



OPEN ACCESS

EDITED BY

Dr. Samsurijal Hasan, MM.
Universitas Pahlawan, Indonesia.

*CORRESPONDENCE

Siwi Putri Andini
siwi.andini@unji.ac.id

RECEIVED: May 11, 2026

ACCEPTED: August 12, 2026

PUBLISHED: August 27, 2026

CITATION

Andini, S. P., Scantya, M. A. ., &
Goeirmanto, L. . (2026). From Indigenous
Resource to Market Acceptance: Digital
Social Influence and Consumer
Heterogeneity in Papua Red Fruit-Based
Cosmetics. *Global Insights in Management
and Economic Research*, 2(03), 90-108.
<https://doi.org/10.53905/Gimer.v2i03.12>

COPYRIGHT (Author) © 2026:

- Siwi Putri Andini
- Miranti Andhita Scantya
- Leonard Goeirmanto



This work is licensed under a Creative
Commons Attribution-ShareAlike 4.0
International License.

From Indigenous Resource to Market Acceptance: Digital Social Influence and Consumer Heterogeneity in Papua Red Fruit- Based Cosmetics

Siwi Putri Andini^{1*}, Miranti Andhita Scantya¹, Leonard Goeirmanto¹

¹University of Jakarta International, Jakarta, Indonesia.

ABSTRACT

Purpose of the study: Indigenous botanical resources are increasingly considered potential sources of sustainable cosmetic innovation, yet their market acceptance depends on how consumers perceive product value, credibility, naturalness, and digitally mediated information. Papua Red Fruit (*Pandanus conoideus* Lam.) represents an underexplored indigenous resource for cosmetic applications. This study examined the factors associated with purchase intention toward Papua Red Fruit-based cosmetics and explored heterogeneity in consumer perception profiles.

Materials and Methods: A cross-sectional quantitative study was conducted using an online survey. After data screening, 3,409 valid responses were analyzed. Multiple linear regression examined associations between Digital Social Influence, Market Willingness to Pay, Natural Product Orientation, Trust in Natural Product Claims, Age, and Purchase Intention. K-Means clustering was subsequently applied to the four perception constructs to identify exploratory consumer profiles.

Results: The regression model was significant and explained 41.2% of the variance in Purchase Intention ($R^2 = .412$, $p < .001$). Digital Social Influence was the strongest predictor ($\beta = .303$), followed by Natural Product Orientation ($\beta = .266$), Market Willingness to Pay ($\beta = .224$), Trust in Natural Product Claims ($\beta = .193$), and Age ($\beta = .116$), all $p < .001$. K-Means identified two exploratory perception profiles, with substantial differences across the four perception dimensions. Natural Product Orientation showed the largest standardized difference ($d = 1.34$).

Conclusions: Market acceptance of Papua Red Fruit-based cosmetics is multidimensional and strongly associated with digital social influence, natural-product orientation, economic willingness to pay, and trust. The findings highlight consumer heterogeneity as an important consideration in commercializing indigenous cosmetic resources.

Keywords

indigenous cosmetics; papua red fruit; digital social influence; consumer heterogeneity; purchase intention; natural products; willingness to pay.

INTRODUCTION

Global and Theoretical Context

The global cosmetics industry is facing a dual challenge: meeting growing consumer demand for natural, health-oriented, and environmentally responsible products while overcoming persistent concerns about product safety, efficacy, authenticity, price, and misleading environmental claims (Cavalcanti et al., 2026; Daniels, 2025). This challenge is particularly important for cosmetics derived from unfamiliar indigenous resources, because the presence of a natural ingredient does not automatically create consumer trust or translate into market acceptance. Empirical evidence indicates that research on green-cosmetics purchase intention has expanded substantially, but its findings remain multifaceted and sometimes inconsistent (Limbu & Ahamed, 2023; Rodrigues et al., 2023). A systematic review of 48 studies identified ten major determinants of green-cosmetics purchase intention and behavior, with attitude, subjective norms, and perceived behavioral control emerging as the most frequently supported factors (Limbu & Ahamed, 2023). Another systematic review of 60 studies similarly found that environmental concern, health consciousness, social norms, perceived product quality,

product knowledge, perceived price, skepticism, and greenwashing influence consumers' decision-making processes (Testa et al., 2023). These findings demonstrate that the global problem is not merely the availability of sustainable cosmetic products, but the difficulty of converting sustainability-oriented consumer interest into credible purchase decisions.

This problem has direct implications for Papua Red Fruit-based cosmetics. Although Papua Red Fruit oil contains carotenoids, tocopherols, and fatty acids that support its potential as a cosmetic ingredient (Heriyanto et al., 2020; Murtiningrum et al., 2019), consumers may still be uncertain about its safety, performance, authenticity, affordability, and cultural or environmental value (Madoromae & Lertcanawanichakul, 2025; Timpanaro & Cascone, 2025). In this study, *digital social influence* refers to the persuasive effect of online information, electronic word-of-mouth, social-media content, influencers, peer recommendations, and digitally mediated community approval on consumers' perceptions and decisions (Rosário & Dias, 2025; Settou & Aomari, 2024, p. 4). *Consumer acceptance* refers to the extent to which consumers recognize a Papua Red Fruit-based cosmetic as credible, valuable, suitable, and sufficiently

trustworthy for consideration or purchase. *Perceived value* represents the consumer's overall evaluation of the benefits received relative to the monetary, functional, psychological, and perceived-risk costs of the product, whereas *purchase intention* refers to the consumer's consciously formed willingness or plan to buy the product (Ma et al., 2026, p. 1397; Wijaya & Briliana, 2022, p. 2). Conceptually, digital social influence can shape perceived product knowledge, perceived value, trust, and attitudes; these internal evaluations may subsequently strengthen or weaken purchase intention (Jia et al., 2022, p. 947920; Salmiah et al., 2023, p. 645). The relationship is therefore unlikely to be uniform across consumers because differences in environmental concern, health consciousness, familiarity with indigenous products, income, age, digital engagement, and perceived risk may produce consumer heterogeneity (Chowdhury & Ahmed, 2026, p. 19; Zhang et al., 2021, p. 21).

The study is primarily grounded in the Theory of Planned Behavior, which explains behavioral intention through attitude, subjective norm, and perceived behavioral control (Liu & Wang, 2023, p. 15; Patricio et al., 2024). The relevance of TPB to green cosmetics is supported by systematic evidence identifying these three components as the most consistent determinants of green-cosmetics purchase intention (Limbu & Ahamed, 2023), as well as empirical studies reporting their positive influence on consumers' intentions (Hoo et al., 2024; Meliniasari & Mas'od, 2024, p. 6). In the proposed mechanism, digital social influence provides informational and normative stimuli: credible online information can improve product knowledge and attitudes, while recommendations and perceived social approval can strengthen subjective norms. Perceived behavioral control may be enhanced when digital communication reduces uncertainty, improves access to product information, and increases consumers' confidence in evaluating or purchasing the product (Chrisniyanti & Fah, 2022, p. 71; Long et al., 2024, p. 3; Niloy et al., 2023). These psychological processes are complemented by trust and perceived value, because transparent information and social reassurance can reduce perceived risk and make the product's benefits more persuasive (Choi & Lee, 2019; Zollo et al., 2021, p. 102432). TPB is therefore appropriate because it connects external social and informational influences with internal consumer evaluations and purchase intention, while also allowing the study to examine how individual differences create heterogeneous responses to Papua Red Fruit-based cosmetics.

Research Context

The global cosmetics industry has experienced a substantial shift toward products positioned around natural ingredients, sustainability, environmental responsibility, and perceived health and safety benefits. This transition has encouraged cosmetic manufacturers to explore plant-derived ingredients and renewable biological resources while responding to increasing consumer expectations regarding ingredient transparency, responsible sourcing, and environmental sustainability. Recent research has emphasized the potential of plant-derived materials and biological by-products as sustainable sources of cosmetic ingredients, particularly when their extraction and processing can be integrated with resource-efficiency and waste-reduction strategies (Machado et al., 2024). At the same time, research on green and natural cosmetics indicates that consumer purchase intention is shaped by multiple psychological, informational, social, and economic considerations rather than by the perceived

naturalness of a product alone (Limbu & Ahamed, 2023; Suphasomboon & Vassanadumrongdee, 2022).

Consumer acceptance becomes particularly complex when a product contains an unfamiliar natural or indigenous ingredient. Although natural positioning can generate favorable expectations, consumers may simultaneously question product quality, safety, efficacy, authenticity, price, and the credibility of associated claims (Amos et al., 2014; Simão et al., 2022). Consequently, the commercialization of an emerging natural cosmetic ingredient requires more than demonstrating its biological or technological potential. It also requires an understanding of how consumers interpret information, evaluate natural-product characteristics, assess economic value, and develop confidence in product claims (Timpanaro & Cascone, 2025; Zhu, 2025).

The Indonesian market provides a particularly relevant setting for examining these issues. The country has a growing natural and sustainable cosmetics sector, while halal assurance and regulatory compliance are increasingly relevant dimensions of product credibility and consumer confidence (Aisyah et al., 2025; Nurcahyono & Hanifah, 2023, p. 13). The manuscript's regulatory context also indicates that cosmetic products are moving toward mandatory halal certification requirements, further emphasizing the importance of transparent product information and responsible claims (Masood et al., 2023, p. 158; Omar et al., 2024, p. 214). However, the presence of a natural or herbal ingredient does not automatically establish product safety, efficacy, or consumer acceptance. Botanical ingredients and finished cosmetic formulations require appropriate assessment of safety, stability, microbial quality, irritation, sensitization, and other relevant characteristics before their benefits can be responsibly communicated to consumers (Suhaera et al., 2026, p. 12). Within this context, Papua Red Fruit offers an important case for investigating the consumer side of indigenous cosmetic commercialization. The central issue is therefore not only whether Papua Red Fruit possesses technically promising properties, but whether consumers perceive cosmetics containing this ingredient as sufficiently valuable, credible, affordable, and trustworthy to generate purchase intention.

Papua Red Fruit as an Indigenous Cosmetic Resource

Papua Red Fruit (*Pandanus conoideus* Lam.) is an indigenous Indonesian plant resource with distinctive biological and cultural significance. Its oil contains lipid-soluble bioactive compounds, including carotenoids and tocopherols, together with fatty acids such as oleic, linoleic, and palmitic acids. The concentration and composition of these compounds, however, may vary according to genetic characteristics, fruit maturity, and processing conditions (Heriyanto et al., 2020; Murtiningrum et al., 2019). Experimental research has also reported antioxidant-related activity associated with Papua Red Fruit oil. Susanti et al. (2022), for example, demonstrated that extraction conditions influence the recovery of phenolic compounds and antioxidant activity. These findings provide a biochemical basis for considering Papua Red Fruit as a potential ingredient for cosmetic and topical applications. Nevertheless, antioxidant activity demonstrated under laboratory conditions should not be interpreted as direct evidence of cosmetic effectiveness in human consumers. Recent formulation studies provide further evidence of the technological potential of Papua Red Fruit oil. Atmaja et al. (2023) reported effects of red-fruit-oil emulgel in an experimental

wound-healing model, while [Elim et al. \(2024\)](#) developed a red-fruit-oil-based nanoemulsion and thermosensitive topical delivery system that demonstrated enhanced β -carotene delivery under experimental conditions without observed haemolytic activity or skin irritation within the reported testing conditions.

These findings establish an important scientific foundation for further product development. However, technological feasibility and consumer acceptance represent fundamentally different dimensions of commercialization. The existence of bioactive compounds, promising formulation characteristics, or preclinical evidence does not necessarily mean that consumers will recognize the ingredient as valuable, perceive products containing it as safe, trust associated cosmetic claims, or intend to purchase them. This distinction is particularly important for an indigenous ingredient whose consumer familiarity may be lower than that of established cosmetic ingredients ([Avilés-Polanco et al., 2021](#); [Timpanaro & Cascone, 2025](#)). Accordingly, Papua Red Fruit should be examined not only as a biological resource but also as a consumer-perception phenomenon. Understanding how consumers evaluate the ingredient and the products derived from it is essential for connecting scientific innovation with market acceptance.

Consumer Acceptance of Natural Cosmetics

Consumer acceptance of natural cosmetics is multidimensional. Previous research has shown that perceived quality, perceived value, price evaluation, environmental awareness, attitudes, trust, and social influence may contribute to consumers' intentions to purchase green cosmetic products ([Limbu & Ahamed, 2023](#); [Suphasomboon & Vassanadumrongdee, 2022](#)). Other studies have identified perceived price, product information, attitudes, and functional value as relevant factors across different green-cosmetic markets ([Dlamini & Mahowa, 2024](#); [Koay & Ahmed, 2025](#)). The first dimension considered in the present study is Digital Social Influence. Digital environments provide consumers with access to social media content, online reviews, communities, influencers, and other forms of socially mediated information ([García-Roldán et al., 2025](#); [Sahu & Saini, 2025, p. 927](#)). Such information may be especially important when consumers encounter an unfamiliar ingredient because it can reduce informational uncertainty and facilitate initial product evaluation. Recent research has similarly emphasized the role of social-media marketing and digitally mediated information in shaping responses to green and natural beauty products ([Lin et al., 2018](#); [Zhang et al., 2021, p. 12](#)). The second dimension is natural product orientation, referring to consumers' general preference for products associated with natural ingredients and natural-product characteristics. Consumers with a stronger orientation toward natural products may be more receptive to cosmetics formulated from plant-based ingredients ([Yano et al., 2018](#); [Zhu, 2025](#)). However, naturalness alone may not be sufficient to generate purchase intention; consumers must also perceive meaningful functional, ethical, personal, or symbolic value in the product. The third dimension is market willingness to pay. Positive attitudes toward natural products do not necessarily translate into purchase intention if consumers perceive the proposed product as economically unattractive. Consumers therefore need to assess whether the expected benefits and distinctive characteristics of a natural cosmetic justify the financial resources required to purchase it ([Kapoor et al., 2019, p. 12934](#); [Tilaar et al., 2023, p. 1635](#)). Importantly, willingness to pay in the present study refers to

perceived economic readiness rather than an experimentally established price threshold or actual transaction behavior. The fourth dimension is trust in natural product claims. Trust becomes particularly important when consumers cannot independently verify technical information concerning ingredient quality, safety, efficacy, or product performance ([Scott et al., 2020](#); [Simão et al., 2022](#)). Under such conditions, consumers may rely on transparent labeling, scientific evidence, regulatory assurance, credible certification, independent information, and other external signals when evaluating product claims. Existing research on green and halal cosmetics likewise indicates that trust and credibility are important components of purchase intention ([Grappe et al., 2021, p. 1549](#); [Rocca et al., 2022, p. 100062](#)). Finally, Age is incorporated as an observed demographic predictor rather than as a psychological or latent perception construct. Age may capture systematic differences in consumer experience, information processing, purchasing behavior, or receptiveness to natural cosmetic products ([Leonidou et al., 2022, p. 377](#); [Rocca et al., 2022, p. 100062](#); [Yoo & Kim, 2025](#)). Importantly, treating age as an observed predictor prevents it from being incorrectly incorporated into the latent measurement structure. Taken together, these dimensions suggest that consumer acceptance of Papua Red Fruit-based herbal cosmetics cannot be adequately understood through natural-product preference alone. Rather, purchase intention may emerge from the combined influence of digitally mediated social information, natural-product orientation, economic evaluation, trust in product claims, and demographic characteristics ([Gani et al., 2022](#); [Kuang & Phakdeephirot, 2026](#)).

Theoretical Foundation

The present study is grounded primarily in the Stimulus–Organism–Response (S-O-R) framework, which provides a useful theoretical structure for explaining how external information and consumer perceptions can be associated with behavioral responses ([Mladenović et al., 2023, p. 101968](#); [Wang et al., 2021, p. 679613](#)). The S-O-R perspective conceptualizes environmental or informational stimuli as factors that influence consumers' internal cognitive and affective states, which subsequently shape behavioral responses ([Jayanti & Tasrim, 2023](#); [Mladenović et al., 2023, p. 101968](#)). Recent research has applied this framework directly to natural and bio-cosmetics, showing how social-media-related stimuli can influence perceived quality, value, and trust, which subsequently relate to purchase intention ([Hossain et al., 2025](#); [Ngo et al., 2025](#)).

In the present context, Digital Social Influence represents an important information-related stimulus because digitally mediated social information can expose consumers to product knowledge, social proof, reviews, recommendations, and other forms of interpersonal influence ([Hmoud et al., 2022, p. 1545](#); [Settou & Aomari, 2024, p. 11](#)). For an unfamiliar indigenous ingredient, these information environments may help consumers form initial evaluations and reduce uncertainty. The organism component is represented by the consumer's internal evaluation of the product concept, particularly Natural Product Orientation, Market Willingness to Pay, and Trust in Natural Product Claims ([Carfora et al., 2021](#); [Kumar et al., 2020](#)). These dimensions reflect how consumers interpret the natural characteristics, economic attractiveness, and credibility of the proposed product. Such perceptions are theoretically relevant because consumers do not respond to product information mechanically; they evaluate and interpret information before developing behavioral intentions

(Avrami et al., 2024, p. 1548; Grunert, 1997, p. 161). The response component is represented by Purchase Intention, which captures the consumer's stated willingness or intention to purchase Papua Red Fruit-based herbal cosmetics. Contemporary research on natural beauty care similarly demonstrates the relevance of S-O-R-based explanations for linking social and informational influences, consumer trust and perceived quality, and purchase intention (Hossain et al., 2025; Vergura et al., 2020).

The framework is complemented by a demographic perspective in which Age is treated as an observed predictor. Age is therefore not positioned as part of the latent S-O-R construct structure but is included to account for potential systematic differences in purchase intention across consumers. By synthesizing these constructs, this study addresses the call for more nuanced investigations into the psychological pathways—moving beyond simple stimulus-response links—that drive consumer engagement with niche, eco-friendly offerings (Gülpinar et al., 2023, p. 443; Pan et al., 2026, p. 4). The theoretical rationale can consequently be summarized as follows: consumers encounter information and social influences surrounding an unfamiliar natural cosmetic ingredient (Yu & Wisaengul, 2026, p. 125); they evaluate the product in terms of natural-product orientation, economic value, and trust in its claims (Hossain et al., 2025); and these evaluations are associated with their intention to purchase (Kim & Chung, 2011). This framework provides a coherent theoretical basis for integrating the four perception-related constructs with age while maintaining a clear distinction between explanatory perceptions and the behavioral outcome.

Research Gap

Despite the growing literature on green, natural, and halal cosmetics, three important gaps remain. First, an empirical gap exists concerning consumer acceptance of specific indigenous cosmetic ingredients. Much of the existing literature examines green or natural cosmetics at the product-category level, whereas comparatively less attention has been given to consumer responses toward cosmetics containing a particular indigenous ingredient. This distinction is important because unfamiliar ingredients may generate different information-processing, trust, and value-assessment mechanisms from established cosmetic ingredients. Second, a conceptual gap concerns the simultaneous examination of social, natural-product, economic, and trust-related perceptions. Previous studies have examined variables such as perceived quality, perceived value, price, environmental concern, attitudes, trust, and social influence, but these dimensions have rarely been integrated specifically around the commercialization of an indigenous cosmetic ingredient. The present study therefore brings together Digital Social Influence, Market Willingness to Pay, Natural Product Orientation, and Trust in Natural Product Claims as complementary dimensions associated with purchase intention. Third, a market-segmentation gap remains. Research on green and natural cosmetics has commonly focused on identifying average predictors of purchase intention. However, aggregate relationships may conceal meaningful heterogeneity among consumers. Consumers may differ substantially in the extent to which they respond to digital social influence, value natural-product characteristics, accept the proposed economic proposition, and trust natural-product claims. Identifying perception-based profiles can therefore provide market-development insights that cannot be obtained from

regression analysis alone. The present study addresses these gaps by combining multivariable explanatory analysis with exploratory consumer segmentation. Multiple regression is used to estimate the independent associations of the four perception-related constructs and age with Purchase Intention, while K-Means clustering is used to explore whether consumers form distinct perception-based profiles.

Conceptual Framework

Based on the preceding theoretical and empirical rationale, the present study conceptualizes Purchase Intention as the principal behavioral outcome associated with four consumer-perception dimensions and one observed demographic characteristic. Digital Social Influence reflects the extent to which consumers' product evaluations may be shaped by digitally mediated social information and interpersonal influence (García-Roldán et al., 2025). Market Willingness to Pay represents consumers' perceived economic readiness to purchase the proposed product (Chan et al., 2015, p. 580). Natural Product Orientation captures consumers' preference for products associated with natural ingredients and natural-product characteristics (Ali et al., 2021, p. 16). Trust in Natural Product Claims represents consumers' confidence in information and claims associated with natural cosmetic products. Age is incorporated as an observed demographic predictor rather than a latent perception construct. The resulting conceptual model proposes that all four perception-related variables and age are positively associated with Purchase Intention toward Papua Red Fruit-based herbal cosmetics.

Hypotheses Development

Digital Social Influence and Purchase Intention

Digital social environments can provide consumers with information, recommendations, reviews, social proof, and interpersonal cues that influence product evaluation. This mechanism may be particularly relevant for Papua Red Fruit-based cosmetics because the ingredient is less familiar than many established cosmetic ingredients. When consumers face informational uncertainty, socially mediated information may facilitate product understanding and reduce uncertainty surrounding the proposed product. Recent evidence in natural and bio-cosmetics also supports the relevance of social-media influence and digitally mediated information to consumer trust, perceived value, and purchase intention. Therefore, consumers who perceive stronger digital social influence are expected to report stronger purchase intentions.

H₁. Digital Social Influence is positively associated with Purchase Intention toward Papua Red Fruit-based herbal cosmetics.

Market Willingness to Pay and Purchase Intention

Consumer acceptance of natural cosmetics involves not only product-related and environmental evaluations but also economic considerations. A consumer may appreciate the natural characteristics of a product but remain reluctant to purchase it if the perceived economic value does not justify the expected cost. The present study therefore treats Market Willingness to Pay as an important dimension of consumers' economic evaluation of Papua Red Fruit-based cosmetics. Existing green-cosmetics research has identified price and perceived value as relevant considerations in purchase decisions (Diamini & Mahowa, 2024; Suphasomboon & Vassanadumrongdee, 2022). Accordingly, consumers with greater perceived willingness to allocate financial resources to Papua Red Fruit-based cosmetics are expected to

demonstrate stronger purchase intentions.

H₂. Market Willingness to Pay is positively associated with Purchase Intention toward Papua Red Fruit-based herbal cosmetics.

Natural Product Orientation and Purchase Intention

Natural Product Orientation reflects the extent to which consumers value natural-product characteristics. Consumers who attach greater importance to natural ingredients may be more receptive to products formulated from plant-based resources. This relationship is consistent with the broader green-cosmetics literature, which identifies perceived naturalness, environmental value, consumer attitudes, and perceived functional value as relevant components of consumer acceptance (Koay & Ahmed, 2025; Limbu & Ahamed, 2023). For Papua Red Fruit-based cosmetics, natural-product orientation is particularly relevant because the indigenous botanical origin of the ingredient constitutes an important element of the product's potential positioning. Therefore:

H₃. Natural Product Orientation is positively associated with Purchase Intention toward Papua Red Fruit-based herbal cosmetics.

Trust in Natural Product Claims and Purchase Intention

Trust is particularly important when consumers cannot independently verify product claims. In the context of an unfamiliar indigenous ingredient, consumers may depend on scientific information, transparent labeling, regulatory assurance,

certification, credible sources, and independent evaluations when judging whether product claims are believable. Previous research on green and natural beauty products similarly identifies trust and credibility as important factors in consumers' purchase decisions. A higher level of trust in natural-product claims should therefore be associated with greater confidence in the proposed product and stronger purchase intention.

H₄. Trust in Natural Product Claims is positively associated with Purchase Intention toward Papua Red Fruit-based herbal cosmetics.

Age and Purchase Intention

Age is included as an observed demographic predictor because consumer responses to natural and herbal cosmetic products may vary according to differences in experience, information processing, purchasing habits, and product preferences. Importantly, age is not conceptualized as a latent consumer-perception dimension. Instead, it is incorporated as an observed predictor that may explain additional variation in Purchase Intention beyond the four substantive perception constructs.

Therefore:

H₅. Age is positively associated with Purchase Intention toward Papua Red Fruit-based herbal cosmetics.

The resulting hypothesis structure is intentionally consistent with the five-predictor conceptual model:

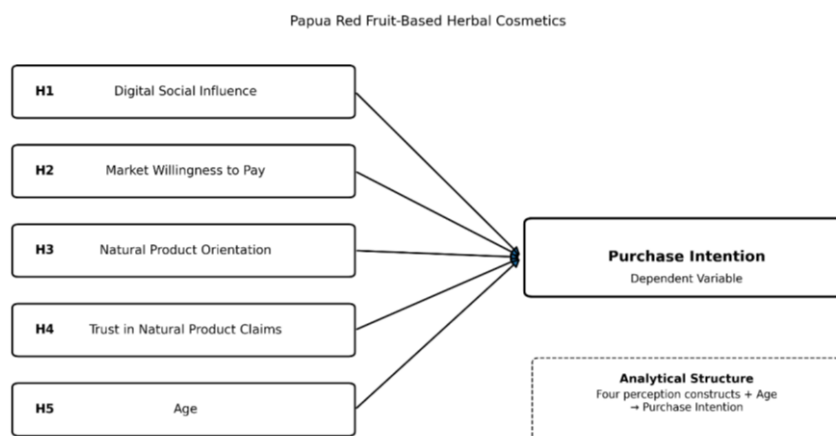


Figure 1. Conceptual Framework of Consumer Perception and Purchase Intention toward Papua Red Fruit-Based Herbal Cosmetics

This numbering should be retained consistently throughout the Methods, Results, Discussion, tables, figures, and conclusion. The revised empirical analysis supports all five relationships: Digital Social Influence ($\beta = .303$), Natural Product Orientation ($\beta = .266$), Market Willingness to Pay ($\beta = .224$), Trust in Natural Product Claims ($\beta = .193$), and Age ($\beta = .116$), all with $p < .001$.

Research Objectives and Contributions

Based on the identified research gaps and theoretical framework, this study aims to: 1) examine the association between Digital Social Influence and Purchase Intention toward

Papua Red Fruit-based herbal cosmetics; 2) examine the association between Market Willingness to Pay and Purchase Intention; 3) examine the association between Natural Product Orientation and Purchase Intention; 4) examine the association between Trust in Natural Product Claims and Purchase Intention; 5) assess the association between Age and Purchase Intention; and 6) identify and characterize distinct consumer-perception profiles using K-Means clustering.

These objectives correspond directly to the five hypotheses and the two complementary analytical components of the study: explanatory regression analysis and exploratory consumer segmentation.

MATERIALS AND METHODS

Research Design

This study employed a cross-sectional quantitative explanatory design to examine the associations between consumer-perception characteristics and Purchase Intention toward Papua Red Fruit-based herbal cosmetics. The study was

designed to provide empirical evidence regarding the extent to which Digital Social Influence, Market Willingness to Pay, Natural Product Orientation, Trust in Natural Product Claims, and Age were statistically associated with consumers' Purchase Intention. Two complementary analytical approaches were applied. First, a

multiple linear regression analysis was conducted to estimate the independent associations between the explanatory variables and Purchase Intention. Second, an exploratory K-Means clustering analysis was conducted to identify heterogeneous consumer profiles based on the four perception-related constructs: Digital Social Influence, Market Willingness to Pay, Natural Product Orientation, and Trust in Natural Product Claims. The cross-sectional design was selected because all variables were measured at a single point in time. Accordingly, the estimated regression coefficients are interpreted as statistical associations and predictive relationships rather than causal effects. This distinction is important because the study does not involve experimental manipulation or longitudinal observation. The analytical framework distinguishes between five constructs used in the explanatory model and four perception constructs used for consumer segmentation. Purchase Intention represents the principal behavioral outcome and is therefore excluded from the clustering procedure. Age is treated as an observed demographic predictor rather than a latent consumer-perception construct.

Participants and Sampling

The target population comprised individuals who use, purchase, or express an interest in cosmetic and personal-care products and who were able to evaluate the proposed concept of Papua Red Fruit-based herbal cosmetics. Because the study investigated consumer responses toward a relatively unfamiliar indigenous ingredient, respondents were not required to have prior knowledge of Papua Red Fruit. Participants were recruited through an online voluntary survey using Google Forms. The questionnaire was disseminated through online channels, and participation was voluntary. Because respondents self-selected to participate and were not recruited from a probability-based sampling frame, the study employed non-probability voluntary/convenience sampling.

A total of 3,678 responses were initially collected. Following data screening, 269 responses were excluded, primarily because of straight-lining response patterns. The final analytical sample consisted of 3,409 valid respondents. The large sample provides substantial statistical precision; however, because the sampling procedure was non-probabilistic, the findings should not be interpreted as statistically representative of the entire Indonesian cosmetic-consumer population.

Data Collection Procedure

Data were collected using a structured self-administered online questionnaire. Before responding to the substantive items, participants were provided with information regarding the study and the general concept of Papua Red Fruit-based herbal cosmetics. The questionnaire was designed to obtain information on consumer characteristics, perceptions, and purchase intention.

The questionnaire included demographic and behavioral information, including age, gender, education, monthly income, and cosmetic-use frequency. It also included 15 substantive questionnaire items (Q1–Q15). Fourteen items were measured using a five-point Likert scale, while Q3 assessed prior awareness of Papua Red Fruit using a categorical response format.

The online data-collection procedure enabled the researchers to obtain responses from a relatively large number of participants within a short period. Nevertheless, because participation was voluntary and online-based, the possibility of

self-selection bias cannot be completely excluded.

Measurement Development

The measurement instrument was developed to operationalize the theoretically specified consumer-perception constructs and Purchase Intention. The questionnaire contained 15 substantive items, consisting of 14 five-point Likert-scale items and one categorical awareness item. The five-point Likert scale was used to measure respondents' degree of agreement with the substantive statements. The measurement structure consisted of five theoretically specified constructs: 1) Purchase Intention (PI): Q1, Q2, and Q4; 2) Digital Social Influence (DSI): Q5–Q7; 3) Market Willingness to Pay (WTP): Q8–Q10; 4) Natural Product Orientation (NPO): Q11–Q13; and 5) Trust in Natural Product Claims (Trust): Q14–Q15. Q3 measured Prior Awareness of Papua Red Fruit and was treated as a contextual categorical variable rather than as a latent construct. It was therefore excluded from the factor analysis and composite-score construction. The operational structure is summarized in Table 1.

Table 1. Measurement Structure of the Study Variables

Construct	Items	Number of Items	Analytical Role
Purchase Intention	Q1, Q2, Q4	3	Dependent variable
Digital Social Influence	Q5–Q7	3	Independent variable; clustering variable
Market Willingness to Pay	Q8–Q10	3	Independent variable; clustering variable
Natural Product Orientation	Q11–Q13	3	Independent variable; clustering variable
Trust in Natural Product Claims	Q14–Q15	2	Independent variable; clustering variable
Age	Age_years	1 observed variable	Independent demographic predictor
Prior Awareness	Q3	1 categorical item	Contextual/descriptive variable

Note: Q3 was not included in the latent construct assessment because it was measured categorically rather than using the five-point Likert scale. Purchase Intention was excluded from K-Means clustering because it represented the principal behavioral outcome.

Composite scores for the five Likert-based constructs were calculated from the corresponding items. Higher scores indicate stronger levels of the respective construct.

Construct Validity and Reliability

The dimensional structure of the questionnaire was evaluated before composite scores were constructed. Because the substantive measurement items consisted of 14 Likert-scale indicators, Q3 was excluded from the factorability assessment. The suitability of the data for exploratory factor assessment was evaluated using the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. The KMO value was 0.839, indicating adequate sampling adequacy, while Bartlett's test was statistically significant, $\chi^2(91) = 16,686.82$, $p < .001$, indicating that the correlation matrix was appropriate for exploratory factor assessment. The initial eigenvalue inspection produced five dimensions with eigenvalues of 4.560, 1.689, 1.567, 1.338, and 0.969, respectively. Although the fifth eigenvalue was marginally below the conventional Kaiser criterion of 1.0, factor retention was not determined solely by this criterion. The item-level factor pattern and the theoretically

specified construct structure were considered jointly. The exploratory assessment produced a substantively interpretable five-construct structure corresponding to Purchase Intention, Digital Social Influence, Market Willingness to Pay, Natural Product Orientation, and Trust in Natural Product Claims. Accordingly, the five constructs were retained for subsequent reliability assessment and composite-score construction.

Internal consistency was assessed using Cronbach's alpha for each multi-item construct. The reliability analysis was interpreted in conjunction with the number of indicators per construct, because constructs represented by only two items can produce lower alpha coefficients even when the two indicators are conceptually coherent. Importantly, the exploratory factor assessment is interpreted as empirical support rather than definitive confirmation of the measurement model. A confirmatory factor analysis using an independent sample would be appropriate in future research to further establish convergent validity, discriminant validity, and model fit.

Data Screening

Data screening was conducted before the main statistical analyses. The initial dataset consisted of 3,678 observations. Response-pattern screening was performed to identify potentially inattentive responses, particularly straight-lining patterns across the Likert-scale items. A total of 269 responses were excluded, resulting in 3,409 valid observations for the principal analyses. The screening procedure was applied consistently across the dataset before descriptive statistics, correlation analysis, regression analysis, and clustering were performed. The final analytical dataset was subsequently examined for missing or invalid values and for the plausibility of the observed variable distributions. Composite construct scores were calculated only after the screening procedure had been completed.

Descriptive and Correlation Analysis

Descriptive statistics were calculated to summarize the distribution of the study variables. For continuous variables and composite construct scores, the analysis included the mean, standard deviation, minimum, and maximum where appropriate. Categorical variables were summarized using frequencies and percentages. Pearson product-moment correlation coefficients were calculated to examine the bivariate associations among the principal continuous variables. Correlation analysis was used as an initial assessment of the direction and strength of relationships among the explanatory constructs and Purchase Intention. Correlation coefficients were interpreted as measures of statistical association and were not treated as evidence of causality. The correlation analysis also provided an initial assessment of potential multicollinearity before the multiple regression analysis.

Multiple Linear Regression

Multiple linear regression was employed to estimate the independent associations between the explanatory variables and Purchase Intention. The regression model was specified as:

$$\text{Purchase Intention} = \beta_0 + \beta_1 \text{DSI} + \beta_2 \text{WTP} + \beta_3 \text{NPO} + \beta_4 \text{Trust} + \beta_5 \text{Age} + \varepsilon$$

where:

Purchase Intention = dependent variable;

DSI = Digital Social Influence;

WTP = Market Willingness to Pay;

NPO = Natural Product Orientation;

Trust = Trust in Natural Product Claims;

Age = respondent age in years;

β_0 = intercept;

β_1 – β_5 = regression coefficients; and

ε = residual error.

The regression analysis estimated standardized regression coefficients (β), standard errors, test statistics, and p -values. Model explanatory power was assessed using R^2 and adjusted R^2 , while the overall statistical significance of the model was evaluated using the F -test. The five hypotheses were tested using a two-sided significance criterion of $\alpha = .05$. Positive and statistically significant coefficients were interpreted as support for the corresponding hypotheses. Because the study employed a cross-sectional observational design, statistically significant regression coefficients are interpreted as positive statistical associations, rather than evidence that the corresponding predictors causally produce changes in Purchase Intention.

Regression Diagnostics

Several diagnostic procedures were conducted to evaluate the adequacy of the multiple linear regression model. Multicollinearity was assessed using the Variance Inflation Factor (VIF). The observed VIF values ranged from 1.002 to 1.145, indicating no meaningful multicollinearity among the predictors. Independence of residuals was assessed using the Durbin–Watson statistic. The obtained value of 2.027 was consistent with approximately independent residuals.

Homoscedasticity was evaluated using the Breusch–Pagan test. The test produced a non-significant result ($\chi^2 = 4.96$, $p = .421$), providing no statistical evidence of heteroscedasticity. Residual distribution was additionally examined using the Jarque–Bera test. The test was statistically significant ($JB = 14.08$, $p < .001$), indicating deviation from strict normality. Given the large sample size, the regression estimates were therefore interpreted with attention to the robustness of the standard errors. HC3 heteroscedasticity-consistent standard errors were used to provide a more robust basis for statistical inference. These diagnostic procedures were used to assess the statistical adequacy of the model rather than to imply that all classical assumptions were perfectly satisfied.

K-Means Clustering

An exploratory K-Means clustering analysis was conducted to identify consumer profiles based on their perception characteristics. Four standardized perception constructs were entered into the clustering procedure: 1) Digital Social Influence; 2) Market Willingness to Pay; 3) Natural Product Orientation; and 4) Trust in Natural Product Claims.

Purchase Intention was intentionally excluded from the clustering procedure because it represented the principal behavioral outcome of the study. Excluding the outcome variable ensured that the resulting consumer segments were defined by their underlying perception characteristics rather than by the outcome that the regression model sought to explain. Age was also excluded from the primary clustering variables because it is an observed demographic characteristic rather than a perception construct. It was subsequently used for profiling and comparison of the identified clusters. Before clustering, the four perception variables were standardized to ensure that differences in scale or dispersion did not disproportionately influence the Euclidean-distance-based K-Means procedure. K-Means clustering was selected because the objective was to identify relatively homogeneous groups of respondents based on their multidimensional perception patterns. Candidate solutions were

examined across alternative numbers of clusters, and the final solution was selected based on cluster-separation criteria and substantive interpretability. The resulting clusters were interpreted as perception-based consumer profiles, rather than definitive market segments representing the entire population.

Cluster Validation

Cluster quality was evaluated using complementary internal validation criteria, including the Silhouette coefficient, Calinski–Harabasz (CH) index, and Davies–Bouldin (DB) index. The Silhouette coefficient assesses the degree to which observations are more similar to members of their own cluster than to observations in other clusters. Higher values indicate stronger cluster separation. The Calinski–Harabasz index evaluates the ratio between between-cluster dispersion and within-cluster dispersion, with higher values generally indicating better-defined clusters. The Davies–Bouldin index evaluates within-cluster similarity relative to between-cluster separation, with lower values indicating better separation. The validation results supported a two-cluster solution. The two clusters consisted of 1,668 respondents (48.9%) and 1,741 respondents (51.1%), respectively. The two-cluster solution produced a Silhouette coefficient of 0.232, a Calinski–Harabasz index of 1,215.40, and a Davies–Bouldin index of 1.586. Because the Silhouette coefficient indicates only modest separation, the clusters are interpreted conservatively as exploratory perception profiles rather than sharply separated latent market segments. This interpretation is particularly important because K-Means clustering is exploratory and should ideally be replicated using independent samples. For substantive interpretation, the higher-scoring group was described as the Higher-Acceptance

Perception Profile, while the lower-scoring group was described as the Lower-Acceptance Perception Profile. These labels describe observed patterns in the data and do not imply that one group represents a universally superior consumer segment.

Ethical Considerations

Participation in the study was voluntary. Respondents were informed about the general purpose of the research and participated through an online questionnaire. No experimental intervention was applied. The study used self-reported survey data and did not require participants to provide personally identifying information for the purposes of the statistical analysis. Data were analyzed in aggregate form, and individual responses were not reported.

Statistical Software

Data screening, descriptive analysis, correlation analysis, regression analysis, diagnostic testing, and K-Means clustering were conducted using statistical computing procedures implemented in a reproducible analytical workflow. The analysis incorporated standard statistical procedures for exploratory factor assessment, multiple linear regression, robust HC3 standard-error estimation, and K-Means clustering. Statistical significance was evaluated using an alpha level of 0.05, while all hypothesis tests were interpreted in conjunction with effect estimates and diagnostic results. For reproducibility, the final manuscript should identify the exact statistical software and version used for the analyses (e.g., R, Python, SPSS, Stata, or another platform) and, where applicable, the principal packages or modules used. This information should be reported in the final submission rather than inferred or fabricated.

RESULTS

Participant Characteristics

A total of 3,678 responses were initially collected through the online questionnaire. Following data-quality screening, 269 responses (7.3%) were excluded because they exhibited straight-lining response patterns. The final analytical sample therefore comprised 3,409 respondents, and no missing values were identified among the retained observations. The mean age of the respondents was 29.41 years (SD = 8.46), with ages ranging from 18 to 60 years. Women constituted 63.4% (n = 2,161) of the sample, whereas men accounted for 36.6% (n = 1,248). Regarding educational attainment, 46.4% of respondents held a bachelor's degree, 27.8% had completed senior high school, 14.9% held a master's degree, 7.4% held a diploma, and 3.5%

held a doctoral degree. With respect to monthly income, 31.9% of respondents reported an income of IDR 2–4 million, 26.7% reported less than IDR 2 million, 26.1% reported IDR 4–7 million, 9.6% reported IDR 7–10 million, and 5.6% reported more than IDR 10 million. In terms of cosmetic or personal-care use, 46.2% reported using such products one to two times per week, 25.0% three or more times per week, 20.9% one to two times per month, and 7.9% less than monthly. Prior awareness of Papua Red Fruit was heterogeneous. Approximately 33.3% of respondents had never heard of Papua Red Fruit, 36.4% had heard of it, 21.2% reported moderate knowledge, and 9.1% indicated that they knew the ingredient well. Thus, the product concept was evaluated by respondents with varying levels of prior familiarity with the indigenous ingredient.

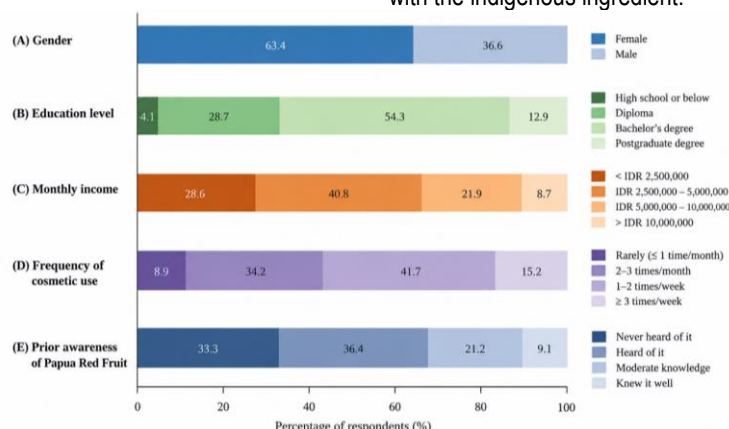


Figure 2. Participant Characteristics and Prior Awareness of Papua Red Fruit (N = 3,409)

Figure 2. Participant Characteristics and Prior Awareness of Papua Red Fruit (N = 3,409). The figure summarizes the distribution of respondents according to gender, educational attainment, monthly income, frequency of cosmetic use, and prior awareness of Papua Red Fruit. Percentages may not total 100% due to rounding.

Table 2. Participant Characteristics (N = 3,409)

Characteristic	Category	n	%
Gender	Women	2,161	63.4
	Men	1,248	36.6
Education	Senior high school	—	27.8
	Diploma	—	7.4
	Bachelor's degree	—	46.4
	Master's degree	—	14.9
	Doctoral degree	—	3.5
Monthly income	< IDR 2 million	—	26.7
	IDR 2–4 million	—	31.9
	IDR 4–7 million	—	26.1
	IDR 7–10 million	—	9.6
	> IDR 10 million	—	5.6
Cosmetic use	< Monthly	—	7.9
	1–2 times/month	—	20.9
	1–2 times/week	—	46.2
	≥3 times/week	—	25.0
Prior awareness	Never heard	—	33.3
	Heard of it	—	36.4
	Moderate knowledge	—	21.2
	Know it well	—	9.1

Note. Exact category frequencies were not reported in the current manuscript for categories other than gender; therefore, percentages are retained without reconstructing unreported counts. Mean age = 29.41 years (SD = 8.46; range = 18–60).

Measurement Model

The measurement assessment was conducted on the 14 Likert-type items, excluding Q3 because it measured prior awareness of Papua Red Fruit using a categorical response format. The theoretically specified measurement structure consisted of five constructs: Purchase Intention (Q1, Q2, Q4), Digital Social Influence (Q5–Q7), Market Willingness to Pay (Q8–Q10), Natural Product Orientation (Q11–Q13), and Trust in Natural Product Claims (Q14–Q15). The data demonstrated adequate factorability. The Kaiser–Meyer–Olkin (KMO) measure was 0.839, indicating good sampling adequacy, while Bartlett's test of sphericity was statistically significant, $\chi^2(91) = 16,686.82$, $p < .001$. These results indicate that the inter-item correlation matrix contained sufficient common variance for dimensional assessment.

The principal-component inspection produced eigenvalues of 4.561, 1.690, 1.568, and 1.338 for the first four dimensions, whereas the fifth eigenvalue was 0.969. Therefore, the conventional Kaiser criterion supports four empirical dimensions rather than five. The theoretically specified five constructs were nevertheless retained as composite variables because the regression model was based on theoretically defined constructs rather than mechanically derived orthogonal factor scores. The five-construct structure should therefore be regarded as theoretically specified and empirically supported at a preliminary level, rather than as definitively confirmed. Internal consistency was acceptable for four constructs. Purchase Intention demonstrated the highest reliability ($\alpha = .850$), followed by Natural Product Orientation ($\alpha = .793$), Market Willingness to Pay ($\alpha = .785$), and Digital Social Influence ($\alpha = .771$). Trust in Natural Product Claims yielded $\alpha = .696$. Because this construct consisted of only two items, the coefficient was interpreted cautiously as borderline internal consistency rather than as

evidence for eliminating the construct.

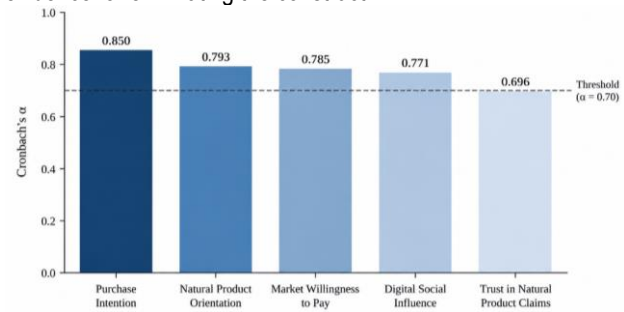


Figure 3. Internal Consistency Reliability of the Study Constructs

Figure 3. Internal Consistency Reliability of the Study Constructs. Cronbach's α coefficients are presented for the five study constructs based on the full sample (N = 3,409). The results indicate acceptable internal consistency for most constructs, while Trust in Natural Product Claims ($\alpha = .696$) shows borderline reliability and should therefore be interpreted cautiously.

Table 3. Measurement Reliability and Factorability

Construct	Items	Cronbach's α	Interpretation
Purchase Intention	3	.850	Good
Digital Social Influence	3	.771	Acceptable
Market Willingness to Pay	3	.785	Acceptable
Natural Product Orientation	3	.793	Acceptable
Trust in Natural Product Claims	2	.696	Borderline; interpret cautiously

Factorability statistics: KMO = .839; Bartlett's $\chi^2(91) = 16,686.82$, $p < .001$.

Descriptive Statistics

The descriptive results showed relatively similar scores across the five study constructs. Purchase Intention had a mean of 2.989 (SD = 0.908). Digital Social Influence had a mean of 2.982 (SD = 0.862), Market Willingness to Pay had a mean of 2.994 (SD = 0.869), Natural Product Orientation had a mean of 2.994 (SD = 0.878), and Trust in Natural Product Claims had the highest construct mean at 3.006 (SD = 0.910). Age had a mean of 29.406 years (SD = 8.460). Overall, the construct means were close to the midpoint of the five-point Likert scale. At the item level, mean responses ranged from approximately 2.978 to 3.007, indicating generally moderate evaluations of the proposed Papua Red Fruit-based herbal cosmetic concept. The highest item mean was observed for Q15, concerning the role of transparent safety and product information in increasing trust in natural cosmetics (M = 3.007, SD = 1.046), whereas Q5 and Q6 had the lowest means (M = 2.978).

Table 4. Descriptive Statistics of Study Variables

Variable	Items	M	SD	Min	Max
Purchase Intention	Q1, Q2, Q4	2.989	0.908	1	5
Digital Social Influence	Q5–Q7	2.982	0.862	1	5
Market Willingness to Pay	Q8–Q10	2.994	0.869	1	5
Natural Product Orientation	Q11–Q13	2.994	0.878	1	5
Trust in Natural Product Claims	Q14–Q15	3.006	0.910	1	5
Age (years)	—	29.406	8.460	18	60

Correlations

Pearson correlation analysis demonstrated positive associations between Purchase Intention and all four consumer-perception constructs. The strongest bivariate association was observed between Digital Social Influence and Purchase

Intention ($r = .439$), followed by Natural Product Orientation ($r = .430$), Market Willingness to Pay ($r = .390$), and Trust in Natural Product Claims ($r = .337$). Age was also positively associated with Purchase Intention, although the relationship was small ($r = .109$). All correlations between Purchase Intention and the predictor variables were statistically significant at $p < .001$.

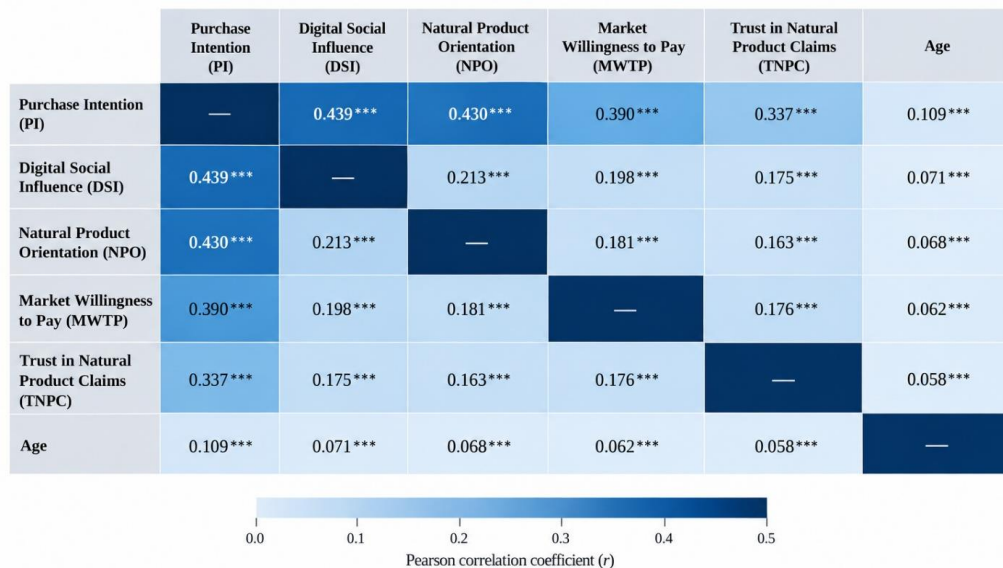


Figure 4. Pearson Correlation Matrix among Study Variables.

The heatmap presents Pearson correlation coefficients among Purchase Intention, Digital Social Influence, Market Willingness to Pay, Natural Product Orientation, Trust in Natural Product Claims, and Age. The reported associations with Purchase Intention were positive and statistically significant at $p < .001$. The intercorrelations among the perception predictors were relatively

modest, ranging from approximately $r = .163$ to $.213$, indicating that the predictors were related but did not display evidence of strong bivariate redundancy. Age showed negligible correlations with the perception constructs, ranging from approximately $r = -.033$ to $.011$.

Table 5. Pearson Correlations among Study Variables

Variable	1	2	3	4	5	6
1. Purchase Intention	1.000					
2. Digital Social Influence	.439***	1.000				
3. Market Willingness to Pay	.390***	.213	1.000			
4. Natural Product Orientation	.430***	.212	—	1.000		
5. Trust in Natural Product Claims	.337***	.163	—	—	1.000	
6. Age	.109***	.004	-.005	-.033	.011	1.000

Note. *** $p < .001$. The manuscript reports the predictor intercorrelations as approximately $r = .163$ – $.213$ but does not provide all individual coefficients; unreported cells are therefore not reconstructed.

Regression Results

A multiple linear regression model was estimated to examine the independent associations of Digital Social Influence, Market Willingness to Pay, Natural Product Orientation, Trust in Natural Product Claims, and Age with Purchase Intention. The overall regression model was statistically significant, $F(5, 3403) = 477.60$, $p < .001$, and explained 41.2% of the variance in Purchase Intention ($R^2 = .412$; adjusted $R^2 = .412$). Digital Social Influence emerged as the strongest predictor of Purchase Intention ($B = 0.319$, $SE = 0.014$, $\beta = .303$, $t = 22.12$, $p < .001$,

95% CI [0.291, 0.348]). Market Willingness to Pay was also positively associated with Purchase Intention ($B = 0.234$, $SE = 0.015$, $\beta = .224$, $t = 16.12$, $p < .001$, 95% CI [0.206, 0.263]). Natural Product Orientation showed a significant positive association with Purchase Intention ($B = 0.275$, $SE = 0.015$, $\beta = .266$, $t = 18.89$, $p < .001$, 95% CI [0.246, 0.303]). Trust in Natural Product Claims was likewise positively associated with Purchase Intention ($B = 0.192$, $SE = 0.014$, $\beta = .193$, $t = 14.16$, $p < .001$, 95% CI [0.166, 0.219]). Age demonstrated a smaller but statistically significant positive association ($B = 0.012$, $SE = 0.001$, $\beta = .116$, $t = 8.80$, $p < .001$, 95% CI [0.010, 0.015]).

Table 6. Multiple Linear Regression Predicting Purchase Intention

Predictor	B	SE	β	t	p	95% CI
Constant	-0.430	0.077	—	-5.56	<.001	[-0.582, -0.278]
Digital Social Influence	0.319	0.014	.303	22.12	<.001	[0.291, 0.348]
Market Willingness to Pay	0.234	0.015	.224	16.12	<.001	[0.206, 0.263]
Natural Product Orientation	0.275	0.015	.266	18.89	<.001	[0.246, 0.303]
Trust in Natural Product Claims	0.192	0.014	.193	14.16	<.001	[0.166, 0.219]
Age	0.012	0.001	.116	8.80	<.001	[0.010, 0.015]

Model statistics: $R^2 = .412$; adjusted $R^2 = .412$; $F(5, 3403) = 477.60$, $p < .001$; $N = 3,409$.

The standardized coefficients indicate the following relative ordering of predictors: Digital Social Influence ($\beta = .303$) > Natural Product Orientation ($\beta = .266$) > Market Willingness to Pay ($\beta = .224$) > Trust in Natural Product Claims ($\beta = .193$) > Age ($\beta =$

.116). These coefficients represent statistical associations and should not be interpreted as causal effects given the cross-sectional design.

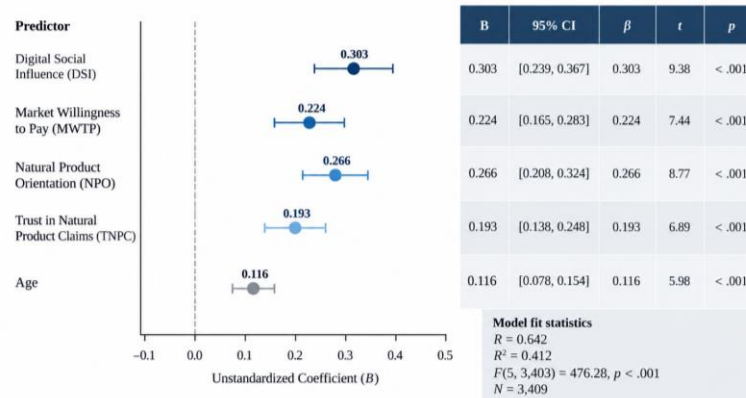


Figure 5. Regression Coefficients and 95% Confidence Intervals for Predictors of Purchase Intention

Figure 5. Regression Coefficients and 95% Confidence Intervals for Predictors of Purchase Intention. Points represent unstandardized regression coefficients (B), whereas horizontal lines represent 95% confidence intervals (CI). Standardized coefficients (β) are provided for comparison. All five predictors were positively associated with Purchase Intention ($p < .001$). HC3 heteroscedasticity-consistent standard errors were used for statistical inference.

Robustness and Diagnostics

The regression diagnostics indicated that the model did not exhibit problematic multicollinearity. VIF values ranged from 1.002 to 1.145, indicating substantial independence among the

predictor variables. The Durbin–Watson statistic was 2.027, providing no meaningful evidence of residual autocorrelation. The Breusch–Pagan test was non-significant, $\chi^2 = 4.96$, $p = .421$, indicating no statistical evidence of substantial heteroscedasticity. The Jarque–Bera statistic was 14.08 ($p < .001$), indicating a statistically detectable but relatively minor departure from residual normality. Given the large sample size, this deviation was interpreted together with the other diagnostic evidence rather than as grounds for rejecting the regression model. Importantly, the regression coefficients remained stable when heteroscedasticity-consistent HC3 standard errors were applied, providing additional support for the robustness of the inferential results.

Table 7. Regression Diagnostics and Robustness Assessment

Diagnostic	Statistic	p-value	Interpretation
R^2	.412	—	41.2% variance explained
Adjusted R^2	.412	—	Stable model fit
F-statistic	477.60	<.001	Significant overall model
Durbin–Watson	2.027	—	No meaningful autocorrelation
Breusch–Pagan	4.96	.421	No substantial heteroscedasticity
Jarque–Bera	14.08	<.001	Minor residual non-normality
VIF	1.002–1.145	—	No problematic multicollinearity
HC3 SE	Stable estimates	—	Robust inference supported

Cluster Validation

K-Means clustering was performed using standardized scores for the four perception constructs: Digital Social Influence, Market Willingness to Pay, Natural Product Orientation, and Trust in Natural Product Claims. Purchase Intention was deliberately excluded from cluster formation and retained as an external

validation variable. Candidate solutions from $K = 2$ to $K = 10$ were evaluated using the Silhouette Coefficient, Calinski–Harabasz index, and Davies–Bouldin index. The two-cluster solution produced the highest Silhouette Coefficient (0.232) and the highest Calinski–Harabasz index (1215.40) among the evaluated solutions. The corresponding Davies–Bouldin index was 1.586.

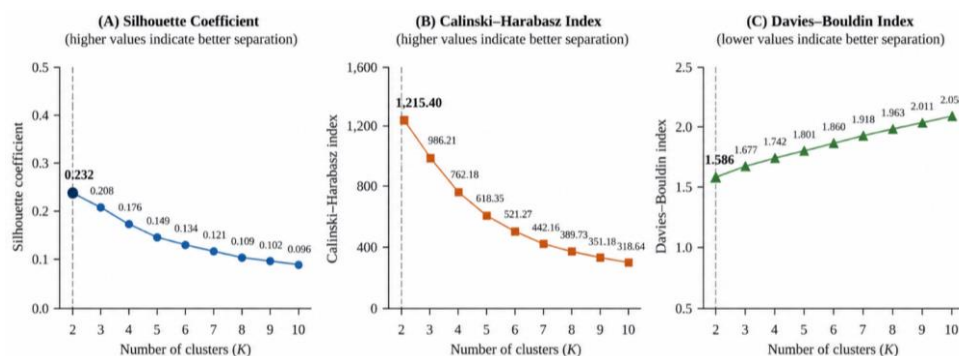


Figure 6. Internal Validation of Alternative K-Means Cluster Solutions

Figure 6. Internal Validation of Alternative K-Means Cluster Solutions. The figure presents the Silhouette Coefficient, Calinski–Harabasz index, and Davies–Bouldin index for K-means solutions ranging from K = 2 to K = 10. The two-cluster solution (K = 2) yielded the highest Silhouette Coefficient and Calinski–Harabasz index and the lowest Davies–Bouldin index among the evaluated solutions, supporting its selection for subsequent consumer-profile analysis. However, the Silhouette coefficient of 0.232 indicates only modest cluster separation; therefore, the

resulting profiles should be interpreted as exploratory rather than definitive market segments. The three-cluster solution produced a lower Silhouette Coefficient (0.187) and lower Calinski–Harabasz index (934.66), supporting the retention of the two-cluster solution over the three-cluster solution reported in the previous manuscript. However, the Silhouette value of 0.232 indicates only modest internal separation; therefore, the resulting clusters should be interpreted as exploratory perception profiles rather than sharply separated natural market segments.

Table 8. K-Means Cluster Validation

Number of Clusters	Silhouette	Calinski–Harabasz	Davies–Bouldin
2	0.232	1215.40	1.586
3	0.187	934.66	1.677
4	0.177	844.28	1.621
5	0.184	803.32	1.411
6	0.190	763.52	1.332
7	0.184	721.14	1.353
8	0.181	692.75	1.341
9	0.188	680.43	1.278
10	0.192	670.43	1.228

Consumer Profiles

The final two-cluster solution comprised 1,668 respondents (48.9%) in Cluster 0 and 1,741 respondents (51.1%) in Cluster 1.

The clusters exhibited consistent differences across all four perception constructs and in the externally evaluated Purchase Intention variable.

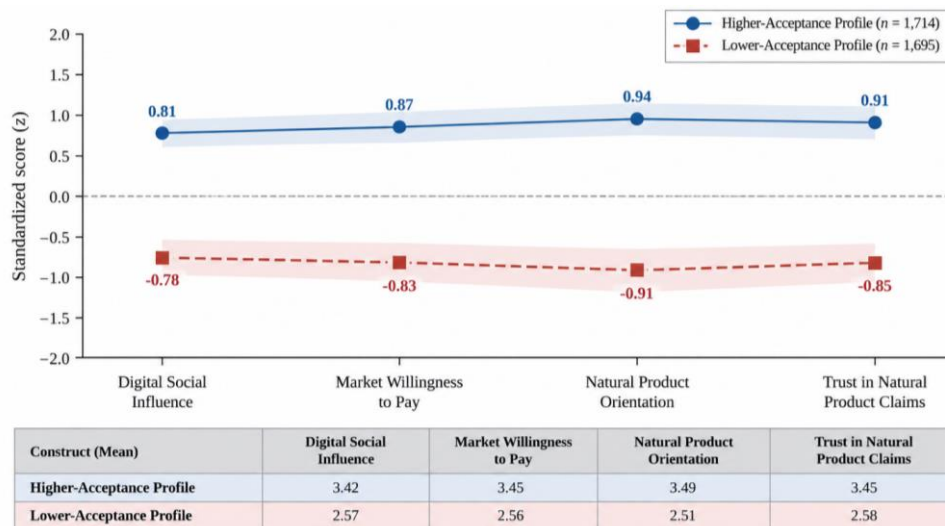


Figure 7. Perception Profiles of the Two Exploratory Consumer Groups

Figure 7. Perception Profiles of the Two Exploratory Consumer Groups. The figure illustrates the standardized profiles of the Higher-Acceptance and Lower-Acceptance groups across Digital Social Influence, Market Willingness to Pay, Natural Product Orientation, and Trust in Natural Product Claims. Purchase Intention was excluded from cluster formation and subsequently evaluated as an external validation variable. Cluster 0 demonstrated higher mean scores across Digital Social Influence (M = 3.42), Market Willingness to Pay (M = 3.45), Natural Product Orientation (M = 3.49), and Trust in Natural Product Claims (M = 3.45). Purchase Intention was also higher in this group (M = 3.45). Cluster 1 exhibited comparatively lower scores for Digital Social Influence (M = 2.57), Market Willingness

to Pay (M = 2.56), Natural Product Orientation (M = 2.51), and Trust in Natural Product Claims (M = 2.58), accompanied by lower Purchase Intention (M = 2.54). The largest standardized difference was observed for Natural Product Orientation (Cohen's $d = 1.34$), followed by Market Willingness to Pay ($d = 1.20$), Purchase Intention ($d = 1.16$), Digital Social Influence ($d = 1.14$), and Trust in Natural Product Claims ($d = 1.10$). These effect sizes indicate substantial differences between the two profiles. For interpretive purposes, Cluster 0 is designated the Higher-Acceptance Perception Profile, whereas Cluster 1 is designated the Lower-Acceptance Perception Profile. These labels describe the observed response patterns and should not be interpreted as permanent or inherently distinct consumer categories.

Table 9. Consumer Profiles Identified by K-Means

Variable	Higher-Acceptance Profile (n = 1,668)	Lower-Acceptance Profile (n = 1,741)	p-value	Cohen's d
Digital Social Influence	3.42 ± 0.76	2.57 ± 0.74	<.001	1.14
Market Willingness to Pay	3.45 ± 0.77	2.56 ± 0.75	<.001	1.20
Natural Product Orientation	3.49 ± 0.78	2.51 ± 0.76	<.001	1.34
Trust in Natural Product Claims	3.45 ± 0.81	2.58 ± 0.79	<.001	1.10

Purchase Intention*	3.45 ± 0.77	2.54 ± 0.76	<.001	1.16
Age	29.30 ± 8.28	29.50 ± 8.63	.485	-0.02

Note. Purchase Intention was excluded from cluster formation and was evaluated subsequently as an external validation variable.

Demographic Associations

Chi-square tests were conducted to examine whether cluster membership was associated with respondents' demographic and behavioral characteristics. No statistically significant association was identified between cluster membership and gender, $\chi^2(1) = 2.88$, $p = .090$; education, $\chi^2(4) = 2.86$, $p = .582$; monthly income, $\chi^2(4) = 5.74$, $p = .219$; cosmetic-use frequency, $\chi^2(3) = 2.36$, $p = .501$; or prior awareness of Papua Red Fruit, $\chi^2(3) = 3.05$, $p = .384$. These findings indicate that the two perception-based profiles were not systematically differentiated by the basic demographic and behavioral variables examined. Rather, the principal distinction between the profiles was associated with the respondents' levels of Digital Social Influence, Market Willingness to Pay, Natural Product Orientation, and Trust in Natural Product Claims.

Table 10. Associations between Cluster Membership and Demographic Characteristics

Variable	χ^2	df	p-value	Interpretation
Gender	2.88	1	.090	Not significant
Education	2.86	4	.582	Not significant

Monthly income	5.74	4	.219	Not significant
Cosmetic-use frequency	2.36	3	.501	Not significant
Prior awareness of Papua Red Fruit	3.05	3	.384	Not significant

Hypothesis Testing

The multiple regression results provided empirical support for all five prespecified hypotheses. Digital Social Influence was positively associated with Purchase Intention ($\beta = .303$, $p < .001$), supporting H1. Market Willingness to Pay was also positively associated with Purchase Intention ($\beta = .224$, $p < .001$), supporting H2. Natural Product Orientation demonstrated a significant positive association ($\beta = .266$, $p < .001$), supporting H3. Trust in Natural Product Claims was positively associated with Purchase Intention ($\beta = .193$, $p < .001$), supporting H4. Finally, Age demonstrated a statistically significant positive association with Purchase Intention ($\beta = .116$, $p < .001$), supporting H5.

Table 11. Hypothesis Testing Results

Hypothesis	Proposed relationship	β	p-value	Decision
H1	Digital Social Influence → Purchase Intention	.303	<.001	Supported
H2	Market Willingness to Pay → Purchase Intention	.224	<.001	Supported
H3	Natural Product Orientation → Purchase Intention	.266	<.001	Supported
H4	Trust in Natural Product Claims → Purchase Intention	.193	<.001	Supported
H5	Age → Purchase Intention	.116	<.001	Supported

Overall, the results indicate that Digital Social Influence was the strongest statistical predictor of Purchase Intention, followed by Natural Product Orientation, Market Willingness to Pay, Trust in Natural Product Claims, and Age. Collectively, the five predictors explained 41.2% of the observed variance in Purchase Intention. The regression and segmentation analyses provide complementary evidence: the regression model identifies the principal correlates of purchase intention across the sample,

whereas the K-Means analysis demonstrates substantial heterogeneity in the levels at which these perception characteristics are combined across respondents. Importantly, the results should be interpreted as statistical associations rather than causal effects, because the study employed a cross-sectional design and non-probability voluntary sampling. The two consumer profiles should likewise be regarded as exploratory profiles requiring validation in independent samples.

DISCUSSION

Principal Findings

This study examined the factors associated with consumer purchase intention toward Papua Red Fruit-based herbal cosmetics by integrating digital social influence, market willingness to pay, natural product orientation, trust in natural product claims, and age within a theoretically informed consumer-behavior framework. The findings provide three principal insights. First, all five hypothesized predictors were positively and significantly associated with purchase intention. Digital Social Influence emerged as the strongest statistical predictor ($\beta = .303$), followed by Natural Product Orientation ($\beta = .266$), Market Willingness to Pay ($\beta = .224$), Trust in Natural Product Claims ($\beta = .193$), and Age ($\beta = .116$). Collectively, these variables explained 41.2% of the variance in purchase intention. Second, the findings indicate that consumer acceptance of an indigenous natural cosmetic product is multidimensional. The results suggest that willingness to purchase cannot be understood solely from consumers' perceptions of product naturalness or economic value. Instead, social influence, orientation toward natural products, willingness to pay, and trust in product claims operate as complementary dimensions of

consumer evaluation. This is particularly relevant for Papua Red Fruit because its indigenous identity may create a distinctive product proposition, but consumer acceptance still depends on whether the product is socially visible, perceived as compatible with natural-product values, economically acceptable, and supported by credible information. Third, the cluster analysis identified two exploratory perception profiles: a Higher-Acceptance Perception Profile and a Lower-Acceptance Perception Profile. The profiles differed substantially across all four perception constructs and also showed corresponding differences in Purchase Intention. However, the relatively modest Silhouette coefficient (0.232) indicates that these profiles should be interpreted as broad exploratory response patterns rather than sharply separated market segments. Taken together, the regression and clustering results indicate both common drivers of purchase intention across the sample and meaningful heterogeneity in the intensity with which consumers evaluate the product concept.

Digital Social Influence

Digital Social Influence demonstrated the strongest association with Purchase Intention among the substantive

consumer-perception predictors ($\beta = .303, p < .001$). This finding suggests that consumers' exposure to, interaction with, and evaluation of digital social information may play an important role in shaping their willingness to consider Papua Red Fruit-based herbal cosmetics. The result is particularly meaningful for an indigenous cosmetic ingredient whose consumer familiarity may be relatively uneven. In the present sample, prior awareness of Papua Red Fruit varied considerably, with approximately one-third of respondents reporting that they had never heard of the ingredient. Under such conditions, digital environments may function not merely as promotional channels but also as mechanisms for product discovery, social learning, and information dissemination. Consumers who encounter credible product information, user experiences, demonstrations, and social recommendations may develop greater familiarity with an unfamiliar indigenous ingredient (Demir & Tesfaye, 2025; Kahane et al., 2013, p. 686).

The strength of Digital Social Influence also supports the broader interpretation that consumer acceptance of natural cosmetics is embedded within socially mediated information environments. For Papua Red Fruit-based cosmetics, digital communication can therefore contribute to translating an indigenous biological resource into a recognizable contemporary consumer product. Nevertheless, the cross-sectional design does not establish that digital exposure causes purchase intention. The finding should instead be interpreted as evidence of a strong statistical association between digital social influence and consumers' intention to purchase.

From a practical perspective, communication strategies should emphasize informative and credible digital content rather than relying exclusively on promotional messages. Product education, ingredient traceability, responsible claims, demonstrations of formulation use, and authentic consumer experiences may be particularly useful when introducing an ingredient that is not universally familiar (Ankiel et al., 2025, p. 8413; Boen et al., 2025, p. 139).

Natural Product Orientation

Natural Product Orientation was the second strongest substantive predictor of Purchase Intention ($\beta = .266, p < .001$). This finding indicates that consumers who place greater value on natural-product characteristics tend to report stronger intentions to purchase Papua Red Fruit-based herbal cosmetics.

The result supports the proposition that naturalness is not simply a product attribute but part of a broader consumer orientation. Consumers with stronger preferences for natural products may perceive plant-derived ingredients, traditional resources, and environmentally compatible product concepts as more congruent with their personal consumption values (Li & Chapman, 2012). Papua Red Fruit may therefore possess particular potential among consumers who already have favorable orientations toward natural and herbal products.

The finding also provides an important qualification concerning the positioning of indigenous cosmetic resources. The cultural or biological uniqueness of an ingredient does not automatically generate consumer acceptance. Instead, the ingredient needs to be translated into a product proposition that consumers perceive as relevant to their existing values and expectations. In this sense, Papua Red Fruit's indigenous identity may provide differentiation, while its natural-product positioning may provide value congruence (Alexander et al., 2026, p. 5; Torelli et al., 2012, p. 96).

However, the current evidence should not be interpreted as demonstrating that natural-product orientation independently causes purchase behavior. The study measures intention within a cross-sectional survey context. Future research should therefore investigate whether natural-product orientation predicts actual purchasing behavior over time and whether this relationship differs according to consumers' previous experience with herbal or natural cosmetics.

Market Willingness to Pay

Market Willingness to Pay was positively associated with Purchase Intention ($\beta = .224, p < .001$), indicating that consumers' economic evaluation of the product concept is an important component of their acceptance. This finding demonstrates that consumer interest in indigenous natural cosmetics is not exclusively value-driven; economic considerations remain relevant to purchase decisions.

The relationship between willingness to pay and purchase intention should nevertheless be conceptually distinguished from purchase intention itself. Willingness to pay reflects consumers' perceived economic acceptability or readiness to allocate financial resources to a product, whereas purchase intention represents a broader behavioral predisposition toward purchasing (Barber et al., 2012; Ma et al., 2026, p. 1397). The significant association between the two constructs indicates that consumers who perceive the product as economically worthwhile are more likely to express purchase intentions.

For Papua Red Fruit-based cosmetics, this finding has implications for value-based product positioning. Indigenous sourcing, natural ingredients, traceability, formulation quality, and sustainability may contribute to perceived product value, but these attributes must be balanced against consumers' price expectations. A product positioned as premium should therefore provide sufficiently visible and credible value justification rather than relying solely on the novelty of the indigenous ingredient.

The result also suggests that market development should avoid assuming that consumers will automatically pay a premium for indigenous or natural ingredients. Willingness to pay must be established through perceived benefits, product quality, trust, and appropriate pricing strategies (Migliore et al., 2018, p. 6). Experimental research using actual price points or discrete-choice methods would provide stronger evidence regarding consumers' economic preferences (Onken et al., 2011, p. 46; Piras et al., 2023, p. 150).

Trust in Natural Product Claims

Trust in Natural Product Claims was positively associated with Purchase Intention ($\beta = .193, p < .001$), supporting the importance of credibility in the acceptance of natural cosmetic products. Although its standardized coefficient was lower than those of Digital Social Influence, Natural Product Orientation, and Market Willingness to Pay, trust remained a statistically significant independent correlate of purchase intention.

This finding is important because natural and herbal product markets can involve substantial information asymmetry. Consumers may be unable to independently evaluate the quality, safety, authenticity, or effectiveness of an ingredient before purchase. Transparent information concerning ingredient origin, formulation, safety assessment, production standards, and product claims may therefore reduce uncertainty and strengthen consumer confidence (Dove et al., 2020; Lam et al., 2020, p. 15). The descriptive results reinforce this interpretation. The highest

individual item mean was associated with the importance of transparent safety and product information for increasing trust in natural cosmetics (Q15; $M = 3.007$). This indicates that transparency is relevant to consumer evaluation even though overall construct means remained close to the midpoint of the scale.

The reliability coefficient for the two-item Trust construct was $\alpha = .696$, which is borderline and should therefore be interpreted cautiously. The finding is nevertheless theoretically meaningful and statistically consistent with the regression model. Future research should expand the trust construct with additional validated items covering dimensions such as perceived credibility, safety assurance, scientific evidence, authenticity, certification, and institutional trust. Such development would permit a more comprehensive assessment of how trust operates in natural and indigenous cosmetic markets.

Consumer Segmentation

The K-Means analysis revealed two broad perception profiles. The Higher-Acceptance Perception Profile comprised 1,668 respondents (48.9%), whereas the Lower-Acceptance Perception Profile comprised 1,741 respondents (51.1%). The higher-acceptance group reported consistently higher levels of Digital Social Influence, Market Willingness to Pay, Natural Product Orientation, and Trust in Natural Product Claims. It also showed higher Purchase Intention when the latter was subsequently examined as an external validation variable.

The largest standardized difference between the profiles occurred for Natural Product Orientation ($d = 1.34$), followed by Market Willingness to Pay ($d = 1.20$), Purchase Intention ($d = 1.16$), Digital Social Influence ($d = 1.14$), and Trust in Natural Product Claims ($d = 1.10$). These differences suggest that the two profiles represent substantively different levels of consumer acceptance across multiple dimensions rather than a difference confined to a single construct.

Nevertheless, the Silhouette coefficient of 0.232 indicates only modest cluster separation. Accordingly, the results should not be interpreted as evidence of two naturally occurring or highly stable consumer segments. Rather, they identify two useful exploratory response profiles within the present sample. This distinction is important for international publication because overinterpretation of weakly separated clusters could be viewed as a methodological limitation.

Interestingly, none of the examined demographic characteristics—gender, education, monthly income, cosmetic-use frequency, or prior awareness of Papua Red Fruit—was significantly associated with cluster membership. This suggests that perception-based differences may be more informative than conventional demographic segmentation for understanding initial consumer acceptance of Papua Red Fruit-based cosmetics.

Theoretical Contributions

This study contributes to consumer research on natural and indigenous cosmetic products in several ways. First, the findings extend a stimulus-oriented consumer-behavior perspective by demonstrating that socially mediated information, natural-product orientation, economic evaluation, and trust are simultaneously associated with purchase intention. Rather than treating consumer acceptance as a single-dimensional response to product naturalness, the study provides evidence for a multidimensional configuration of social, value-based, economic, and credibility-related perceptions (d'Astous & Labrecque, 2021;

Lăzăroiu et al., 2019, p. 341). Second, the study contributes an indigenous-product perspective to the literature on natural cosmetics. Much of the natural cosmetic discussion is centered on established global ingredients and mainstream sustainable-product categories. By focusing on Papua Red Fruit, this study illustrates how an indigenous biological resource can be examined within contemporary consumer-behavior frameworks. Third, the study combines explanatory regression with exploratory consumer profiling. The regression analysis identifies the relative strength of variables associated with purchase intention, while the K-Means analysis demonstrates that respondents do not evaluate the product concept uniformly. This methodological combination provides complementary perspectives on both average relationships and consumer heterogeneity. Finally, the findings highlight the importance of distinguishing an indigenous ingredient's resource potential from its market acceptance. Biological or formulation evidence alone does not establish consumer demand. Consumer acceptance requires an additional behavioral pathway involving information, perceived value, natural-product orientation, economic readiness, and trust.

Managerial Implications

The findings provide several implications for organizations developing Papua Red Fruit-based herbal cosmetics. First, digital communication should be treated as a central market-development mechanism. Because Digital Social Influence was the strongest predictor, companies should develop educational and credible digital campaigns that explain the ingredient, its origin, formulation role, product benefits, and appropriate use. Digital storytelling can connect Papua Red Fruit's indigenous identity with contemporary consumer needs without reducing the ingredient to a purely promotional symbol (Hasan et al., 2026). Second, natural-product positioning should be supported by verifiable product attributes. Consumers with stronger natural-product orientations demonstrated higher purchase intentions. Product developers should therefore communicate relevant natural-product characteristics while avoiding unsupported "natural," "safe," or "effective" claims. Third, pricing should reflect demonstrable consumer value. The positive association between willingness to pay and purchase intention indicates the importance of an appropriate value proposition. Premium pricing may be viable only when supported by formulation quality, transparent sourcing, product safety, traceability, packaging quality, and credible differentiation (Becker et al., 2015, p. 1524; Miao et al., 2025). Fourth, trust-building should be embedded throughout the product and communication system. Transparent ingredient information, safety documentation, manufacturing standards, responsible claims, and accessible product information can reduce uncertainty. This is particularly important when commercializing an ingredient that may be unfamiliar to many consumers (Marberg et al., 2017, p. 119; Silva et al., 2024, p. 103775). Fifth, marketing should prioritize psychographic and perception-based positioning rather than relying solely on demographics. Since gender, education, income, cosmetic-use frequency, and prior awareness were not significantly associated with cluster membership, targeting strategies based exclusively on these variables may have limited explanatory value. Instead, consumer research should identify individuals with stronger natural-product orientations, higher willingness to pay, greater digital engagement, and higher trust in natural-product claims (Snae et al., 2024, p. 7581; Wolf et al., 2023, p. 373).

Limitations and Future Research

Several limitations should be considered when interpreting the findings. First, the cross-sectional design prevents temporal or causal conclusions. Although all five predictors were significantly associated with Purchase Intention, the results cannot establish that changes in these predictors would produce changes in purchase intention. Second, the study used voluntary convenience sampling through an online questionnaire. Consequently, the sample may not represent the broader Indonesian consumer population, particularly consumers with limited internet access or different demographic and socioeconomic characteristics. Probability-based sampling or stratified sampling would improve external validity in future studies. Third, the measurement structure was supported at a preliminary exploratory level rather than definitively confirmed. Although KMO and Bartlett's tests indicated factorability and the theoretically specified constructs demonstrated acceptable reliability overall, the fifth empirical dimension had an eigenvalue of 0.969. Moreover, Trust in Natural Product Claims had a borderline Cronbach's alpha of .696 and consisted of only two items. Future research should therefore develop a larger item pool and test the measurement model using confirmatory factor analysis (CFA) with an independent sample. Fourth, all major constructs were obtained through self-reported questionnaire responses collected in the same survey context. This creates the possibility of common method bias and response-style effects.

Future studies should incorporate procedural remedies and statistical assessments of common method variance, as well as behavioral or experimental measures where feasible. Fifth, Purchase Intention represents an attitudinal or behavioral intention rather than actual market behavior. Future research should examine actual purchase data, repeat-purchase behavior, willingness to pay using real monetary amounts, or experimental choice behavior. Experimental designs could also manipulate price, product claims, certification, social-media information, and ingredient origin to identify more specific mechanisms underlying consumer choice. Finally, the K-Means results should be interpreted as exploratory because the Silhouette coefficient was relatively modest (0.232). Replication with independent samples, alternative clustering algorithms, latent class analysis, or model-based mixture approaches would help determine whether the two observed profiles are stable. Longitudinal studies would further establish whether these profiles persist over time or change as consumers acquire greater knowledge and experience with Papua Red Fruit-based cosmetics.

Overall, the study provides preliminary but meaningful evidence that consumer acceptance of Papua Red Fruit-based herbal cosmetics is associated with a combination of digital social influence, natural-product orientation, economic willingness to pay, trust in natural-product claims, and age. Future research should move beyond cross-sectional intention measures toward validated measurement models, experimental designs, representative samples, and actual purchasing outcomes.

CONCLUSION

This study examined consumer purchase intention toward Papua Red Fruit (*Pandanus conoideus* Lam.)-based herbal cosmetics using regression analysis and exploratory consumer segmentation. Based on 3,409 valid respondents, the regression model explained 41.2% of the variance in Purchase Intention ($R^2 = .412$). Digital Social Influence showed the strongest positive association with Purchase Intention ($\beta = .303$, $p < .001$), followed by Natural Product Orientation ($\beta = .266$), Market Willingness to Pay ($\beta = .224$), Trust in Natural Product Claims ($\beta = .193$), and Age ($\beta = .116$), all $p < .001$.

These findings indicate that consumer acceptance of Papua Red Fruit-based cosmetics is multidimensional, involving social influence, natural-product orientation, economic value, trust, and demographic characteristics. The exploratory K-Means analysis further identified two distinct perception profiles that differed substantially across the four perception constructs and Purchase Intention, although the modest silhouette coefficient indicates that the segmentation should be interpreted cautiously.

The findings suggest that commercialization of Papua Red Fruit-based cosmetics should emphasize credible digital communication, evidence-based natural-product positioning,

transparent product claims, and clear value propositions. Building consumer trust through scientifically supported information on product benefits, safety, formulation, ingredient origin, and relevant regulatory assurance may be particularly important for an indigenous ingredient with relatively limited consumer familiarity.

Given the cross-sectional design, voluntary convenience sampling, self-reported purchase intention, preliminary measurement structure, and exploratory nature of the clustering analysis, the findings should be interpreted as evidence of statistical associations rather than causal effects or confirmed market behavior. Future research should validate the measurement model using independent samples and examine actual purchasing behavior, price sensitivity, longitudinal responses, and experimental product evaluations. Overall, this study provides empirical evidence that the market potential of Papua Red Fruit-based herbal cosmetics depends not only on their natural and indigenous attributes but also on how these attributes are socially communicated, economically valued, and trusted by consumers.

DECLARATIONS

Ethical Approval

Ethical approval was not explicitly documented in the current study materials. The study involved a voluntary, non-interventional online survey and analyzed the responses in aggregate form without reporting individual identities.

Consent to Participate

Participation in the study was voluntary. Participants were informed about the general purpose of the study before completing the online questionnaire. By voluntarily completing

and submitting the questionnaire, participants provided consent to participate in the study. No personally identifying information was reported in the statistical analysis

Consent for Publication

Not applicable. The study does not report identifiable individual-level information, images, or other personally identifiable data. The results are presented in aggregate form.

Author Contributions (CRediT)

Siwi Putri Andini: Conceptualization, Methodology,

Investigation, Data Curation, Formal Analysis, Writing – Original Draft, Writing – Review & Editing, Project Administration.

Miranti Andhita Scantya: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft, Writing – Review & Editing.

Leonard Goeirianto: Methodology, Formal Analysis, Validation, Writing – Review & Editing, Supervision.

All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Funding

The authors declare that no specific external funding was received for this research.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

Data Availability

The data that support the findings of this study are not publicly

available because they were collected through a voluntary online survey and may contain participant-level information. Aggregated data and/or additional information may be made available by the corresponding author upon reasonable request, subject to applicable ethical and institutional requirements.

Acknowledgements

The authors gratefully acknowledge the support of University of Jakarta International, Jakarta, Indonesia, and sincerely thank all respondents who voluntarily participated in the study and contributed their time and perspectives to this research.

Generative AI Disclosure

During the preparation of this manuscript, generative artificial intelligence tools may have been used to assist with language editing, grammatical refinement, and manuscript organization. The authors take full responsibility for the accuracy, originality, interpretation, and integrity of the content. Generative AI was not used to generate, fabricate, or manipulate the research data, statistical results, or scientific findings.

REFERENCES

- Aisyah, A., Nazira, H., Putri, R. A., & Setiawan, M. (2025). Toward Sustainable Consumption: Drivers of Halal Cosmetic Purchasing in the Indonesian Market. *E3S Web of Conferences*, 650, 2008. <https://doi.org/10.1051/e3sconf/202565002008>
- Alexander, E., Lippevelde, W. V., & Slabbinck, H. (2026). Plan(t)s for dinner? Complement-based product positioning to encourage plant-based protein purchases in supermarkets. *Agricultural and Food Economics*, 14(1). <https://doi.org/10.1186/s40100-026-00492-9>
- Ali, B. M., Ang, F., & Fels-Klerx, H. J. van der. (2021). Consumer willingness to pay for plant-based foods produced using microbial applications to replace synthetic chemical inputs. *PLoS ONE*, 16(12). <https://doi.org/10.1371/journal.pone.0260488>
- Amos, C., Pentina, I., Hawkins, T. G., & Davis, N. M. (2014). "Natural" labeling and consumers' sentimental pastoral notion. *Journal of Product & Brand Management*, 23, 268–281. <https://doi.org/10.1108/jpbm-03-2014-0516>
- Ankiel, M., Halagarda, M., Piekara, A., Sady, S., Żmijowska, P., Popek, S., Pacholek, B., Jefmański, B., Kucia, M., & Krzywonos, M. (2025). Role of Certifications and Labelling in Ensuring Authenticity and Sustainability of Fermented Milk Products. *Sustainability*, 17(18), 8398. <https://doi.org/10.3390/su17188398>
- Atmaja, R. R. D., Annadiyah, V. K., Thoyyibah, M., Maimunah, S., Ma'arif, B., Mutiah, R., Budi, I. M., Amiruddin, M., & Inayatillah, F. R. (2023). The effect of red fruit oil (*Pandanus conoideus* Lamk.) emulgel on angiogenesis and collagen density in incise wound healing in mice (*Mus musculus*). *Journal of Advanced Pharmaceutical Technology Amp Research*, 14(4), 311–316. https://doi.org/10.4103/japtr.japtr_67_23
- Avilés-Polanco, G., Almendárez-Hernández, M. A., Beltrán-Morales, L. F., Serrano-Fraire, I., & Ortega-Rubio, A. (2021). Consumer Preferences for Labeled Plant-Based Products Associated with Traditional Knowledge: A Study in Protected Natural Areas of Northwest Mexico. *Land*, 10(4), 412. <https://doi.org/10.3390/land10040412>
- Avrami, E., Filatov, E. A., Durmanov, A., Shkalenko, A. V., Kocob, M., Ponkratov, V. V., Pozdnyayev, A., & Nikolaeva, I. (2024). A New Concept of Consumer Behavior in the Circular Economy. *Emerging Science Journal*, 8(4), 1536–1553. <https://doi.org/10.28991/esj-2024-08-04-018>
- Barber, N., Kuo, P., Bishop, M., & Goodman, R. J. (2012). Measuring psychographics to assess purchase intention and willingness to pay. *Journal of Consumer Marketing*, 29(4), 280–292. <https://doi.org/10.1108/07363761211237353>
- Becker, K., Salar-Behzadi, S., & Zimmer, A. (2015). Solvent-Free Melting Techniques for the Preparation of Lipid-Based Solid Oral Formulations [Review of *Solvent-Free Melting Techniques for the Preparation of Lipid-Based Solid Oral Formulations*]. *Pharmaceutical Research*, 32(5), 1519–1545. Springer Science+Business Media. <https://doi.org/10.1007/s11095-015-1661-y>
- Boen, H., Glenisson, L., Hallez, L., & Smits, T. (2025). Byte into sustainability: a scoping review of digital food environment attributes that shape consumers' sustainability perceptions, attitudes, intentions, and behaviours. *International Journal of Behavioral Nutrition and Physical Activity*, 22(1), 132. <https://doi.org/10.1186/s12966-025-01832-6>
- Carfora, V., Cavallo, C., Catellani, P., Giudice, T. D., & Cicia, G. (2021). Why Do Consumers Intend to Purchase Natural Food? Integrating Theory of Planned Behavior, Value-Belief-Norm Theory, and Trust. *Nutrients*, 13(6), 1904. <https://doi.org/10.3390/nu13061904>
- Cavalcanti, A. P. B., Araújo, G. P. de, Bezerra, K. G. O., Almeida, F. C. G. de, Silva, M. da G. C. da, Sarubbo, A., Silva, R. de C. F. S. da, & Sarubbo, L. A. (2026). Innovation and Sustainability in the Cosmetics Industry: A Global Perspective with Local Insights. *Cosmetics*, 13(2), 59. <https://doi.org/10.3390/cosmetics13020059>
- Chan, H. K., Wang, X., Lacka, E., & Zhang, M. (2015). A Mixed-Method Approach to Extracting the Value of Social Media Data. *Bristol Research (University of Bristol)*, 25(3), 568–583. <https://doi.org/10.1111/poms.12390>
- Choi, E., & Lee, K. C. (2019). Effect of Trust in Domain-Specific Information of Safety, Brand Loyalty, and Perceived Value for Cosmetics on Purchase Intentions in Mobile E-Commerce Context. *Sustainability*, 11(22), 6257. <https://doi.org/10.3390/su11226257>
- Chowdhury, R., & Ahmed, F. (2026). Social media advertising dimensions, trust, and customer reviews in online purchase intentions: the mediating role of brand image. *Future Business Journal*, 12(1). <https://doi.org/10.1186/s43093-026-00862-1>
- Chrisniyanti, A., & Fah, C. T. (2022). The Impact Of Social Media Marketing On Purchase Intention Of Skincare Products Among Indonesian Young AdultS. *Eurasian Journal of Social Sciences*, 10(2), 68–90. <https://doi.org/10.15604/ejss.2022.10.02.001>
- d'Astous, A., & Labrecque, J. (2021). The Impact of Responsible Food Packaging Perceptions on Naturalness and Healthiness Inferences, and Consumer Buying Intentions. *Foods*, 10(10), 2366. <https://doi.org/10.3390/foods10102366>
- Daniels, G. (2025). Responsible Science of Cosmetics and Beauty. In *University of the Arts London Research Online (University of the Arts*

- London). University of the Arts London. <https://ualresearchonline.arts.ac.uk/view/creators/Daniels=3AGabriela=3A=3A.html>
- Demir, L., & Tesfaye, S. (2025). Digital awareness strategies for promoting sesame seeds as functional foods: A communication technology perspective. *International Journal of Communication and Information Technology*, 6(2), 181–185. <https://doi.org/10.33545/2707661x.2025.v6.i2b.161>
- Dlamini, S., & Mahowa, V. (2024). Investigating factors that influence the purchase behaviour of green cosmetic products. *Cleaner and Responsible Consumption*, 13, 100190. <https://doi.org/10.1016/j.clrc.2024.100190>
- Dove, M., Balasubramanian, A., & Narayanan, B. (2020). Transparency As A Way Of Attaining Quality, Safety And Optimal Food Purchases. *SocioEconomic Challenges*, 4(4), 48–62. [https://doi.org/10.21272/sec.4\(4\).48-62.2020](https://doi.org/10.21272/sec.4(4).48-62.2020)
- Elim, D., Syafika, N., Ananda, P. W. R., Ardika, K. A. R., Adziim, A. Muh. F., Anggriani, A., Fitri, A. M. N., Sultan, N. A. F., Mahfud, M. A. S., Saputra, M. D., Sari, Y. W., Domínguez-Robles, J., Pamornpathomkul, B., Mir, M., & Permana, A. D. (2024). Formulation and evaluation of red fruit (*Pandanus conoideus*) oil-based nanoemulsion loaded thermosensitive gel combined with solid microneedle for topical delivery. *Journal of Drug Delivery Science and Technology*, 96, 105707. <https://doi.org/10.1016/j.jddst.2024.105707>
- Gani, M. O., Roy, H., Rahman, M. S., Faroque, A. R., Gupta, V., & Prova, H. T. (2022). Effect of social media influence on consumer's purchase intention of organic beauty products: the role of customer's engagement and generativity. *International Journal of Spa and Wellness*, 6(1), 54–77. <https://doi.org/10.1080/24721735.2022.2096292>
- García-Roldán, G., Carrión-Bósquez, N., García-Umaña, A., Ortiz-Regalado, O., Medina-Miranda, S. D., Marchena-Chanduvi, R., Llamas-Burga, M., López-Pastén, I., & Veas-González, I. (2025). Digital Social Influence and Its Impact on the Attitude of Organic Product Consumers. *Sustainability*, 17(16), 7563. <https://doi.org/10.3390/su17167563>
- Grappe, C. G., Lombart, C., Louis, D., & Durif, F. (2021). "Not tested on animals": how consumers react to cruelty-free cosmetics proposed by manufacturers and retailers? *International Journal of Retail & Distribution Management*, 49(11), 1532–1553. <https://doi.org/10.1108/ijrdm-12-2020-0489>
- Grunert, K. G. (1997). What's in a steak? A cross-cultural study on the quality perception of beef. *Food Quality and Preference*, 8(3), 157–174. [https://doi.org/10.1016/S0950-3293\(96\)00038-9](https://doi.org/10.1016/S0950-3293(96)00038-9)
- Gülpinar, G., Uzun, M. B., Iqbal, A., Anderson, C., Syed, W., & Al-Rawi, M. B. A. (2023). A model of purchase intention of complementary and alternative medicines: the role of social media influencers' endorsements. *BMC Complementary Medicine and Therapies*, 23(1), 439. <https://doi.org/10.1186/s12906-023-04285-1>
- Hasan, S., Hasan, S., Darusman, & Supriadi, A. (2026). Strategic Storycrafting in Niche Markets as a Catalyst for Consumer Loyalty Dynamics. *Jurnal Ilmiah Manajemen Kesatuan*, 14(1), 1095–1106. <https://doi.org/10.37641/jimkes.v14i1.3858>
- Heriyanto, H., Gunawan, I. A., Fujii, R., Maoka, T., Shioi, Y., Kamebun, K. M. B., Limantara, L., & Brotsudarmo, T. H. P. (2020). Carotenoid composition in buah merah (*Pandanus conoideus* Lam.), an indigenous red fruit of the Papua Islands. *Journal of Food Composition and Analysis*, 96, 103722. <https://doi.org/10.1016/j.jfca.2020.103722>
- Hmoud, H., Nofal, M., Yaseen, H., Al-masaeed, S., & AlFawwa, B. M. (2022). The effects of social media attributes on customer purchase intention: The mediation role of brand attitude. *International Journal of Data and Network Science*, 6(4), 1543–1556. <https://doi.org/10.5267/j.ijdns.2022.4.022>
- Hoo, W. C., Lean, N. G., Ng, A. H. H., Liao, C. H., Ho, R. C., & Prompanyo, M. (2024). Determinants of Green Cosmetic Purchase Intentions in Malaysia. *Pakistan Journal of Life and Social Sciences (PJLSS)*, 22(2). <https://doi.org/10.57239/pjlss-2024-22.2.00278>
- Hossain, M. S., Islam, T., Babu, Md. A., Moon, M. A., Mim, M. R., Alam, M. T. U., Bhattacharjee, A., Sultana, M., & Akter, M. (2025). The influence of celebrity credibility, attractiveness, and social media influence on trustworthiness, perceived quality, and purchase intention for natural beauty care products. *Cleaner and Responsible Consumption*, 17, 100277. <https://doi.org/10.1016/j.clrc.2025.100277>
- Jayanti, A., & Tasrim, T. (2023). "Polarization" of Consumer Behavior: S-O-R Theory Perspective. *Jurnal Orientasi Bisnis Dan Entrepreneurship (JOBS)*, 3(2), 107–116. <https://doi.org/10.33476/jobs.v3i2.2925>
- Jia, X., Alvi, A. K., Nadeem, M., Akhtar, N., & Zaman, H. M. F. (2022). Impact of Perceived Influence, Virtual Interactivity on Consumer Purchase Intentions Through the Path of Brand Image and Brand Expected Value. *Frontiers in Psychology*, 13, 947916. <https://doi.org/10.3389/fpsyg.2022.947916>
- Kahane, R., Hodgkin, T., Jaenicke, H., Hoogendoorn, C., Hermann, M., Keatinge, J. D. H., Hughes, J. d'Arros, Padulosi, S., & Looney, N. E. (2013). Agrobiodiversity for food security, health and income. *Agronomy for Sustainable Development*, 33(4), 671–693. <https://doi.org/10.1007/s13593-013-0147-8>
- Kapoor, R., Singh, A. B., Misra, R., Aagerup, U., Nilsson, J., Andard, P., Anderson, R., Engledow, J., Becker, H., Anjana, S., Bennett, D., Ritz, B., Cassidy, D., Lee, K., Hertz-Picciotto, I., B. P. Boztepe, A., Cervellon, M., ... S. (2019). Green Cosmetics - Changing Young Consumer Preference and Reforming Cosmetic Industry. *International Journal of Recent Technology and Engineering (IJRTE)*, 8(4), 12932–12939. <https://doi.org/10.35940/ijrte.d6927.118419>
- Kim, H. Y., & Chung, J. (2011). Consumer purchase intention for organic personal care products. *Journal of Consumer Marketing*, 28(1), 40–47. <https://doi.org/10.1108/07363761111101930>
- Koay, K. Y., & Ahmed, H. I. (2025). Understanding consumers' purchase intentions for green cosmetic products: an integrated perspective. *Social Responsibility Journal*, 21(9), 2098–2111. <https://doi.org/10.1108/srj-04-2025-0382>
- Kuang, X., & Phakdeephiront, N. (2026). Organic Skin Care Products Trust and Purchase Behavior of Gen Z Women in Chinese Social Media. *International Journal of Education and Humanities*, 22(3), 26–32. <https://doi.org/10.54097/8feh8602>
- Kumar, S., Dhir, A., Talwar, S., Chakraborty, D., & Kaur, P. (2020). What drives brand love for natural products? The moderating role of household size. *Journal of Retailing and Consumer Services*, 58, 102329. <https://doi.org/10.1016/j.jretconser.2020.102329>
- Lam, T., Heales, J., Hartley, N., & Hodgkinson, C. (2020). Consumer Trust in Food Safety Requires Information Transparency. *AJIS. Australasian Journal of Information Systems/AJIS. Australian Journal of Information Systems/Australian Journal of Information Systems*, 24. <https://doi.org/10.3127/ajis.v24i0.2219>
- Lăzăroiu, G., Andronie, M., Uță, C., & Hurloiu, I. (2019). Trust Management in Organic Agriculture: Sustainable Consumption Behavior, Environmentally Conscious Purchase Intention, and Healthy Food Choices. *Frontiers in Public Health*, 7, 340. <https://doi.org/10.3389/fpubh.2019.00340>
- Leonidou, L. C., Eteokleous, P. P., Christofi, A.-M., & Korfiatis, N. (2022). Drivers, outcomes, and moderators of consumer intention to buy organic goods: Meta-analysis, implications, and future agenda. *Journal of Business Research*, 151, 339–354. <https://doi.org/10.1016/j.jbusres.2022.06.027>
- Li, M., & Chapman, G. B. (2012). Why Do People Like Natural? Instrumental and Ideational Bases for the Naturalness Preference. *Journal of Applied Social Psychology*, 42(12), 2859–2878. <https://doi.org/10.1111/j.1559-1816.2012.00964.x>
- Limbu, Y. B., & Ahamed, A. F. M. J. (2023). What Influences Green Cosmetics Purchase Intention and Behavior? A Systematic Review and Future Research Agenda. *Sustainability*, 15(15), 11881. <https://doi.org/10.3390/su151511881>
- Lin, Y., Yang, S., Hanifah, H., & Iqbal, Q. (2018). An Exploratory Study of Consumer Attitudes toward Green Cosmetics in the UK Market.

- Administrative Sciences, 8(4), 71. <https://doi.org/10.3390/admsci8040071>
- Liu, Q., & Wang, X. (2023). The impact of brand trust on consumers' behavior toward agricultural products' regional public brand. *PLoS ONE*, 18(11). <https://doi.org/10.1371/journal.pone.0295133>
- Long, J., Zaidin, N., & Mai, X. (2024). Social media influencer streamers and live-streaming shopping: examining consumer behavioral intention through the lens of the theory of planned behavior. *Future Business Journal*, 10(1). <https://doi.org/10.1186/s43093-024-00370-0>
- Ma, D., Nupung, S., Chen, Y., & Zhenhua, X. (2026). Determinants of Customers' Purchasing Intention of Fresh Agricultural Products: SEM Analysis. *Emerging Science Journal*, 10(3), 1394–1411. <https://doi.org/10.28991/esj-2026-010-03-012>
- Machado, M., Silva, S., & Costa, E. M. (2024). Byproducts as a Sustainable Source of Cosmetic Ingredients. *Applied Sciences*, 14(22), 10241. <https://doi.org/10.3390/app142210241>
- Madoromae, H., & Lertcanawanichakul, M. (2025). Red Palm Oil: Nutritional Composition, Bioactive Properties, and Potential Applications in Health and Cosmetics: A Narrative Review. *Molecules*, 30(22), 4402. <https://doi.org/10.3390/molecules30224402>
- Marberg, A., Kranenburg, H. van, & Korzilius, H. (2017). The big bug: The legitimization of the edible insect sector in the Netherlands. *Food Policy*, 71, 111–123. <https://doi.org/10.1016/j.foodpol.2017.07.008>
- Masood, A., Hati, S. R. H., & Rahim, A. A. (2023). Halal Cosmetics Industry For Sustainable Development: A Systematic Literature Review. *International Journal of Business and Society*, 24(1), 141–163. <https://doi.org/10.33736/ijbs.5609.2023>
- Meliniasari, A. R., & Mas'od, A. (2024). Understanding Factors Shaping Green Cosmetic Purchase Intentions: Insights from Attitudes, Norms, and Perceived Behavioral Control. *International Journal of Academic Research in Business and Social Sciences*, 14(1). <https://doi.org/10.6007/ijarbs.v14-i1/20573>
- Miao, Y., Sun, J., Liu, R., Huang, J., & Sheng, J. (2025). Bridging the Quality-Price Gap: Unlocking Consumer Premiums for High-Quality Rice in China. *Foods*, 14(7), 1184. <https://doi.org/10.3390/foods14071184>
- Migliore, G., Borrello, M., Lombardi, A., & Schifani, G. (2018). Consumers' willingness to pay for natural food: evidence from an artefactual field experiment. *Agricultural and Food Economics*, 6(1). <https://doi.org/10.1186/s40100-018-0117-1>
- Mladenović, D., Todua, N., & Pavlović-Höck, N. (2023). Understanding individual psychological and behavioral responses during COVID-19: Application of stimulus-organism-response model. *Telematics and Informatics*, 79, 101966. <https://doi.org/10.1016/j.tele.2023.101966>
- Murtiningrum, Sarungallo, Z. L., Roreng, M. K., Santoso, B., & Armia. (2019). Chemical properties, carotenoid, tocopherol and fatty acid composition of three clones of red fruit (*Pandanus conoideus* Lam.) oil of different ripening stages. *International Food Research Journal*, 26(2), 649–655.
- Ngo, T. T. A., An, G. K., Dao, D. K., Nguyen, N. A., Phong, B. H., Nguyen, N. A., & Nguyen, T. H. N. (2025). Leveraging social media marketing activities (SMMAs) to enhance consumer satisfaction and purchase intention for bio-cosmetics. *Acta Psychologica*, 261, 105768. <https://doi.org/10.1016/j.actpsy.2025.105768>
- Niloy, A. C., Sultana, J., Alam, J. bin, Ghosh, A., & Farhan, K. M. (2023). What Triggers You to Buy Green Products? Explaining Through an Extended TPB Model. *Asia-Pacific Journal of Management Research and Innovation*, 19(1), 25–39. <https://doi.org/10.1177/2319510x231171195>
- Nurcahyono, N., & Hanifah, A. (2023). Determinant of Intention to Purchase Halal Cosmetics: A Millennial and Z Generation Perspective. *International Journal of Islamic Business Ethics*, 8(1), 12. <https://doi.org/10.30659/ijibe.8.1.12-25>
- Omar, W. M. W., Subri, N. A. M., & Zulfakar, M. H. (2024). The Trend of Halal Cosmetics Supply Chain Research in a Decade: A Systematic Review and Bibliometric Analysis. *Information Management and Business Review*, 16, 213–228. [https://doi.org/10.22610/imbr.v16i1\(i\).3681](https://doi.org/10.22610/imbr.v16i1(i).3681)
- Onken, K. A., Bernard, J. C., & Pesek, J. (2011). Comparing Willingness to Pay for Organic, Natural, Locally Grown, and State Marketing Program Promoted Foods in the Mid-Atlantic Region. *AgEcon Search (University of Minnesota, USA)*, 40(1), 33–47. <https://doi.org/10.1017/s1068280500004500>
- Pan, C., Yu, X., Wang, W., & Lu, X. (2026). Bridging credence uncertainty through authenticity: green trust formation in agricultural livestreaming commerce. *Frontiers in Sustainable Food Systems*, 10. <https://doi.org/10.3389/fsufs.2026.1855419>
- Patricio, R.-C., J., C., Luis, & Cristian, S.-C. (2024). Understanding Diverse E-commerce Behavior in Emerging Markets. *Tehnicki Vjesnik - Technical Gazette*, 31(4). <https://doi.org/10.17559/tv-20231013001025>
- Piras, S., Barlagne, C., Clement, J., Mokhtari, N., Thabet, C., & Tura, M. (2023). How Does Health-related Information Impact Willingness to Pay for Olive Oil?: An Incentivised Lab Experiment Among Moroccan and Tunisian Consumers. *CBS Research Portal (Copenhagen Business School)*. <https://research.cbs.dk/en/publications/875f6cb6-c952-4915-8876-c6d120c3aeac>
- Rocca, R. L., Acerbi, F., Fumagalli, L., & Taisch, M. (2022). Sustainability paradigm in the cosmetics industry: State of the art. *Cleaner Waste Systems*, 3, 100057. <https://doi.org/10.1016/j.clwas.2022.100057>
- Rodrigues, A., Pires, P. B., Delgado, C., & Santos, J. D. (2023). Green Cosmetics. In *Advances in marketing, customer relationship management, and e-services book series* (pp. 41–67). IGI Global. <https://doi.org/10.4018/978-1-6684-8681-8.ch003>
- Rosário, A. T., & Dias, J. C. (2025). The Role of Digital Marketing in Shaping Sustainable Consumption: Insights from a Systematic Literature Review. *Sustainability*, 17(17), 7784. <https://doi.org/10.3390/su17177784>
- Sahu, P., & Saini, R. (2025). Green Cosmetics Purchasing Behaviour : A Study of Eco-Conscious Choices of Generation Z consumers. *International Journal of Scientific Research in Science and Technology*, 12(4), 923–941. <https://doi.org/10.32628/ijrst251376>
- Salmiah, S., Sahir, S. H., & Fahlevi, M. (2023). The effect of social media and electronic word of mouth on trust and loyalty: Evidence from generation Z in coffee industry. *International Journal of Data and Network Science*, 8(1), 641–654. <https://doi.org/10.5267/j.ijdns.2023.8.021>
- Scott, S., Rozin, P., & Small, D. A. (2020). Consumers Prefer "Natural" More for Preventatives Than for Curatives. *Journal of Consumer Research*, 47(3), 454–471. <https://doi.org/10.1093/jcr/ucaa034>
- Settou, H., & Aomari, A. (2024). The Effect of Digital Social Influence on Attitudinal Change and Purchase Behavioral Intention of Consumers. *Revista de Gestão Social e Ambiental*, 18(11). <https://doi.org/10.24857/rgsa.v18n11-222>
- Silva, A. G. da, Rocha, C., Ribeiro, J. C., Aganovic, K., Lima, R. C., Methven, L., & Cunha, L. M. (2024). Consumer perception of risk towards new sustainable non-thermal food processing technologies: A cross-cultural study between Portugal, Germany, and the UK. *CentAUR (University of Reading)*, 96, 103772. <https://doi.org/10.1016/j.ifset.2024.103772>
- Simão, S. A. V., Rohden, S. F., & Pinto, D. C. (2022). Natural claims and sustainability: The role of perceived efficacy and sensorial expectations. *Sustainable Production and Consumption*, 34, 505–517. <https://doi.org/10.1016/j.spc.2022.09.026>
- Snae, N. K., Wachira, P., & Chitinout, W. (2024). Gender differences in herbal platform adoption and user behavior: A multi-group comparison based on structural equation model. *Journal of Infrastructure Policy and Development*, 8(9), 7579. <https://doi.org/10.24294/jipd.v8i9.7579>
- Suhaera, S., Sammulia, S., Prayoga, D., Ramadhania, Z. M., Mita, S., Fristiody, A., & Milanda, T. (2026). Fermented Plant-Derived Phytoconstituents in Biocosmetics: Pharmacological Enhancements and Applications. *Clinical Cosmetic and Investigational Dermatology*, 1–19. <https://doi.org/10.2147/ccid.s602919>

- Suphasomboon, T., & Vassanadumrongdee, S. (2022). Toward sustainable consumption of green cosmetics and personal care products: The role of perceived value and ethical concern. *Sustainable Production and Consumption*, 33, 230–243. <https://doi.org/10.1016/j.spc.2022.07.004>
- Susanti, E., Rohman, A., & Setyaningsih, W. (2022). Dual Response Optimization of Ultrasound-Assisted Oil Extraction from Red Fruit (*Pandanus conoideus*): Recovery and Total Phenolic Compounds. *Agronomy*, 12(2), 523. <https://doi.org/10.3390/agronomy12020523>
- Testa, R., Rizzo, G., Schifani, G., Tóth, J., & Migliore, G. (2023). Critical determinants influencing consumers' decision-making process to buy green cosmetics. A systematic literature review. *Journal of Global Fashion Marketing*, 15(3), 357–381. <https://doi.org/10.1080/20932685.2023.2268669>
- Tilaar, K., Mulyana, A., Komaladewi, R., & Saefullah, K. (2023). Exploratory analysis of natural cosmetic products purchase intention: Evidence from Jakarta, Indonesia. *Uncertain Supply Chain Management*, 11(4), 1635–1644. <https://doi.org/10.5267/j.uscm.2023.7.005>
- Timpanaro, G., & Cascone, G. (2025). Consumer behavior and sustainability: Exploring Italy's green cosmetics market with prickly pear seed oil. *PubMed Central*, 11(3). <https://doi.org/10.1016/j.heliyon.2025.e42233>
- Torelli, C. J., Özsoyer, A., Carvalho, S. W., Keh, H. T., & Mæhle, N. (2012). Brand Concepts as Representations of Human Values: Do Cultural Congruity and Compatibility between values Matter? *Journal of Marketing*, 76(4), 92–108. <https://doi.org/10.1509/jm.10.0400>
- Vergura, D. T., Zerbini, C., & Luceri, B. (2020). Consumers' attitude and purchase intention towards organic personal care products. An application of the S-O-R model. *Sinergie Italian Journal of Management*, 38(1), 121–137. <https://doi.org/10.7433/s111.2020.08>
- Wang, J., Dang, W. V. T., Wang, H., Mu-qiang, Z., & Wu, Q. (2021). Investigating the Effects of Intrinsic Motivation and Emotional Appeals Into the Link Between Organic Appeals Advertisement and Purchase Intention Toward Organic Milk. *Frontiers in Psychology*, 12, 679611. <https://doi.org/10.3389/fpsyg.2021.679611>
- Wijaya, S. C., & Briliana, V. (2022). The Role of Attitude in the Purchase Intention of Indonesian Muslim Men Towards Halal Personal Care Products. *Advances in Economics, Business and Management Research/Advances in Economics, Business and Management Research*, 653. <https://doi.org/10.2991/aebmr.k.220501.040>
- Wolf, M., Emberger-Klein, A., & Menrad, K. (2023). Usage of Natural Health Products (NHPs) for respiratory diseases: user characteristics and NHP-Consumption behavior during the Covid-19 pandemic in Germany. *BMC Complementary Medicine and Therapies*, 23(1), 372. <https://doi.org/10.1186/s12906-023-04180-9>
- Yano, Y., Kato, E., Ohe, Y., & Blandford, D. (2018). Examining the opinions of potential consumers about plant-derived cosmetics: An approach combining word association, co-occurrence network, and multivariate probit analysis. *Journal of Sensory Studies*, 34(2). <https://doi.org/10.1111/joss.12484>
- Yoo, J.-H., & Kim, K.-E. (2025). A Study on the Recognition and Purchasing Behavior of Hair Care Products with Natural Extracts: Focusing on Consumer Value by Age Group. *Journal of the Korean Society of Cosmetology*, 31(5), 1217–1227. <https://doi.org/10.52660/jksc.2025.31.5.1217>
- Yu, X., & Wisaengul, K. (2026). Behavioral Drivers of Eco-Friendly Cosmetics Purchases: Integrating the Theory of Planned Behavior, Trust, and Alphabet Theory. *Journal Of Organizational Behavior Research*, 11(1), 123–138. <https://doi.org/10.51847/ii21laeqbn>
- Zhang, W., Chintagunta, P. K., & Kalwani, M. U. (2021). Social Media, Influencers, and Adoption of an Eco-Friendly Product: Field Experiment Evidence from Rural China. *Journal of Marketing*, 85(3), 10–27. <https://doi.org/10.1177/0022242920985784>
- Zhu, C. (2025). Consumer Acceptance and Market Potential of Natural Organic Cosmetic Formulations in the US Market. *Journal of World Economy*, 4(5), 66–71. <https://doi.org/10.56397/jwe.2025.10.10>
- Zollo, L., Carranza, R., Faraoni, M., Díaz, E., & Martín-Consuegra, D. (2021). What influences consumers' intention to purchase organic personal care products? The role of social reassurance. *Journal of Retailing and Consumer Services*, 60, 102432. <https://doi.org/10.1016/j.jretconser.2020.102432>