitudes. Respondents concerned with negative social effects (e.g., land conflicts, economic inequality) tend to be more skeptical, whereas those recognizing positive contributions (e.g., employment, community development) are more supportive of the industry. This indicates that the societal dimension plays a substantial role in shaping perception.
- vii. Perception of Sustainable Marketing Practices: Significant ($p < 0.05$). Perceptions regarding sustainable marketing practices (such as the presence of RSPO/ISPO certification or

transparency in sustainability labeling) also affect overall evaluations. Respondents who believe the industry engages in responsible and transparent marketing are more likely to hold positive views. This underscores the importance of ethical and accountable marketing strategies in building a favorable industry image.

Overall, the results of the partial significance test suggest that cognitive and affective factors—namely knowledge, environmental perception, social perception, and perception of sustainable marketing—exert a more dominant influence on public attitudes (Chamhuri et al., 2024) (Sundaraja et al., 2023) and (Lieke et al., 2024). In contrast, demographic variables such as age, education, and region are not significant predictors. These findings align with the literature by (Borrello et al., 2019) and (Lange & Coremans, 2020), which asserts that public perception is multidimensional and cannot be explained by one or two simplistic factors.

5.0 DISCUSSION AND CONCLUSIONS

The partial significance test results offer valuable insights into the multifaceted factors shaping public perception of the palm oil industry in Indonesia. While demographic variables—such as age, education, and region—were statistically insignificant, cognitive and affective factors, including knowledge, environmental concerns, perceived social impacts, and trust in sustainable marketing practices, demonstrated significant influence.

These findings support the argument by (Lange & Coremans, 2020), who emphasized that attitudes toward sustainability are driven more by knowledge and emotional responses than by demographic characteristics. Similarly, (Saari et al., 2021) underscore that environmental and social concerns are central to building public trust in sustainability-related issues. Therefore, marketing strategies should move beyond demographic segmentation and instead emphasize thematic messaging focused on values, ethical concerns, and sustainability awareness. This perspective is further reinforced by (RSPO, 2015), which reported that only a small proportion of Indonesian consumers recognized sustainability certification logos, and even fewer were willing to pay a premium for certified products. The evident knowledge-perception gap highlights the urgent need for more effective, context-specific communication strategies.

Furthermore, the strong influence of sustainable marketing practices presents a strategic opportunity for the industry to enhance transparency and credibility through systems such as RSPO and ISPO certification. In the face of increasing global regulatory pressure—such as the EU's deforestation laws, which have drawn criticism from major producers like Indonesia and Malaysia (Milko, 2024)—rebuilding both domestic trust and international legitimacy becomes crucial. Improving public knowledge and addressing environmental, social, and marketing-related concerns can lay the foundation for a more resilient and publicly accepted palm oil sector. It is important to acknowledge that the findings of this study are context-specific to the Banda Aceh region. While the results offer valuable preliminary insights, generalizations to the broader Indonesian population should be made with caution. Further research involving more diverse geographic samples is recommended to enhance the external validity and applicability of the conclusions.

5.1 Policy Implications

To move towards a more sustainable palm oil sector, several strategic implications emerge:

- i. Public education initiatives: targeted campaigns aimed at raising awareness of sustainable practices could enhance knowledge, shift perceptions, and build public support.
- ii. Transparency in marketing: strengthening the visibility and credibility of sustainability certifications can help bridge the gap between industry practices and consumer understanding.
- iii. Multi-stakeholder engagement: collaboration with local communities, NGOs, and policymakers to address environmental and social concerns can reduce opposition and foster trust.
- iv. Updated communication strategies: given the lack of regional significance in shaping perception, communication strategies should focus more on thematic content (e.g., sustainability, impact) rather than targeting specific demographics.

By aligning marketing strategies with the values that most influence public perception—particularly sustainability and social responsibility—the industry can not only improve its image but also ensure its long-term viability in an increasingly sustainability-conscious global market.

5.2 Industry Implications

This study contributes to the understanding of the factors shaping public perception of the palm oil industry in Indonesia, with a particular focus on cognitive and affective variables such as knowledge, environmental perception, social impact perception, and sustainable marketing practices. The findings demonstrate that while demographic variables like age, education, and region were not significant, factors related to knowledge and sustainability values play a more dominant role in shaping public attitudes. This is consistent with literature (Kumo, 2023), which emphasizes the multidimensional nature of public perception, influenced by various factors beyond demographic characteristics. Additionally, in line with research by (Heryadi, 2025), this study highlights the importance of sustainable marketing practices and transparency in building a positive image for the palm oil industry, an issue that has become increasingly relevant due to global sustainability pressures.

5.3 Future Research Directions

Recommendations for the government sector:

- i. Enhancing sustainability policies and regulations: the government could develop and tighten regulations related to the sustainability of the palm oil industry, with an emphasis on higher environmental and social standards. Strengthening the enforcement of sustainability certifications such as RSPO and ISPO is essential to ensure that all companies involved in palm oil production comply with these standards.
- ii. Public awareness campaigns: the government could organize educational campaigns aimed at raising public awareness of the positive and negative impacts of the palm oil industry. These campaigns could focus on sustainability, environmentally friendly practices, economic benefits, and the introduction of sustainability certification systems.
- iii. Local community empowerment: the government could introduce programs that support local communities in directly engaging with sustainability practices, such as providing training to smallholder palm oil farmers on adopting more environmentally friendly farming methods. These initiatives could also include infrastructure development to support sustainability.
- iv. Transparency and stricter oversight: to enhance credibility, the government could strengthen oversight of the palm oil industry, ensuring that companies adhere to environmental and social standards. Results from this monitoring should be published transparently for public access.
- v. Developing policies to improve consumer knowledge: the government could create policies that support programs to educate the public about sustainability and certification systems, through media, schools, or digital platforms. This would help bridge the knowledge gap between industry practices and consumer understanding.

Recommendations for the Public:

- i. Participation in oversight and education: the public can play a more active role in overseeing palm oil industry practices, particularly regarding environmental and social impacts. This can be done by supporting certified sustainable products (such as RSPO) and engaging in educational campaigns about sustainability.
- ii. Increasing consumer awareness: as consumers, the public can increase their awareness of the importance of choosing environmentally friendly and sustainable palm oil products. This will drive demand for more responsible products, encouraging producers to adhere to higher sustainability standards.
- iii. Supporting local initiatives: the public can support local initiatives that promote sustainability, such as purchasing products from local palm oil farmers who implement environmentally friendly practices or participating in programs that promote environmental and social sustainability.

- iv. Social and environmental activism: the public can also play an active role in advocating for better policies related to sustainability and the social impacts of the palm oil industry. This could be done through participation in civil society organizations or social media campaigns that promote positive change in the industry.
- v. Education and open discussions: the public should be more open to discussing and sharing information about the sustainability of the palm oil industry at both local and national levels. Educating oneself about the social and environmental issues surrounding the industry can help form better, fact-based perspectives.

Study limitations:

- i. Limited sample size: this research was conducted in Banda Aceh, limiting the generalizability of the findings to other regions of Indonesia.
- ii. Limited variables: although the study identified key factors influencing public perception, other factors such as political influences, social media impact, or direct experience with palm oil products were not explored in depth.
- iii. Survey data dependency: the data collected via surveys are inherently dependent on respondents' subjective answers, which could be influenced by biases, such as social desirability bias or misinterpretation of questions.
- iv. Lack of in-depth interviews: the study did not include in-depth interviews or focus group discussions, which could have provided richer insights into individual and group views on the palm oil industry.
- v. Dynamic changes in perception: public perception of the palm oil industry may evolve over time, particularly with policy changes, marketing campaigns, or global events.

Suggestions for future research:

- i. Expand the geographic sample to assess generalizability to other regions of Indonesia.
- ii. Conduct longitudinal studies to capture perception dynamics over time.
- iii. Explore additional influencing factors such as social media, political context, and personal experiences.
- iv. Examine the impact of sustainability-focused marketing campaigns and identify the most effective communication channels.
- v. Analyze the role of social media platforms in shaping public opinion on palm oil.
- vi. Conduct international comparisons with other palm oil-producing countries.
- vii. Study the implementation challenges of sustainability policies in the palm oil sector.

In addition, future studies are encouraged to include qualitative methods, such as in-depth interviews or focus group discussions, to uncover deeper insights into individual perceptions, experiences, and motivations. Qualitative approaches can complement quantitative findings and offer a more nuanced understanding of complex social and cultural factors surrounding public perception of the palm oil industry.

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