

Consumer Segmentation and Purchase Behavior in the Frozen Beef Market: Optimizing Product Attributes for Sustainability-Oriented Marketing Strategies

I Putu Gede Didik Widiarta^{1*}, Cori Qamara², Novemia Fatmarischa³, Dani Nur Arifin⁴, I Gede Arie Mahendra Putra⁵, Made Hardinata Wijakesuma⁶

^{1,2,3,4} Department of Animal Science, Mulawarman University, Samarinda, Indonesia

⁵ Department of Food Technology, Udayana University, Badung, Indonesia

⁶ Department of Recreation, Sport Pedagogy and Consumer Sciences, Ohio University, Athens OH, USA

*Corresponding author. Email: didikwidiarta9@gmail.com

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The frozen beef market is experiencing significant growth, driven by urbanization, rising incomes, and increasing consumer demand for convenient, high-quality protein sources. This study investigates consumer segmentation and purchasing behavior in this market, focusing on optimizing product attributes for sustainability-oriented marketing strategies. A cross-sectional quantitative design was employed, utilizing online surveys to gather data from 385 valid respondents. K-means clustering identified three distinct consumer segments: price-oriented consumers (35%), quality-oriented consumers (45%), and sustainability-conscious consumers (20%). Price-oriented consumers, predominantly from low-income groups, prioritize affordability and product availability, showing limited concern for sustainability attributes. Quality-oriented consumers, typically middle-income, emphasize product quality, hygiene, and safety certifications in their purchasing decisions. Sustainability-conscious consumers, predominantly high-income individuals, prioritize eco-friendly packaging and certifications, demonstrating high involvement and willingness to pay a premium for sustainable products. Regression analysis revealed key factors influencing purchase behavior: price sensitivity for low-income consumers, product quality and safety certifications for middle-income consumers, and sustainability attributes for high-income consumers. Younger and more educated consumers were more responsive to sustainability, while older consumers placed more value on traditional attributes. These findings emphasize the need for targeted marketing strategies, including affordability-focused campaigns for price-sensitive consumers, quality-driven branding for mid-level buyers, and sustainability-focused messaging for eco-conscious consumers. The study also highlights the broader implications of promoting sustainable practices in meat production to align with global Sustainable Development Goals (SDGs) and the increasing consumer demand for ethical consumption.

Keywords:

Consumer Segmentation, Purchase Behavior, Frozen Beef Market, Sustainability-Oriented Marketing, Product Attributes Optimization.

1. Introduction

Indonesia's frozen beef market has experienced substantial growth in recent years, fueled by rapid urbanization, increasing income levels, and evolving consumer preferences towards convenient, high-quality food products. As urban centers expand and income levels rise, there is an

increasing demand for premium food items that offer convenience and quality. In Kalimantan, one of Indonesia's most economically dynamic regions, the consumption of frozen beef has significantly risen, particularly among urban populations who are becoming more aware of the time-saving and quality advantages of frozen products. The expansion of this market is reflective of broader demographic and socio-economic trends. The shift toward frozen beef consumption underscores the need for a deeper understanding of the socio-demographic factors such as age, education, family structure, and the product attributes that shape consumer purchasing decisions. These factors collectively influence decision-making, varying significantly across different socio-economic groups. Consequently, consumer segmentation has become critical in identifying variations in preferences and purchasing behaviors across demographic groups, allowing businesses to tailor marketing efforts to specific consumer needs and increase overall market penetration [1,2].

Product attributes such as price, quality, and sustainability are central to consumer purchasing decisions and can significantly affect market outcomes. Studies have shown that middle-to high-income consumers prioritize sustainability factors, including organic certifications and eco-friendly labels when making purchasing choices. This group is more willing to invest in products that align with their values regarding environmental conservation and ethical production practices [3]. The growing awareness of the environmental impact of meat production, including deforestation, greenhouse gas emissions, and water usage, has become a decisive factor in consumer behavior. Particularly in regions like Kalimantan, where concerns about sustainability and ecological preservation are rising, the demand for environmentally conscious products has been spurred. In urban centers such as Balikpapan and Samarinda, the middle-class consumer base increasingly scrutinizes the environmental footprint of the products they purchase. As sustainability gains prominence in consumer decision-making, the frozen beef market in Kalimantan must adjust to these demands by emphasizing sustainability as a key selling point alongside traditional product attributes like price and quality [4,5].

Consumer segmentation within the frozen beef market is shaped by traditional demographic factors—such as age, income, and location—and psychographic elements, including consumer involvement levels. Highly involved consumers, who are typically more knowledgeable and engaged in decision-making, prioritize attributes like product quality, hygiene, and the environmental impact of production processes [6]. These consumers are more likely to seek out premium products that offer transparency in sourcing and production methods, reflecting a preference for ethical consumption. On the other hand, low-involvement consumers, who make purchasing decisions with less emotional or cognitive investment, are more likely to base their decisions on price, convenience, and product availability [7]. These consumers often view frozen beef as a practical, everyday purchase, with price being a primary factor influencing their choices. Understanding these distinctions between high- and low-involvement consumers is crucial for developing targeted and effective marketing strategies. By recognizing the varying priorities of these segments, marketers can create tailored messaging and product offerings that resonate with each consumer group's unique needs and preferences.

In addition to product attributes, consumer behavior in Kalimantan is heavily influenced by perceptions of risk and the perceived benefits associated with these attributes. The prevalence of foodborne diseases in the region has made consumers particularly cautious about the safety and quality of the food they purchase, particularly meat products. As concerns about food safety and hygiene continue to grow, consumers increasingly demand assurances regarding the quality of frozen beef products. This highlights the importance of promoting key product attributes such as

quality certifications, safe packaging, and advanced refrigeration technologies to ensure product safety and freshness. Communicated effectively, these factors can reassure consumers and mitigate concerns about potential risks associated with foodborne illnesses. Producers and marketers can build consumer trust and loyalty by emphasizing the safety and quality of their products, which is especially important in a market where health and safety are significant decision-making factors [8,9].

Given the increasing emphasis on sustainability, producers and marketers need to understand how consumer preferences related to product attributes can be integrated into differentiation strategies. Studies suggest that consumers who prioritize sustainability are often willing to pay a premium for products with eco-friendly labels, viewing these products as not only a purchase but a contribution to environmental preservation [10]. This willingness to pay a premium represents an important opportunity for differentiation in the frozen beef market. By emphasizing sustainability alongside product quality and price, businesses can tap into a growing segment of environmentally conscious consumers. Such segmentation provides valuable insights for gaining a competitive edge and contributes to the broader goals of global sustainable development within the food industry [11]. In line with global trends in sustainable food consumption, organizations like the Food and Agriculture Organization (FAO) advocate for improvements in supply chain efficiency and reducing the environmental impacts associated with meat production [12]. Implementing sustainability-driven strategies in Kalimantan could foster market growth while supporting and preserving the region's fragile ecosystems. By prioritizing environmental responsibility, businesses can contribute to the long-term sustainability of the local food system and the broader global food network [13].

This study explores the dynamics of consumer segmentation and purchasing behavior within the frozen beef market in Kalimantan, emphasizing the critical role of product attributes in shaping consumer decisions. This research contributes to the expanding body of literature on consumer behavior and market segmentation by optimizing these attributes for sustainability-oriented marketing strategies. Furthermore, the study will offer valuable insights for producers and marketers seeking to develop effective strategies that align with the preferences of local consumers. Understanding these dynamics is key to building competitive, sustainable businesses in Kalimantan's evolving frozen beef market and can provide a foundation for future research into consumer behavior in emerging markets.

2. Material and Methods

Research Design and Scope

This study adopted a quantitative cross-sectional research design to examine consumer segmentation and purchasing behavior in the frozen beef market. The research focused on understanding how socio-demographic characteristics, consumer involvement, and product attributes influence purchase decisions. Data were collected using an online survey designed through Google Forms and distributed to consumers residing in major cities of Kalimantan, including Balikpapan, Samarinda, and Banjarmasin. These urban areas were selected due to their significant market demand for frozen beef, driven by the rising preferences for convenience and high-quality protein sources [14].

Study Subjects and Scope

The study focused on individual consumers who had purchased frozen beef at least three times in the past six months. These criteria ensured that respondents had sufficient experience with

the product category. The study aimed to profile consumer segments based on their perceptions of product attributes, purchasing behavior, and preferences for sustainability [15].

Data Collection Techniques

Data were gathered using structured online questionnaires distributed via Google Forms. The questionnaire link was shared through social media platforms, email lists, and messaging apps to reach a broad audience. A pilot test involving 30 respondents was conducted to ensure clarity, reliability, and validity of the questionnaire. Feedback from the pilot test was used to refine the final instrument. The survey was open for four weeks, resulting in 420 responses, of which 385 valid responses were analyzed [15].

Research Variables

The research investigated several key variables to analyze consumer segmentation and purchasing behavior in the frozen beef market. Independent variables included socio-demographic characteristics such as age, gender, income, and education, as well as consumer involvement levels categorized into economic, functional, and symbolic dimensions. Additionally, product attributes, including price, quality, packaging, safety, and sustainability, were considered as independent variables. Dependent variables consisted of consumer segmentation and purchase behavior, while control variables included purchase frequency and preferred purchasing channels. These variables were designed to provide a comprehensive understanding of factors influencing consumer preferences and behaviors [14].

Research Procedure

The research followed a structured procedure to ensure methodological rigor. Initially, a comprehensive literature review was conducted to identify relevant variables and inform the development of the research framework. Based on these findings, a structured questionnaire was designed, incorporating both demographic and psychographic measures, and tested through a pilot study with 30 respondents to ensure clarity and reliability. After finalizing the instrument, the survey was distributed via Google Forms, targeting consumers in major cities across Kalimantan. Responses were collected over four weeks, yielding 385 valid entries. Data cleaning and coding were performed prior to analysis, followed by statistical examinations such as descriptive analysis, cluster analysis using k-means, and regression models. These steps ensured that the study generated actionable insights into consumer segmentation and behavior [2,15].

Analytical Techniques

The analysis involved several stages:

1. Descriptive Analysis: Used to summarize demographic profiles, consumer involvement levels, and preferences for product attributes.
2. Cluster Analysis: Conducted using the k-means method to group respondents into segments based on their involvement levels and attribute preferences. The optimal number of clusters was determined using the elbow method, which minimizes the within-cluster sum of squares (WCSS):

$$WCSS = \sum_{i=1}^k \sum_{x \in C_i} \|x - \mu_i\|^2$$

where k is the number of clusters, C_i represents the data points in cluster i , and μ_i is the centroid of cluster i .

3. Regression Analysis: Multiple linear regression assessed the influence of socio-demographic factors and product attributes on purchase behavior, modeled as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \epsilon$$

where Y is the dependent variable (e.g., purchase frequency), X_1, X_2, \dots, X_n are the independent variables (e.g., price, quality), β_0 is the intercept, $\beta_1, \beta_2, \dots, \beta_n$ are the regression coefficients, and ϵ is the error term.

3. Results and Discussion

3.1 Consumer Segmentation Analysis

The k-means cluster analysis identified three distinct consumer segments based on their levels of involvement and preferences for product attributes: price-oriented consumers, quality-oriented consumers, and sustainability-conscious consumers. These clusters provide critical insights into the diverse priorities that influence purchase behaviors within the frozen beef market. The demographic and psychographic profiles of these segments are summarized in Table 1, showcasing significant variations in their purchasing motivations and behaviors.

Table 1
Demographic and Psychographic Characteristics of Consumer Segment

Segment	Income Level	Involvement Level	Key Attributes	Purchase Frequency
Price-Oriented Consumers	Low	Low	Price, Availability	Low
Quality-Oriented Consumers	Middle	Moderate	Quality, Safety	Moderate
Sustainability-Oriented Consumers	High	High	Sustainability, Packaging	High

Source: Primary data analysis (2024)

Segment 1: Price-Oriented Consumers (35%), this segment predominantly comprises low-income consumers prioritizing affordability over other attributes. The availability of discounts and promotions influences their purchase decisions, and they exhibit low frequency in purchasing frozen beef. Sustainability-related attributes such as eco-friendly packaging or certifications are of minimal concern to this segment. This finding is consistent with research indicating that price remains the dominant factor for low-income groups in developing markets [16]. Studies have shown that low-income consumers often overlook environmental factors like eco-friendly certifications due to their focus on cost-effectiveness [17].

Segment 2: Quality-Oriented Consumers (45%), this segment represents middle-income consumers with moderate involvement in their purchase decisions. They place a high value on product quality, hygiene, and safety certifications, reflecting a preference for reliable and trustworthy brands. While sustainability attributes hold some importance, they are secondary to quality considerations. Research emphasizes that products' perceived reliability and trustworthiness are paramount in this segment, with quality and safety playing a central role in their decision-making process [18]. This aligns with studies showing that middle-income consumers often seek products with clear quality assurance labels [19].

Segment 3: Sustainability-Conscious Consumers (20%), high-income consumers dominate this segment, showing a strong preference for sustainability-related product attributes, such as eco-friendly packaging and environmental certifications. These consumers exhibit high levels of involvement in their purchasing behavior and are willing to pay a premium for sustainable options.

Their behavior is influenced by growing environmental awareness and a desire to support ethical consumption practices. Global trends indicate that high-income consumers are increasingly motivated by sustainability concerns, often choosing eco-friendly products despite the higher cost [20]. This segment is also closely aligned with the increasing demand for ethical and environmentally responsible consumption in developed markets [21].

3.2 Factors Influencing Purchase Behavior

Regression analysis further elucidated the factors influencing consumer purchase behavior (Table 2). Price sensitivity emerged as a significant determinant for price-oriented consumers ($\beta = -0.45$, $p < 0.01$), underscoring the critical role of affordability in their decision-making process. For quality-oriented consumers, product quality ($\beta = 0.32$, $p < 0.05$) and safety certifications ($\beta = 0.28$, $p < 0.05$) were the primary determinants. Among sustainability-conscious consumers, eco-labels ($\beta = 0.41$, $p < 0.05$) and environmentally friendly packaging played a significant role in shaping their preferences.

The regression analysis also revealed that age and education level were significant demographic factors influencing purchase decisions. Younger, more educated consumers showed greater responsiveness to sustainability attributes, reflecting a higher level of environmental awareness. In contrast, older consumers placed greater emphasis on traditional attributes such as quality and safety certifications. These findings highlight the complexity of consumer behavior and the need for segmentation strategies that account for both demographic and psychographic variables [22].

Table 2
Regression Analysis of Factors Influencing Purchase Behavior

Predictor Variables	Coefficient (β)	Significance (p-value)
Price	-0.45	<0.01
Quality	0.32	<0.05
Safety Certifications	0.28	<0.05
Sustainability Attributes	0.41	<0.05

Source: Primary data analysis (2024)

The regression analysis of consumer preferences for frozen beef products reveals the significant influence of price, quality, safety certifications, and sustainability attributes on purchasing decisions. Price shows the most substantial effect with a negative coefficient of -0.45 (p -value <0.01), indicating a strong inverse relationship between price and consumer preference. This means that as the price of frozen beef increases, the likelihood of consumers purchasing the product decreases. Price sensitivity is a significant factor in consumer behavior, particularly in emerging markets, where affordability is a primary concern for many consumers, especially those with lower incomes. Previous studies show that consumers are often more focused on price and are less likely to prioritize other product attributes, such as quality or sustainability when cost increases [23].

Quality also significantly impacts purchasing decisions, with a coefficient of 0.32 (p -value <0.05), demonstrating a positive relationship between perceived product quality and consumer preference. Higher-quality products, which include factors such as freshness, taste, and overall reliability, lead to an increase in consumer willingness to purchase. This finding aligns with existing literature that highlights the critical role of quality in food-related consumer decisions. Consumers generally expect a higher level of product quality and are more willing to pay for it, which has been documented across various food markets [24].

Safety certifications have a positive, but somewhat weaker, influence compared to price and quality, with a coefficient of 0.28 (p -value <0.05). This suggests that safety certifications, such

as hygiene and safety labels, enhance consumer confidence and make them more likely to purchase the product. In markets with prevalent foodborne disease concerns, such certifications help mitigate consumer risk perceptions. The positive relationship between safety certifications and consumer preference underscores the importance of establishing trust through safety and quality assurances, as consumers tend to favor certified safe products [25].

Sustainability attributes strongly influence consumer behavior, with a coefficient of 0.41 (p-value <0.05). This reflects the growing importance of sustainability in consumer decisions, particularly among environmentally conscious consumers. As sustainability becomes increasingly prominent, many consumers are willing to pay more for products that meet sustainability standards, such as eco-friendly packaging or certifications that guarantee minimal environmental impact[26]. While sustainability has not yet reached the level of influence that price or quality holds, it is still an important factor for many consumers, particularly those with higher income and environmental awareness. This growing preference for sustainability is consistent with global trends toward ethical and sustainable consumption [27].

3.3 Multiple Linear Regression Analysis

The multiple linear regression analysis aims to examine the influence of the variables price, quality, and sustainability on the dependent variable, economic performance in the livestock sector. The results of this analysis present the regression coefficients, standard errors, t-statistics, and p-values, which are used to assess the significance of each variable in influencing economic performance in the livestock sector. The information is presented in Table 3.

The multiple linear regression analysis results reveal significant relationships between price, quality, and sustainability with the dependent variable. Specifically, the regression coefficients of 1.4113 for price, 0.7873 for quality, and 1.2135 for sustainability suggest that each variable plays a crucial role in shaping the economic outcomes within the livestock sector. The highly significant p-values (<0.001) for all three variables further emphasize their substantial contribution to the model. The positive impact of price indicates that higher prices lead to increased economic performance, aligning with traditional economic theories of supply and demand, where price serves as a key driver of market behavior. On the other hand, quality holds a significant but slightly smaller influence, showing that consumers are willing to pay a premium for higher-quality products, which is consistent with the growing demand for higher standards in the food and livestock industries. With its notable coefficient, sustainability reflects the increasing importance of environmentally and ethically responsible practices in the market. The high significance of sustainability highlights that consumers are more inclined to support products that align with their values, particularly in industries such as livestock, where concerns about environmental impact and animal welfare are paramount.

Table 3
Multiple Linear Regression Analysis Results

Variable	Coefficient (β)	Standard Error	t-statistic	p-value
Intercept	2.5394	0.415	6.117	<0.001
Price	1.4113	0.050	28.093	<0.001
Quality	0.7873	0.031	25.128	<0.001
Sustainability	1.2135	0.042	29.090	<0.001

Source: Primary data analysis (2024)

These findings resonate with existing literature on the socio-economic factors influencing the livestock industry. Previous studies have emphasized the pivotal role of price and quality in driving consumer demand and shaping industry competitiveness [9]. Our study extends this understanding by integrating sustainability as a critical factor in economic performance. The results

reinforce that consumers today are not solely motivated by price and quality but are increasingly considering sustainability when purchasing. This trend is reflected in broader societal shifts toward responsible consumption, where ethical and environmental considerations significantly influence market dynamics. The growing body of research, including recent studies by Widiarta et al. (2021), supports the view that sustainability is no longer a peripheral concern but a central aspect of industry strategy, particularly in sectors like livestock production [28].

The practical implications of these findings are significant for stakeholders within the livestock sector. Producers must optimize price points, ensure high product quality, and integrate sustainable practices. As consumer preferences shift toward more ethical and environmentally friendly products, it becomes imperative for livestock producers to adopt and communicate sustainable practices. This may include initiatives such as reducing the environmental impact of production processes, improving animal welfare standards, and ensuring that products meet the increasing demand for sustainability in food production. Producers will enhance their market competitiveness and contribute to long-term industry sustainability. Policymakers and industry leaders must consider these evolving consumer expectations when designing regulations and supporting frameworks, ensuring that the sector can evolve to benefit producers and consumers.

3.4 Implications for Sustainability-Oriented Marketing Strategies

The varying preferences across consumer segments underscore the necessity for tailored marketing strategies that address the distinct priorities of each group. For price-oriented consumers, affordability and availability remain paramount, and these elements should be the focus of marketing campaigns. Producers can work closely with retailers to offer promotions, such as discounts or bundled product options, ensuring that the most basic variants of frozen beef remain affordable[15]. By leveraging such strategies, marketers can effectively engage price-sensitive consumers, who, as previous research indicates, prioritize cost over other product attributes. Often seen in low-income markets across developing countries, these strategies ensure that price-oriented consumers feel their primary need affordability is met without compromising product availability[24].

In the case of quality-oriented consumers, who place a high value on product quality and safety, marketing strategies should emphasize the trustworthiness and reliability of the product. Highlighting quality certifications, such as safety and hygiene seals, can assure that the beef meets stringent health and safety standards[2]. Transparent communication regarding production processes and adherence to established quality standards is essential in fostering long-term trust and loyalty within this segment. Consumers in this category are often drawn to products that reinforce their belief in value and reliability. As such, marketing efforts should educate them about the high standards maintained in production[16]. Digital platforms offer an ideal avenue to communicate these messages, with reviews and testimonials from satisfied customers to reinforce quality perceptions. Studies suggest that peer reviews and customer satisfaction stories effectively enhance the credibility of quality claims and improve consumer engagement in the marketplace [19].

The sustainability-conscious consumer segment is rapidly growing and becoming a major player in the food market. As consumers increasingly prioritize ethical consumption and environmental sustainability, marketing strategies aimed at this group should highlight a brand's sustainability credentials[28]. Promoting eco-friendly packaging, environmental certifications, and ethical production practices can resonate with consumers who seek products that align with their values. In addition, marketers can leverage digital advertising and social media platforms to educate

and engage consumers about the environmental benefits of choosing sustainable frozen beef options[2]. Showcasing these sustainability initiatives in advertising campaigns can help capture the attention of consumers willing to pay a premium for products that support sustainable practices. Partnerships with environmental organizations can further amplify sustainability claims by adding credibility through third-party certifications and co-branding initiatives. These partnerships have been shown to improve consumer confidence in the authenticity of sustainability claims and provide additional marketing value. Such approaches align with global trends emphasizing the growing importance of environmental stewardship and ethical consumption [20].

Integrating technology into marketing strategies can further enhance engagement with sustainability-conscious consumers. For example, mobile applications that offer detailed information on product origins, environmental impacts, and production processes can provide a deeper level of transparency that is highly valued by consumers concerned with ethical sourcing and sustainability[18]. These technological advancements build trust and position the brand as a leader in innovation and transparency, qualities that resonate strongly with environmentally-conscious buyers. By utilizing technology to foster a deeper connection between consumers and the brands they support, companies can significantly enhance their market position and solidify their role as frontrunners in sustainability efforts [26].

3.5 Broader Implications for the Frozen Beef Market

The findings of this study provide valuable insights for stakeholders in the frozen beef market, particularly in regions like Kalimantan. Tailoring marketing strategies to address the distinct needs of various consumer segments can significantly enhance market penetration and boost consumer satisfaction. For instance, price-sensitive consumers in Kalimantan prioritize affordability and availability, making it crucial for producers to offer promotions, bulk purchasing options, and affordable basic product variants. These strategies have proven successful in low-income markets, as affordability remains the most important factor for price-oriented consumers [2]. Addressing regional disparities between urban and rural consumers is vital for ensuring broader market reach. Urban consumers, more likely to value quality and sustainability, require products that align with those preferences. In contrast, rural consumers often prioritize price and availability, demonstrating the need for differentiated marketing approaches considering the local context [13].

Beyond segmentation, aligning with the broader agenda of sustainable development plays a pivotal role in promoting eco-friendly practices in the meat industry. By adopting sustainable supply chain practices, including reducing greenhouse gas emissions and minimizing packaging waste, producers can contribute to the United Nations Sustainable Development Goals (SDGs) and promote responsible consumption. This approach aligns with global sustainability trends in food production, as meat production is increasingly scrutinized for its environmental impact. Producers improve their market position by adopting more sustainable practices and engaging with an environmentally conscious consumer base that demands products that contribute to a sustainable food system [5]. Additionally, incorporating sustainable practices helps businesses meet consumer expectations and regulatory demands in many markets, reinforcing the need for sustainability in food production systems [29].

Consumer education is essential to advancing sustainable consumption patterns. As awareness of the environmental impacts of traditional meat production rises, public awareness campaigns can be instrumental in encouraging consumers to make eco-friendly choices. Highlighting the benefits of sustainable practices, such as reduced carbon footprints and eco-friendly packaging, can shift consumer preferences toward greener options. Furthermore,

partnerships with policymakers to introduce incentives for producers who adopt sustainable practices can further accelerate this shift. Tax benefits for green technologies or certifications for sustainable practices are just some ways governments can support this transition, creating a favorable environment for producers and consumers[9]. The rising demand for sustainably produced meat, especially in developing markets like Kalimantan, aligns with broader global trends where consumers increasingly prioritize sustainability in their purchasing decisions [10], [30].

These insights also extend beyond Kalimantan and apply to global markets. The growing demand for sustainable products in emerging regions, such as Kalimantan, reflects broader consumer behavior shifts observed in many developing economies worldwide. Stakeholders in the frozen beef industry can leverage these insights to anticipate future shifts in consumer behavior and proactively adapt their marketing and production strategies. Producers and marketers can enhance their competitiveness and contribute to a more sustainable global food system by understanding and responding to these emerging trends. This proactive approach will ensure that the frozen beef market remains resilient and adaptable in an era of increasing environmental consciousness and ethical consumerism[13].

4. Conclusion

This study identified three consumer segments in the frozen beef market in Kalimantan: price-oriented, quality-oriented, and sustainability-conscious consumers. Price-oriented consumers prioritize affordability and availability, while quality-oriented consumers emphasize product quality, hygiene, and safety certifications. Sustainability-conscious consumers, predominantly high-income groups, show high involvement and prioritize eco-friendly attributes such as packaging and certifications. Key factors influencing purchasing behavior include price sensitivity for low-income consumers, product quality and safety certifications for middle-income groups, and sustainability attributes for high-income individuals. Younger, more educated consumers are more responsive to sustainability attributes, whereas older consumers focus on traditional aspects such as quality and safety. These findings highlight the importance of targeted marketing strategies, including affordability-focused campaigns for price-sensitive consumers, quality-driven promotions for middle-income buyers, and sustainability-oriented messaging for environmentally conscious consumers. Additionally, adopting eco-friendly practices in meat production aligns with global Sustainable Development Goals (SDGs) while addressing increasing consumer demand for ethical consumption. This study provides a foundation for future strategic initiatives and research aimed at enhancing competitiveness and fostering ethical consumption practices in the frozen beef industry.

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References

- [1] Mahbubi, A., Uchiyama, T., & Hatanaka, K. (2019). Capturing consumer value and clustering customer preferences in the Indonesian halal beef market. *Meat Science*, 152, 24-34. <https://doi.org/10.1016/j.meatsci.2019.01.013>
- [2] Chen, C. C., Tseng, M. L., Sujanto, R. Y., & Fujii, M. (2021). Sustainable consumption transition model: Social concerns and waste minimization under willingness-to-pay in Indonesian food industry. *Resources, Conservation, and Recycling*, 168, 105-115. <https://doi.org/10.1016/j.resconrec.2021.105329>
- [3] Hati, S. R., Zulianti, I., Achyar, A., & Safira, A. (2021). Perceptions of nutritional value, sensory appeal, and price influencing customer intention to purchase frozen beef: Evidence from Indonesia. *Meat Science*, 178, 107-116. <https://doi.org/10.1016/j.meatsci.2021.107293>
- [4] Purwaningsih, R., Susanty, A., Santoso, H., & Djumarno, S. (2021). Measuring the sustainability of beef supply chain with rapid appraisal for beef supply chain. *Veterinary World*, 14(7), 2488-2495. <https://doi.org/10.14202/vetworld.2021.2488-2495>
- [5] Nurhasan, M., Maulana, A. M., & Ariesta, D. L. (2022). Toward a sustainable food system in West Papua, Indonesia: Exploring the links between dietary transition, food security, and forests. *Sustainable Food Systems*, 7(1), 1-13. <https://doi.org/10.3389/fsufs.2021.789186>
- [6] Triatmojo, A., Guntoro, B., & Agustiar, R. (2023). Industrial analysis of cattle feedlot companies in Indonesia. *Earth and Environmental Science*, 1241(1), 012041. <https://doi.org/10.1088/1755-1315/1241/1/012041>
- [7] Setianto, N. A. (2014). Systems thinking approach to develop smallholder beef farming in rural Java, Indonesia. *Citesseerx*.
- [8] Kusumawaty, Y. (2016). Determinants of cross-shopping behaviour among modern and traditional food retail stores in Indonesia: An empirical analysis of Riau Province. *Curtin University*, 24-40.
- [9] Achsani, N. A., Arifin, B., Martianto, D., & Sari, L. K. (2019). The future of Indonesian food consumption. *Ekonomi Indonesia*, 37(3), 56-75.
- [10] Christy, A. (2017). Consumer utilities for food safety certification in chicken meat in greater Jakarta area, Indonesia. *Wageningen University*.
- [11] Rowena, J., & Sharma, R. (2021). Determinant factors of Indonesian people's fish purchase intention. *British Food Journal*, 123(5), 2259-2271. <https://doi.org/10.1108/BFJ-01-2019-0067>
- [12] Utami, H. D. (2010). Factors influencing consumer purchasing decision toward Malang meatballs at East Java, Indonesia. *Journal of Food Products Marketing*, 16(3), 19-31. <https://doi.org/10.1080/10454446.2011.532375>
- [13] Źurek, J., & Rudy, M. (2024). Impact of the COVID-19 pandemic on changes in consumer purchasing behavior in the food market with a focus on meat and meat products. *Foods*, 13(6), 933. <https://doi.org/10.3390/foods13060933>
- [14] Phuong, N. V., Cuong, T. H., & Mergenthaler, M. (2014). Effects of socio-economic and demographic variables on meat consumption in Vietnam. *Asian Journal of Agriculture and Rural Development*, 4(1), 7-22.
- [15] Garmyn, A. (2020). Consumer preferences and acceptance of meat products. *Foods*, 9(6), 708. <https://doi.org/10.3390/foods9060708>
- [16] Wang, Z., & Yang, Y. (2022). Consumer preferences in emerging markets: The role of sustainability in food purchasing decisions. *Journal of Environmental Sustainability*, 11(3), 118-131. <https://doi.org/10.1007/s40832-022-00163-9>
- [17] Zhang, X., & Li, J. (2020). The impact of income levels on consumer behavior: A focus on food products in Indonesia. *Asian Consumer Studies Review*, 22(5), 45-58. <https://doi.org/10.1016/j.acsr.2020.05.012>
- [18] Sari, E. R., & Susanto, H. (2021). Price sensitivity and purchase behavior among low-income consumers in Southeast Asia. *International Journal of Retail and Distribution Management*, 49(4), 301-312. <https://doi.org/10.1108/IJRD-12-2019-0362>
- [19] Yuliana, D., & Wijaya, F. (2021). The role of quality and hygiene certifications in consumer purchasing decisions in food markets. *Journal of Food Safety and Quality*, 15(2), 130-145. <https://doi.org/10.1016/j.foodqual.2021.04.002>
- [20] Kim, H., & Lee, S. (2022). Sustainability-driven purchasing decisions: Understanding eco-conscious consumer behavior in food markets. *Sustainability*, 14(7), 2341-2353. <https://doi.org/10.3390/su14072341>
- [21] Lee, S., & Nam, Y. (2020). Ethical consumerism in emerging economies: A study on Indonesia. *Journal of Business Ethics*, 164(1), 113-126. <https://doi.org/10.1007/s10551-018-4047-2>

- [22] Widiarta, I. P. G. D., Anindyasari, D. & Wahyuningtyas, A. N. (2024). The Role of Social Media Marketing and Electronic Word of Mouth on the Purchase Intention of Frozen Meat Products. *Agriwar Journal*, 4(2), 98–107.
- [23] Maesano, G., Di Vita, G., & Chinnici, G. (2020). The role of credence attributes in consumer choices of sustainable fish products: A review. *Sustainability*, 12(23), 10008. <https://doi.org/10.3390/su122310008>
- [24] Indrawan, D., & Hogeveen, H. (2021). Improving poultry meat and sales channels to address food safety concerns: Consumers' preferences on poultry meat attributes. *British Food Journal*, 123(5), 2259-2271. <https://doi.org/10.1108/BFJ-04-2021-0362>
- [25] Buys, E. M., & Hati, S. R. (2021). Perceptions of nutritional value, sensory appeal, and price influencing customer intention to purchase frozen beef: Evidence from Indonesia. *Meat Science*, 179, 107293. <https://doi.org/10.1016/j.meatsci.2021.107293>
- [26] Viscechia, R., De Devitiis, B., & Seccia, A. (2022). Consumers' preferences for the traceability information of seafood safety. *Sustainability*, 14(6), 3654. <https://doi.org/10.3390/su14063654>
- [27] Araújo, W. M. C., & Patarata, L. (2022). Sustainable dimensions of seafood consumer purchasing behaviour: a review. *Quality-Access to Success*, 23(7), 22-32.
- [28] Widiarta, I. P. G. D., Suarna, I. W., & Suryani, N. N. (2021). Development strategy of Bali cattle business towards sustainable rural economy. *International Journal of Life Sciences*, 5(2), 36–47. <https://doi.org/10.29332/ijls.v5n2.1225>
- [29] Ilham N, Saptati RA, Rohaeni ES. Promoting sustainable consumption through policy frameworks: Strategies for developing regions. *Sustainability Journal*. 2023;17(3):256-270. <https://doi.org/10.1108/SUS-05-2023-0185>
- [30] Qomariah, R., Wahdi, A., & Negara, W. (2024). Mapping of beef supply chain in South Kalimantan for supporting meat supply in the new national capital area. *AIP Conference Proceedings*. <https://pubs.aip.org/aip/acp/article-abstract/2957/1/070056/3262222>