



Leveraging social media marketing activities (SMMAs) to enhance consumer satisfaction and purchase intention for bio-cosmetics

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ABSTRACT

Social media marketing has increasingly become a strategic channel for brands to engage and build relationships with consumers, particularly in trust-sensitive industries such as bio cosmetics. However, research on how Social Media Marketing Activities (SMMAs) shape consumer perceptions and behaviors in this sector remains limited. Guided by the Stimulus-Organism-Response (S-O-R) framework, this study examines how six dimensions of SMMAs, including informativeness, interactivity, personalization, trendiness, entertainment, and electronic word-of-mouth, affect consumer evaluations (perceived quality, value, and trust) and subsequent outcomes (satisfaction and purchase intention) in the bio-cosmetics market. A cross-sectional quantitative design was employed, and data were collected via an online survey from 342 Vietnamese consumers who actively use social media and have prior experience purchasing bio-cosmetic products. The proposed research model was evaluated using Partial Least Squares Structural Equation Modeling (PLS-SEM), which enabled the assessment of both measurement and structural relationships. The results supported all hypotheses, revealing that six dimensions of SMMAs, including informativeness, interactivity, personalization, trendiness, entertainment, and electronic word-of-mouth, positively shape consumer perceived quality, value, and trust, which subsequently enhance satisfaction and purchase intention. Among these factors, perceived trust emerged as the most critical driver, underscoring the central role of trust in building favorable attitudes and behavioral intentions toward bio-cosmetics brands. This study contributes to the literature by extending the understanding of how SMMAs operate in a niche but rapidly growing market and provides actionable insights for managers to design transparent, engaging, and trust-oriented social media strategies.

1. Introduction

In the digital age, social media has transformed a basic communication medium into a key marketing asset, particularly in the bio-cosmetic industry. The progress in information technology has greatly expanded the functionality of social media platforms, transforming them into powerful assets for brand development and customer engagement. Research by Zarei et al. (2021) indicates that over two-thirds of internet users are active on these platforms, presenting substantial opportunities for brands to strengthen their presence and engage with consumers. Compared with traditional media, social media advertising demonstrates superior effectiveness in consumer recall and engagement (Ao

et al., 2023). Platforms such as Instagram and Facebook now play a decisive role in shaping purchasing decisions by enabling product discovery, price comparison, trend monitoring, and even direct transactions (Hu & Zhu, 2022).

Recent academic and industry research underscores the increasing significance of Social Media Marketing Activities (SMMAs) as key drivers of online shopping behavior, primarily due to their capacity to deliver interactive, personalized, and credible communication. In today's highly competitive environment, brands are compelled to adopt SMMAs that not only disseminate information but also foster two-way engagement, personalization, and trust-building (Anas et al., 2023). Social media not only functions as a direct communication channel but

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also facilitates rapid feedback and internal communication, enhancing the overall marketing effectiveness (Seo & Park, 2018). By strategically leveraging SMMAs, brands can achieve differentiation and cultivate long-term customer relationships (Chrisniyanti & Fah, 2022). This dynamic is particularly relevant to the cosmetics industry, which continues to expand in response to rising consumer interest in health, beauty, and sustainability. For firms in this sector, SMMAs have become an indispensable component of marketing strategies (Lim et al., 2024; Prayogi & Sugiat, 2024).

As identified in prior studies, informativeness, interactivity, personalization, trendiness, entertainment, and electronic word-of-mouth (eWOM) constitute the six critical dimensions of SMMAs (Anas et al., 2023; Jamil et al., 2022). These activities collectively strengthen consumer perceptions of quality and value while fostering trust, ultimately influencing satisfaction and purchase intention. Importantly, the Stimulus-Organism-Response (S-O-R) framework provides a solid theoretical foundation to explain these mechanisms. Within this framework, SMMAs function as external stimuli (S), consumer perceptions such as quality, value, and trust represent the internal organismic states (O), and satisfaction and purchase intention constitute the resulting behavioral responses (R). In the context of bio-cosmetics, SMMAs thus serve as a critical stimulus that transforms consumer understanding by communicating product authenticity, benefits, and ethical practices through transparent, engaging, and socially interactive content (An & Ngo, 2025).

Despite growing scholarly interest in social media marketing, the role of SMMAs in shaping consumer behavior within the bio-cosmetics industry remains underexplored. While previous research has examined social media marketing in relation to brand equity (Prayogi & Sugiat, 2024) and e-commerce (Banerji & Singh, 2024), fewer studies have investigated how these multidimensional activities directly and indirectly influence consumer perceptions and outcomes in sustainable consumption contexts. Research on bio-cosmetics has emphasized determinants such as health consciousness, product quality, and ethical considerations (Choi, 2023; Choi & Kim, 2022), yet limited attention has been given to how SMMAs translate these attributes into consumer perceptions of quality, value, and trust, and subsequently into satisfaction and purchase intention.

This research gap is particularly relevant in light of recent shifts in consumer behavior. The COVID-19 pandemic amplified awareness of health, safety, and sustainability, accelerating demand for natural alternatives to conventional cosmetics (Alwan et al., 2023; Lavuri et al., 2022; McKibbin & Fernando, 2023; Park et al., 2020). In emerging markets such as Vietnam, bio-cosmetics have become increasingly popular among younger, digitally engaged consumers (Misesa et al., 2022). Yet, scholarly understanding of how digital marketing strategies, particularly SMMAs, shape their decision-making remains limited. Addressing this gap is crucial as the industry's growth is closely tied to rising awareness of health, sustainability, and the environmental impacts of conventional cosmetics (Goyal & Jerold, 2023).

Given the increasing role of social media in shaping purchasing decisions (Anas et al., 2023), it becomes critical to understand how SMMAs influence key consumer outcomes in the bio-cosmetics sector. Although earlier studies have emphasized the influence of perceived value and health consciousness on organic cosmetic purchases, particularly through trust and satisfaction (Chrisniyanti & Fah, 2022; Pop et al., 2020), there is still limited knowledge on how the interrelated dimensions of SMMAs collectively affect consumer perceptions and behavioral intentions in this context.

The novelty of this study lies in integrating the multidimensional SMMA framework with the S-O-R model to explain consumer behavior in the bio-cosmetics industry. By positioning SMMAs as external stimuli, consumer perceptions (quality, value, trust) as organismic states, and satisfaction and purchase intention as behavioral responses, the study provides a systematic understanding of how social media influences sustainable consumption choices. From a theoretical perspective, this

research enriches the literature by extending the S-O-R framework into the digital marketing and sustainability context. From a practical perspective, it offers actionable insights for bio-cosmetic brands to design more transparent, trust-enhancing, and consumer-oriented social media strategies that not only build satisfaction but also drive purchase intention.

Accordingly, this study pursues two main objectives. First, it investigates how the six components of SMMAs, namely informativeness, personalization, entertainment, interactivity, trendiness, and electronic word-of-mouth (eWOM), influence consumer perceptions of quality, value, and trust. Second, it examines how these perceptions subsequently influence satisfaction and purchase intention. In doing so, the study advances theoretical understanding of consumer responses to social media stimuli and provides practical guidance for marketers aiming to foster sustainable consumption in the bio-cosmetics sector.

2. Literature review

2.1. Theoretical background

2.1.1. Bio cosmetics

Bio cosmetics, defined as products formulated entirely from natural ingredients such as plant extracts, microbes, enzymes, and organic crops, are increasingly popular due to their environmental and health benefits (Goyal & Jerold, 2023). These products are distinguished by their absence of synthetic chemicals, pesticides, and chemical fertilizers, and are intended for use on the skin, face, hair, and other body parts (Tiwari et al., 2020). The rise of bio cosmetics can be attributed to growing consumer awareness surrounding health and environmental issues (Choi & Kim, 2024).

Recent research highlights several key factors shaping consumer behavior toward bio cosmetics. Pandey et al. (2024) highlight that perceived value, environmental consciousness, and health awareness significantly enhance consumers' intentions to purchase organic cosmetics. Similarly, Ribeiro and Meneses (2023) assert that environmental concerns and health benefits are primary motivators for buying bio cosmetics. In the Vietnamese market, bio cosmetics have seen significant growth, with numerous domestic and international brands offering products ranging from skincare to makeup. This growth reflects an increasing consumer preference for products that are natural, health-conscious, and environmentally friendly (Misesa et al., 2022).

Despite this trend, research on the influence of SMMAs on bio cosmetics remains scarce. Studies on social media marketing have demonstrated influence on consumer behavior across various industries. Vithana and Fernando (2024) found that social media advertising and eWOM significantly affect consumer purchase intentions for various products, including cosmetics. Chuah et al. (2023) explored social media marketing's effect on purchase intentions within the broader cosmetics industry but did not specifically address bio cosmetics.

In this study, the bio-cosmetics sector serves as a highly relevant and theoretically meaningful context for examining how social media marketing influences consumer decision-making. Because consumers of bio cosmetics are highly attentive to product safety, natural sourcing, and ethical responsibility, their evaluations of perceived quality, perceived value, and trust become central constructs that explain how marketing activities influence satisfaction and purchase intentions (Pop et al., 2020; Suphasomboon & Vassanadumrongdee, 2022). This makes bio cosmetics not only a rapidly expanding industry but also a rich domain for exploring the mechanisms through which marketing activities drive consumer responses. Moreover, this context is well aligned with prior research showing that in environmentally and health-conscious markets, consumer attitudes are shaped less by traditional advertising and more by credibility, transparency, and perceived value delivered through interactive and engaging marketing channels (Chrisniyanti & Fah, 2022; Ribeiro & Meneses, 2023).

2.1.2. Social media marketing activities (SMMA)s

Social media has become a cornerstone of modern marketing, empowering brands to connect and interact with their customers effectively, strengthen relationships, and enhance brand loyalty (Islam & Sheikh, 2024). Beyond facilitating direct interactions, social media serves as a platform for shaping consumer perceptions, influencing purchasing decisions, and fostering brand credibility (Jamil et al., 2022). Its impact extends beyond business, playing a crucial role in shaping social trends and consumer behavior (Reisach, 2021). SMMA)s have evolved as brands leverage social networks to enhance marketing effectiveness. Drossos et al. (2023) define SMMA)s as multi-dimensional strategies that integrate interactive communication, targeted advertising, and community-driven content to maximize brand reach. The growing reliance on digital platforms, particularly during the COVID-19 pandemic, has expedited this shift, making social media a primary channel for product discovery and engagement (Huang et al., 2022).

Key elements of SMMA)s include interaction, informativeness, eWOM, personalization, and timeliness (Yadav & Rahman, 2018). Interaction fosters brand-consumer engagement, informativeness enhances consumer decision-making, and eWOM strengthens credibility through peer recommendations. Personalization tailors content to individual preferences, increasing brand relevance, while timeliness ensures marketing messages are delivered at optimal moments to maximize engagement (Sohaib et al., 2022). Recent studies have expanded these components, highlighting the significance of entertainment, customization, and trendiness in social media marketing (Shuang et al., 2021; Wirga et al., 2022). Additionally, entertainment captivates audiences, customization refines messaging based on consumer behavior, and trendiness ensures brand relevance in rapidly changing

digital landscapes (Jamil et al., 2022). By effectively integrating these components, brands can improve customer satisfaction, boost the intention to purchase, and build lasting brand equity.

Building on this foundation, the present study adopts the multidimensional SMMA framework as its primary theoretical lens (Jamil et al., 2022; Yadav & Rahman, 2018). This framework conceptualizes SMMA)s as an integrated set of activities, specifically informativeness, interactivity, personalization, trendiness, entertainment, and eWOM, that jointly shape how consumers perception and evaluation of a brand. Unlike single-channel or single-message marketing, the multidimensional SMMA approach emphasizes that consumer responses are driven by the interplay of several marketing dimensions acting simultaneously. To capture the mechanisms through which these marketing activities influence consumer behavior, the model integrates well-established constructs from consumer behavior theory, namely perceived quality, perceived value, trust, customer satisfaction, and purchase intention (Bilgin & Kethüda, 2022; Couceiro et al., 2025). These constructs are particularly critical in sustainability-oriented markets such as bio cosmetics, where consumer decision-making depends heavily on trust, transparency, and perceived value (Jamil et al., 2022; Suphasomboon & Vassanadumrongdee, 2022).

Accordingly, the conceptual model proposed in this study (Fig. 1) integrates the SMMA multidimensional framework with consumer perception theory. Within this structure, SMMA)s function as strategic inputs, consumer perceptions serve as evaluative judgments that translate marketing exposure into meaning, and satisfaction and purchase intention emerge as the behavioral outcomes. This integration provides a strong theoretical grounding while extending prior research by applying these concepts to the underexplored domain of bio cosmetics,

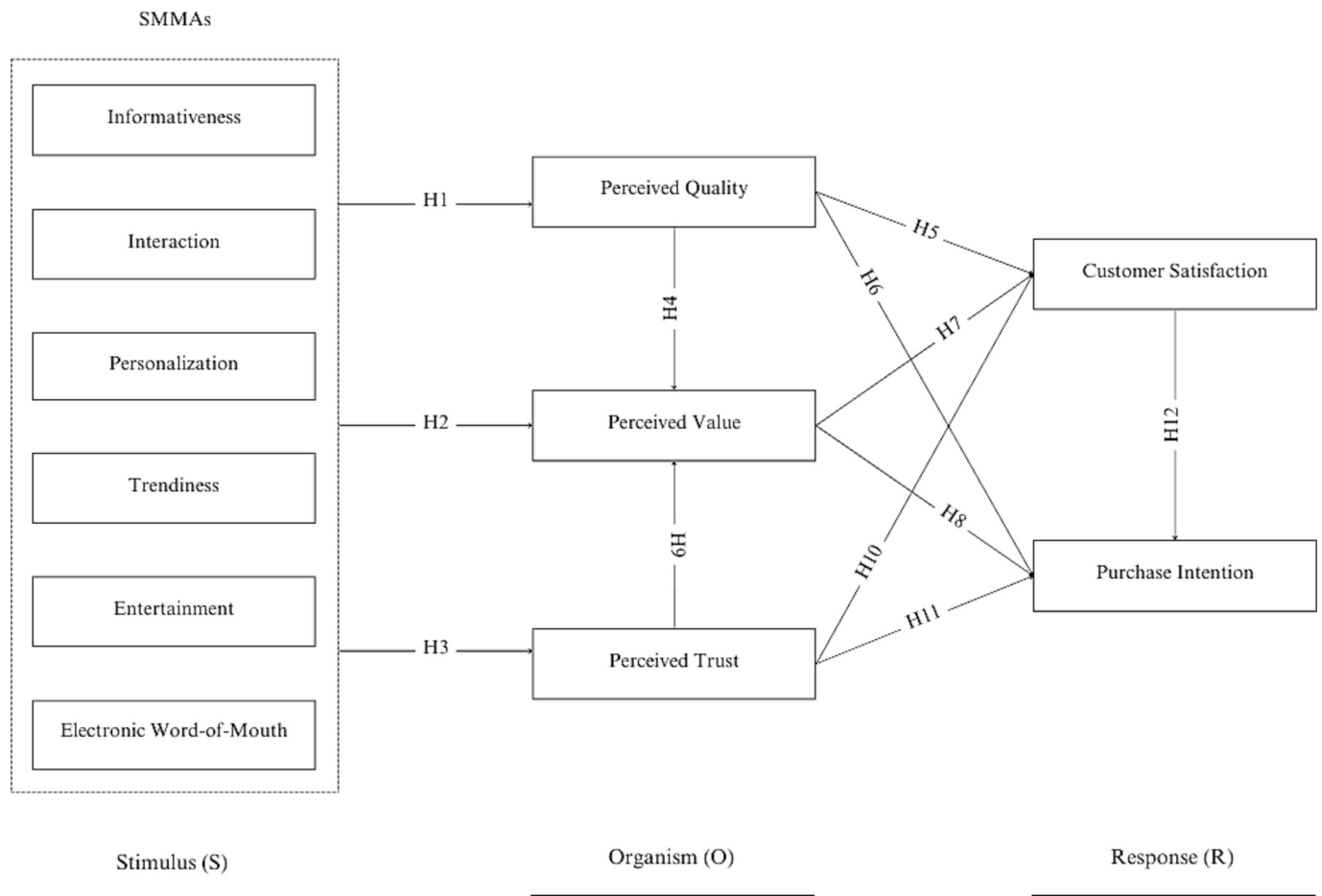


Fig. 1. Conceptual model.

thereby highlighting how sustainability-driven consumer values reshape the effectiveness of social media marketing (Jamil et al., 2022; Pop et al., 2020; Yadav & Rahman, 2018).

2.1.3. Stimulus-Organism-Response (S-O-R) model

The Stimulus-Organism-Response (S-O-R) model, first introduced in environmental psychology (Mehrabian & Russell, 1974), has become a widely adopted framework in consumer behavior research for explaining how external stimuli shape individuals' internal states and subsequent behaviors. Within this framework, stimuli (S) are environmental cues that trigger psychological reactions, the organism (O) represents consumers' cognitive and affective processes, and responses (R) refer to the resulting attitudes and behavioral outcomes.

In digital marketing, the S-O-R model provides a useful lens for examining how online interactions affect consumer decision-making. SMMA act as external stimuli that expose consumers to information, interactivity, and social cues, thereby activating various psychological processes (Kumar & Hsieh, 2024; Kuo & Chen, 2023). These processes, in turn, determine how consumers evaluate products and form purchase-related behaviors (Erensoy et al., 2024).

Drawing on this perspective, the present study conceptualizes six dimensions of SMMA: informativeness, interactivity, personalization, trendiness, entertainment, and eWOM, as the stimuli (S). When exposed to these activities, consumers develop internal cognitive and affective evaluations in the form of perceived quality, perceived value, and perceived trust, which represent the organism (O). These evaluations subsequently drive consumer responses (R), namely customer satisfaction and purchase intention in the bio-cosmetics industry.

By employing the S-O-R framework, this study establishes a clear theoretical foundation for examining how SMMA influence consumer perceptions and behaviors. Moreover, it extends the application of the S-O-R model to the sustainability-driven bio-cosmetics context, where consumer judgments of product quality, value, and trust are central to shaping satisfaction and purchase intentions.

2.2. Hypothesis development

2.2.1. The influence of social media marketing activities on perceived quality, perceived value, and perceived trust

Perceived quality refers to consumers' subjective assessment of a product's overall superiority, which is shaped by both intrinsic attributes (such as composition and functionality) and extrinsic cues (such as brand reputation and marketing communication) (Samu et al., 2023). Unlike objective quality, which is based on measurable standards, perceived quality relies heavily on consumer impressions, prior experiences, and exposure to marketing efforts (Choi, 2023). In the digital era, SMMA play a crucial role in enhancing perceived quality by delivering visually appealing content, educational materials, and interactive experiences that create a sense of product superiority (Koay et al., 2020). Strategies like influencer endorsements, behind-the-scenes brand narratives, and high-resolution product demonstrations enable consumers to evaluate product quality prior to making a purchase decision (Khan, 2022). Additionally, eWOM and customer reviews significantly contribute to perceived quality, as positive feedback reinforces credibility and trust in the product (Ibrahim & Aljarah, 2021). In the bio-cosmetics industry, where consumers prioritize natural ingredients and ethical sourcing, effective SMMA are particularly influential in shaping perceptions of high-quality, safe, and sustainable products.

Perceived value, in contrast, captures the trade-off between the benefits consumers believe they receive from a product and the costs they incur, including monetary, time, and effort investments (Bushara et al., 2023). This construct is multidimensional, encompassing functional benefits (e.g., product effectiveness), emotional benefits (e.g., satisfaction, personal identity), and social benefits (e.g., brand prestige, community recognition) (Roh et al., 2022). In digital marketing, brands use SMMA to enhance perceived value by offering engaging

promotions, interactive content, and meaningful brand narratives (More, 2023). Strategies such as tutorial videos, live product demonstrations, limited time offers, and customer testimonials help consumers recognize the unique advantages of a product, making it appear more valuable (Yang et al., 2020). Particularly in the organic cosmetics sector, where consumers seek safe, eco-friendly, and high-performance products, SMMA effectively highlight product benefits, ethical sourcing, and sustainability commitments, strengthening perceived value (Agarwal et al., 2024; Shoukat & Ramkissoon, 2022). Moreover, interactive communication between brands and consumers on social media enhances relational value, fostering a sense of connection and appreciation that strengthens consumers' perceived value of the brand (Zafar et al., 2021).

Perceived trust is another essential factor influencing purchase decisions, especially in categories where product safety, authenticity, and ethical responsibility are paramount. Trust represents a consumer's belief in a brand's dependability, honesty, and capability to fulfill its commitments (Bilgin & Kethüda, 2022). Trust is built through consistent messaging, transparency, and positive consumer experiences (Ahmed et al., 2024). Social media provides an effective platform for building trust by enabling real-time interactions, addressing consumer concerns, and sharing transparent product information (Bilgin & Kethüda, 2022). Key SMMA strategies that foster trust include influencer collaborations, detailed ingredient explanations, sustainability commitments, and behind-the-scenes content that reveals production processes and ethical sourcing (Pop et al., 2020). Within the S-O-R framework, SMMA act as the external stimulus (S) that shapes consumers' internal psychological states (O), fostering trust, which then drives behavioral responses such as purchase intention (R) (Chin & Wong, 2022). In the organic cosmetics industry, where customers are highly cautious about ingredient authenticity and product safety, brands must leverage SMMA to reinforce trust through transparent communication, ethical branding, and credible endorsements. Based on these considerations, the following hypotheses are proposed:

- H1. SMMA positively influence perceived quality.
- H2. SMMA positively influence perceived value.
- H3. SMMA positively influence perceived trust.

2.2.2. The influence of perceived quality on perceived value, customer satisfaction, and purchase intention

Perceived quality is a fundamental driver of perceived value, particularly in the bio-cosmetics industry, where consumers seek products with high ingredient integrity, eco-friendliness, and ethical sourcing (Choedon & Lee, 2020). Given the sector's emphasis on natural components and sustainable production, consumers often equate superior product quality with higher value (Couceiro et al., 2025). High perceived quality, including product efficacy, safety, and environmental responsibility, enhances consumer trust and directly influences their value perception (Suphasomboon & Vassanadumrongdee, 2022). Moreover, the adoption of advanced biotechnological formulations, sustainable packaging, and transparent labeling practices further strengthens consumer confidence in product value (Goyal & Jerold, 2023; Solin & Curry, 2023). Studies underscore a significant link between perceived quality and brand loyalty; when consumers view a product as high-quality, they often assign greater value to it, leading to increased satisfaction and repeat purchases (Aquinia et al., 2020; Seviliş et al., 2022).

Beyond its contribution to enhancing value perception, perceived quality exerts a strong influence on customer satisfaction by shaping consumers' overall evaluation of a product's performance, reliability, and effectiveness (Xie & Sun, 2021). In the bio-cosmetics sector, satisfaction is often determined by critical quality-related factors such as ingredient purity, packaging sustainability, and brand reputation (El-Otmami et al., 2024), which directly affect how consumers judge product

credibility and trustworthiness. When products consistently meet or exceed consumer expectations, satisfaction rises, fostering positive emotional responses, stronger trust in the brand, and higher levels of loyalty (Lili et al., 2022). Additionally, satisfied customers often engage in positive word-of-mouth communication, which not only strengthens the brand's reputation but also enhances customer retention (Manyanga et al., 2022). Psychological factors such as alignment with self-image and adherence to ethical values play an important role, as consumers derive greater satisfaction from products and brands that resonate with their personal beliefs and lifestyles (Lili et al., 2022). Empirical evidence confirms a robust relationship between perceived quality and satisfaction, which in turn influences purchasing decisions and long-term brand engagement (Santoso et al., 2023). By ensuring consistently high perceived quality, bio-cosmetic brands can effectively meet consumer expectations, enhance satisfaction, and secure a stronger competitive position in the marketplace (Laila & Handini, 2022; Xie & Sun, 2021).

Perceived quality is widely recognized as a strong predictor of purchase intention, as consumers are more inclined to choose products they believe can consistently deliver value (Religia et al., 2024). In the bio-cosmetics industry, where purchasing decisions are often shaped by concerns about ingredient safety, product effectiveness, and overall credibility, perceived quality becomes a decisive factor in guiding consumer behavior (Purnamasari & Fadli, 2024). When consumers view a product as high quality, they tend to form a favorable attitude toward purchasing it, as they associate quality with reliability, efficacy, and value (Mamun et al., 2020). Additionally, positive experiences with high-quality products further strengthen consumer trust, encouraging repeat purchases and fostering long-term loyalty (Limbu & Ahamed, 2023). Research also suggests that brands that consistently deliver superior quality gain a significant competitive advantage, as satisfied consumers not only increase their purchase intention but also recommend the products to others, thereby amplifying brand reputation and market presence (Hanifati & Salehudin, 2021). Thus, ensuring high perceived quality is crucial for enhancing consumer confidence, driving purchase decisions, and sustaining long-term success in the bio-cosmetics sector. Based on these considerations, the following hypotheses are proposed:

- H4. Perceived quality positively influences perceived value.
- H5. Perceived quality positively influences customer satisfaction.
- H6. Perceived quality positively influences purchase intention.

2.2.3. *The influence of perceived value on customer satisfaction and purchase intention*

Perceived value is a key factor in shaping customer satisfaction in the bio-cosmetics industry, where consumers seek products that align with their expectations of quality, safety, and ethical standards. Kotler and Kevin (2021) conceptualize value as the trade-off between quality, service, and price, positioning it as a decisive factor in consumer satisfaction. Ulfah and Jatmiko (2020) further emphasize that consumers perceive higher value when they believe a product offers distinct advantages over competitors. Perceived value encompasses multiple dimensions, including functional benefits (such as efficacy and safety), emotional satisfaction (such as personal identification with the brand), and ethical considerations like environmental sustainability (Nav et al., 2024). Hafidz and Huriyahnuryi (2023) highlight that when consumers recognize high value in a product, their overall satisfaction increases, strengthening brand trust and fostering long-term loyalty. Similarly, Wu (2024) suggests that perceived value enriches the customer experience by incorporating both tangible (e.g., product quality) and intangible (e.g., brand reputation) elements, ultimately enhancing consumer satisfaction. These insights establish perceived value as a foundational determinant of customer satisfaction in the bio-cosmetics sector.

In addition to influencing satisfaction, perceived value is also a powerful predictor of purchase intention, as it reflects the consumer's

overall assessment of product benefits relative to costs. Contemporary consumers increasingly evaluate both tangible attributes, such as health and safety assurances, and intangible considerations, including ethical sourcing and sustainability, when making purchase decisions (Elmor et al., 2024). Sweeney and Soutar (2001) outline five key dimensions of perceived value: social, emotional, functional, cognitive, and conditional, which together shape consumer judgments and behaviors. Research by Luo et al. (2022) and Salhab et al. (2023) demonstrates that high perceived value, particularly when linked to product effectiveness, emotional appeal, and social image, increases the likelihood of purchase. Nav et al. (2024) substantiate this perspective by highlighting that when consumers perceive strong functional and ethical value in a bio-cosmetic product, they tend to favor purchasing it. Moreover, Suphasomboon and Vassanadumrongdee (2022) highlight that ethical considerations significantly contribute to consumer purchase decisions, particularly in industries where sustainability and ingredient transparency are key concerns. Raharja et al. (2022) reinforce this perspective, indicating that when functional, emotional, and social values are integrated, they strongly impact purchase behavior among environmentally conscious consumers. These findings underscore the role of perceived value as a primary driver of consumer purchase intentions. Based on these considerations, the following hypotheses are proposed:

- H7. Perceived value positively influences customer satisfaction.
- H8. Perceived value positively influences purchase intention.

2.2.4. *The influence of perceived trust on perceived value, customer satisfaction, and purchase intention*

Perceived trust is a key element that shapes consumer evaluations of value, satisfaction, and purchase intention, particularly in the bio-cosmetics industry, where product claims often emphasize health, safety, and ethical practices. Trust signifies a consumer's belief in a brand's dependability, integrity, and capability to fulfill its commitments (Li et al., 2023). When consumers perceive a brand as trustworthy, they are more likely to view its products as valuable because trust reduces uncertainty, mitigates perceived risks, and reinforces positive brand associations (Chou et al., 2024). This relationship is especially important in the digital era, where SMMA act as a key communication channel between brands and consumers. Transparent messaging, credible influencer endorsements, and authentic user-generated content contribute to building trust, which, in turn, enhances perceived value (Liu, 2023; Masuda et al., 2022). Research indicates that trust in SMMA significantly affects how consumers assess product value, with studies showing that when consumers trust the information provided through these channels, they are more likely to attribute higher value to bio-cosmetic products (Moreno & Kang, 2020). Conversely, skepticism toward brand messaging can erode perceived value, leading to hesitation in consumer decision-making (Yum & Kim, 2024).

Trust also exerts a strong influence on customer satisfaction by fostering security and confidence throughout the consumer journey. In markets such as bio-cosmetics, where product authenticity and ethical sourcing are critical, trust becomes an essential determinant of post-purchase satisfaction (Beyari, 2020). By reducing perceived risks and offering reassurance, trust enriches consumers' experiences, leading to greater satisfaction (Irshad et al., 2020). Moreover, the interactive and dialogic nature of SMMA enables brands to strengthen trust by responding directly to consumer inquiries, addressing customer concerns in real-time and reinforcing brand credibility (Hamid et al., 2023). When consumers trust a brand's ethical claims and product authenticity, they are more likely to report positive satisfaction with both the product and the overall brand relationship (Jamil et al., 2022). Previous studies further demonstrate that show that consumers who trust the content shared on social media platforms tend to feel more satisfied with their brand experience (Liang, 2021). Therefore, trust in brand communication not only improves consumer perceptions but also strengthens long-

term brand relationships.

Furthermore, perceived trust is a key motivator for purchase intention, especially in online shopping where products cannot be physically inspected. Purchase intention illustrates the probability of a consumer making a purchase, driven by their assessments and trust in the brand (Özer & Uğurhan, 2025). In the bio-cosmetics industry, where consumers rely heavily on product claims about natural ingredients, safety, and ethical sourcing, trust in the brand significantly impacts their readiness to buy (Wang et al., 2022). Prior research highlights that trust cultivated through SMMAs strengthens positive attitudes toward the brand, enhancing consumers' confidence in their purchase decisions (Sung et al., 2023). The credibility of brand messaging, endorsements by trusted influencers, and authentic user-generated content all contribute to fostering consumer trust, which in turn boosts purchase intention (Choedon & Lee, 2020). Without trust, consumers may hesitate to complete a purchase due to doubts about the product's efficacy or authenticity. Based on these considerations, the following hypotheses are proposed:

H9. Perceived trust positively influences perceived value.

H10. Perceived trust positively influences customer satisfaction.

H11. Perceived trust positively influences purchase intention.

2.2.5. The influence of customer satisfaction on purchase intention

Customer satisfaction is the degree to which a product or service fulfills or surpasses expectations (Fornell et al., 1996). It also reflects the customer's overall attitude toward a product after use (Dam & Dam, 2021). The relationship between customer satisfaction and purchase intention has garnered significant attention in consumer behavior research, particularly within the bio-cosmetics industry (Akter et al., 2024). In this context, customer satisfaction is often viewed as a direct precursor to purchase intention, indicating that increased satisfaction levels are strongly associated with a higher probability of repeat purchases (Istijanto et al., 2023). This relationship is especially pronounced in the bio-cosmetics market, where consumer perceptions of product quality, ethical standards, and brand transparency heavily influence satisfaction levels (Yesitadewi & Widodo, 2023).

Empirical evidence supports the assertion that satisfaction derived from bio-cosmetic products, which stemming from their effectiveness, ingredient transparency, and ethical sourcing, can significantly enhance purchase intentions (Suphasomboon & Vassanadumrongdee, 2022). Furthermore, the alignment of bio cosmetics with consumer values surrounding sustainability and health consciousness amplifies the positive impact of satisfaction on purchasing decisions (Akter et al., 2024). Brands that prioritize customer satisfaction are likely to experience a corresponding increase in purchase intentions, fostering repeat business and attracting new customers (Anas et al., 2023). Based on these considerations, the following hypothesis is developed:

H12. Customer satisfaction positively influences purchase intention.

2.3. Conceptual model

The conceptual framework of this study, illustrated in Fig. 1, integrates the theory of Social Media Marketing Activities (SMMAs) with established constructs in consumer behavior and marketing. Within this framework, SMMAs are conceptualized as a multidimensional construct comprising informativeness, interactivity, personalization, trendiness, entertainment, and electronic word-of-mouth (e-WOM). These dimensions represent strategic digital marketing practices designed to shape consumer cognitive and affective responses, particularly perceptions of quality, value, and trust, which subsequently influence customer satisfaction and purchase intention.

The model draws on consumer psychology theories that emphasize the importance of perception and trust in purchase decision-making, particularly in industries where product credibility and complexity are

central, such as bio-cosmetics. In emerging markets, where consumers often face information asymmetry and fragmented supply structures, social media platforms function as crucial spaces for transparency, credibility, and interactive communication. By enabling engagement and facilitating peer-to-peer influence, SMMAs serve as effective tools for fostering trust and enhancing consumer evaluations.

The framework is further anchored in the S-O-R paradigm. From this perspective, SMMAs act as external stimuli that convey digital signals through their six dimensions. These stimuli activate organismic states, expressed through consumers' perceptions of quality, value, and trust, which represent their cognitive and affective evaluations. These evaluations then drive consumer responses in the form of satisfaction and purchase intention. This logic provides a clear mechanism for understanding how marketing inputs delivered through social media translate into observable consumer behaviors.

Accordingly, this study adopts a socio-technical perspective that views SMMAs not merely as promotional tactics but as mechanisms that transform consumer perceptions through multidimensional engagement. By integrating the established components of SMMAs with key constructs of perceived quality, perceived value, and trust, the framework provides a comprehensive lens for examining consumer behavior in the bio-cosmetics sector. This approach advances prior SMMA research by extending its application to a sustainability-oriented product category and situating it within the dynamics of emerging markets, thereby contributing both theoretical enrichment and practical insights.

3. Methodology

3.1. Instruments

This study utilizes a structured questionnaire to collect quantitative data, developed with reference to established theoretical foundations and refined through insights from prior empirical investigations to ensure relevance and accuracy within the bio-cosmetics industry (Hui et al., 2024). The questionnaire comprises two primary sections. The first section gathers respondents' demographic details for profiling purposes, while the second section contains measurement items aimed at assessing the key constructs specified in the research model (Taherdoost, 2016).

The measurement section comprises 51 closed-ended items, evaluated using a 5-point Likert scale spanning from "Strongly Disagree" (1) to "Strongly Agree" (5). This scaling approach allows participants to indicate the intensity of their agreement or disagreement with each statement, thereby facilitating nuanced insights into consumer perceptions and behaviors. Social Media Marketing Activities (SMMAs) are conceptualized as a second-order reflective-reflective construct, consisting of six lower-order reflective dimensions that collectively define the overall construct, with each dimension considered essential to its conceptualization (Jarvis et al., 2003; Sarstedt et al., 2019). The six dimensions, measured through a total of 27 items, include: Informativeness (5 items), Interactivity (5 items), Trendiness (4 items), Personalization (4 items), Entertainment (4 items), and E-WOM (5 items). These items were derived and refined from well-established studies to match the context of bio cosmetics (Bushara et al., 2023; Koay et al., 2023; Malarvizhi et al., 2022; Mustafa & Hosain, 2020; Pandey & Goutam, 2023; Serrano-Malebrán et al., 2023; Yadav & Rahman, 2018; Zarei et al., 2021). Three key constructs: Perceived Quality (PQ), Perceived Value (PV), and Perceived Trust (PT), are included in the model to capture the underlying mechanisms through which SMMAs shape consumer outcomes. Specifically, perceived Quality (PQ) is assessed using five items, sourced from Calvo-Porrall et al. (2013), Jaradat et al. (2018), Suhud et al. (2022), and Zeithaml (1988). Perceived Value (PV) is evaluated through four items, based on scales from Bushara et al. (2023), Doszhanov and Ahmad (2015), and Parasuraman and Grewal (2000). Perceived Trust (PT) is captured through four items, drawn from Jaradat et al. (2018) and Helal et al. (2023).

Furthermore, Customer Satisfaction (CS) is measured using a five-item scale adapted from Román-Augusto et al. (2022) and Yang et al. (2020). Purchase Intention (PI), the key dependent variable, is assessed with six items, following established measures by Doszhanov and Ahmad (2015) and Suhud et al. (2022).

To ensure the clarity, comprehensibility, and validity of the questionnaire, a pilot study was carried out with 30 participants, following the recommendations of Billingham et al. (2013). Participants provided detailed feedback on question wording, structure, and interpretation. Based on this feedback, necessary modifications were applied to enhance content validity and ensure the questionnaire was user-friendly and aligned with the research objectives. The analysis confirmed that the Average Variance Extracted (AVE) values exceeded the recommended threshold of 0.5, while composite reliability and Cronbach's alpha were above 0.7, indicating strong internal consistency and reliability, in line with the standards of Hair Jr et al. (2021). These results confirm that the measurement instrument possesses adequate psychometric properties for large-scale data collection.

3.2. Participants

This study focused on individuals who are active users of social media platforms and have prior experience purchasing or engaging with bio-cosmetic products online in Vietnam. These criteria were applied to ensure that respondents were familiar with both SMMA and the bio-cosmetics context. Since younger consumers are generally more responsive to social media marketing initiatives, their engagement is likely to translate into purchase intentions (Duffett, 2017). To obtain a comprehensive understanding of how social media marketing influences consumer behavior, this study collected data from individuals across diverse age groups, with participation restricted to those aged 18 and above to ensure the exclusion of minors and maintain ethical standards in data collection.

The target population of this research comprised social media users within Vietnam who represent potential or existing consumers of bio-cosmetic products. To effectively access this population, the survey was administered online through multiple relevant channels, including beauty and cosmetic forums, social media communities, and e-commerce platforms. This approach was chosen to maximize coverage of individuals actively involved in discussions or transactions related to cosmetics. As a result, a total of 372 valid responses were collected and included in the analysis. After a thorough data screening process to remove incomplete, illogical, or excessively rapid responses (Lyu et al., 2021). The demographic information of respondents are presented in Table 1. Among the 342 valid respondents, 45.6 % identified as male, 50.3 % as female, and 4.1 % chose not to specify their gender, ensuring a balanced and inclusive representation. The age distribution showed that 31 % participants were aged 18 to 22 years, 23.4 % were aged 23 to 26 years, 19.6 % were aged 27 to 29 years, 13.5 % were aged 30 to 35 years and 12.6 % respondents were above 36 years old, indicating a broad range of perspectives across different age groups. Respondents represented various occupational fields, including 29.2 % students, 23.4 % officers, 24.6 % self-employed, 18.1 % freelancers and 4.7 % housewives. In terms of monthly income, participants also reported diverse income levels, with 22.2 % of respondents earning <5 million VND, 26.6 % earning from 5 million to <10 million VND, 26 % earning from 10 million to <20 million VND, 18.4 % earning from 20 million to <30 million VND, and 6.7 % earning 30 million VND or more. Regarding purchasing frequency, 43.6 % of respondents indicated that they purchase bio-cosmetic products less than once per month, suggesting that while bio cosmetics are known to the participants, they are not necessarily frequent purchasers for many. Moreover, when asked about the brands of bio cosmetics they had previously purchased, Cocoon emerged as the most frequently mentioned brand, indicating its strong market presence among Vietnamese consumers. Notably, each respondent identified at least one bio-cosmetic brand, confirming the relevance and

Table 1
Demographic information.

Variables	Responses	Frequency (F)	Percent (%)
Gender	Male	156	45.6
	Female	172	50.3
	Not to specify	14	4.1
Age	18 to 22 years old	106	31.0
	23 to 26 years old	80	23.4
	27 to 29 years old	67	19.6
	30 to 35 years old	46	13.5
	Above 36 years old	43	12.6
	Students	100	29.2
	Officers	80	23.4
Occupation	Self-employed	84	24.6
	Freelancer	62	18.1
	Housewife	16	4.7
	<5 million VND	76	22.2
Monthly Income	From 5 million to <10 million VND	91	26.6
	From 10 million to <20 million VND	89	26
	From 20 million to <30 million VND	63	18.4
	30 million VND or more	23	6.7
	Less than once a month	149	43.6
Monthly purchase frequency of bio cosmetics	1 to 2 times per month	94	27.5
	3 to 5 times per month	56	16.4
	>5 times per month	43	12.6
Bio cosmetics brand ever purchased (Multiple options)	Acure	72	11.4
	Klairs	145	23.1
	Cocoon	281	44.7
	Skinna	131	20.8

appropriateness of the participant population for this study.

Collectively, these demographic and behavioral insights offer a solid basis for analyzing the influence of social media marketing activities on consumer perceptions, trust, satisfaction, and purchase intentions within the bio-cosmetics industry.

3.3. Data collection

This study utilizes a quantitative research approach, employing non-probability convenience sampling to collect data efficiently and cost-effectively. Convenience sampling was chosen for its practicality in reaching a sufficiently large and diverse group of respondents within a limited timeframe, a method widely recognized for exploratory research (Ramzan et al., 2023). Data were collected through an online self-administered survey created using Google Forms, which was distributed via targeted channels such as online beauty and cosmetic forums, social media groups, and relevant e-commerce platforms to effectively reach qualified respondents. Before proceeding with the survey, participants received an introductory briefing outlining the study's objectives in clear terms, thereby securing ethical consent and encouraging voluntary involvement. Utilizing a cross-sectional design, the data collection process was implemented during a span of one month, from November 24 to December 31, 2024. A total of 372 responses were collected, of which 342 were valid, achieving a valid response rate of 91.9 %. This sample size satisfies the general recommendations for structural equation modeling (SEM), which suggest a minimum of 200 observations for robust analysis Boomsma (1982), and aligns with Hair et al. (2021), who propose a sample range of 100–150 for maximum likelihood estimation, indicating that the sample meets adequacy for dependable statistical analysis.

Ethical considerations are fundamental in research involving human participants (Creswell & Creswell, 2018). This study adhered to strict

ethical guidelines to ensure voluntary participation, informed consent, and data confidentiality (Saunders et al., 2019). Prior to participation, respondents were provided with a clear explanation of the study's objectives, potential benefits, and any foreseeable risks. They were also informed of their right to decline or withdraw at any stage without consequence. Consent was obtained through a checkbox in online survey questionnaire, which confirmed their voluntary agreement to participate and the academic use of their data. To safeguard participants' rights, a cover statement accompanied the questionnaire, outlining the study's purpose, anonymity assurances, data security, and privacy measures. While some individuals chose not to participate or discontinued before completion, no personal data were collected from non-participants. Ethical clearance for this research was formally granted by the Board of Directors at FPT Can Tho University, Vietnam (Approval No. 20240603.08).

3.4. Data analysis

Data analysis employed Partial Least Squares Structural Equation Modeling (PLS-SEM), an approach well-suited for exploratory studies involving complex models and moderate sample sizes. This method was particularly appropriate given the study's focus on examining multiple relationships between SMMAs, consumer perceptions, and behavioral outcomes (Nekmahmud et al., 2022). Prior to analysis, Mardia's multivariate skewness and kurtosis tests, conducted via the WebPower platform, confirmed significant deviations from multivariate normality (skewness = 813.99, $Z = 46,397.31$, $p < 0.001$; kurtosis = 3485.59, $Z = 98.42$, $p < 0.001$) (Cain et al., 2017). As PLS-SEM is robust to non-normal distributions and emphasizes prediction, it was deemed the most appropriate analytical technique (Richter et al., 2020; Rigdon, 2012). The analysis was conducted in two phases. First, SPSS v.20.0 was used to generate descriptive statistics and summarize respondent demographics. Second, SmartPLS v.3.2.9 was applied for model testing, including the evaluation of both measurement and structural models. Bootstrapping with 5000 subsamples was employed to assess the significance of path coefficients and confidence intervals.

To minimize the risk of common method bias (CMB), which can occur in cross-sectional survey designs and potentially distort the observed relationships among constructs, this study applied the full collinearity assessment approach as recommended by Kock (2015). This approach is considered a more comprehensive alternative to Harman's single-factor test, which has been criticized for its limited sensitivity in detecting CMB (Jordan & Troth, 2020). According to this approach, variance inflation factor (VIF) values below 3.3 indicate the absence of CMB. In addition, Hair, Hult, et al. (2017) suggest that VIF values below 5 can be used as a more general threshold to confirm that multicollinearity is not present in the data. This diagnostic technique has been widely used in consumer behavior studies (Qalati et al., 2021).

For the modeling strategy, this study employed a combined approach using the repeated indicators and two-stage methods to model the higher-order construct (HOC), following the methodological guidelines of Becker et al. (2012) for PLS-SEM. Consistent with the procedures recommended by Anderson and Gerbing (1988) and Hair, Babin, et al. (2019), this approach enabled a comprehensive evaluation of both the measurement and structural models. Within this framework, the first-order constructs (LOCs), namely informativeness, interaction, trendiness, personalization, entertainment, and electronic word-of-mouth, were specified as reflective indicators of the broader HOC, which was theoretically defined by the shared variance among these dimensions.

In the first stage, the measurement models of the LOCs were assessed to generate latent variable scores while ensuring that each construct satisfied the reliability and validity requirements. Indicator reliability was assessed through outer loadings, with acceptable values set at above 0.708. Internal consistency reliability was evaluated using Cronbach's alpha and Composite Reliability (CR), with threshold values of 0.7 or higher (Hair, Risher, et al., 2019). Convergent validity was assessed via

Average Variance Extracted (AVE), with values above 0.5 indicating satisfactory validity (Fornell & Larcker, 1981; Hair, Risher, et al., 2019). Discriminant validity was examined using both the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio, with acceptable HTMT values set at below 0.9 (Henseler et al., 2015).

In the second stage, the latent variable scores derived from the LOCs were used as manifest indicators for the HOC. The second-order reflective measurement model was then assessed, with SMMAs conceptualized as a higher-order construct formed by the six first-order reflective dimensions. The structural model assessment included an examination of multicollinearity using the Variance Inflation Factor (VIF), where values below 5 were deemed acceptable (Hair, Hollingsworth, et al., 2017). Path coefficients were analyzed for statistical significance, with bootstrapping used to generate confidence intervals. The coefficient of determination (R^2) was calculated to evaluate the proportion of variance explained in endogenous variables, offering an indication of the model's predictive capability. Predictive relevance (Q^2) was calculated to confirm the model's predictive capability (Hair, Babin, et al., 2019; Teixeira et al., 2023). Effect sizes (f^2) were also computed to determine the relative contribution of each predictor in explaining the variance of its corresponding criterion variable (Götz et al., 2009).

This systematic and rigorous analytical approach ensured the reliability and validity of the measurement instruments and confirmed the robustness of the structural model. By employing advanced statistical techniques and adhering to established methodological standards, the study presents compelling evidence highlighting the impact of social media marketing activities on shaping consumer perceptions and driving purchase intentions in the bio-cosmetics industry.

4. Results

4.1. Evaluation of the measurement model

4.1.1. First-order measurement model assessment

The first stage of analysis involved assessing the first-order measurement model to ensure the reliability and validity of the constructs employed in the study. Specifically, eleven first-order constructs were examined, including the six dimensions of Social Media Marketing Activities (SMMAs) as Informativeness, Interaction, Trendiness, Personalization, Entertainment, and Electronic Word-of-Mouth (e-WOM) along with Perceived Quality, Perceived Value, Perceived Trust, Customer Satisfaction, and Purchase Intention. This assessment was conducted to confirm that the measurement model met the required standards of reliability, convergent validity, and discriminant validity, thereby providing a robust basis for structural model assessment.

Reliability of the constructs was evaluated using outer loadings, Cronbach's alpha, and Composite Reliability (CR) following the guidelines of Hair, Babin, et al. (2019). As shown in Table 2, all outer loadings range from 0.776 to 0.909, surpassing the recommended threshold of 0.708, thereby confirming that >50 % of the variance in each indicator is explained by the corresponding latent variable (Hair, Babin, et al., 2019). Moreover, the values of Cronbach's alpha and CR fell within the range of 0.836 to 0.960, surpassing the acceptable benchmark of 0.7 (Hair, Risher, et al., 2019). These results confirm the internal consistency and reliability of all first-order constructs, affirming the robustness of the measurement model for further analysis.

The subsequent evaluation of the measurement model focused on convergent validity, which ensures that observed variables are strongly correlated with other indicators within the same construct. This assessment confirms that latent constructs effectively account for the variance in their respective indicators (Hair, Babin, et al., 2019). Convergent validity was evaluated using the Average Variance Extracted (AVE), with values above 0.5 considered acceptable (Fornell & Larcker, 1981; Hair, Risher, et al., 2019). As shown in Table 2, AVE values for all first-order constructs ranged from 0.636 to 0.812, demonstrating that a considerable amount of indicator variability is explained by their

Table 2
Construct reliability and validity.

Constructs	Items	Outer Loadings	CA	CR	AVE	VIF
Informativeness (INF)	INF1: "The social media sites of brand X offer accurate information about the products."	0.884	0.891	0.920	0.698	2.892
	INF2: "The social media sites of brand X offer useful information about the products."	0.846				2.436
	INF3: "The social media sites of brand X provide timely information about the products."	0.816				2.055
	INF4: "The social media sites of brand X provide relevant information about the products."	0.816				2.021
	INF5: "The information that is provided on the social media sites of brand X is comprehensible."	0.812				1.979
Interaction (INT)	INT1: "Information sharing is possible on the social media sites of brand X."	0.843	0.901	0.926	0.716	2.425
	INT2: "Discussion and exchange of opinions are possible on the social media sites of brand X."	0.831				2.294
	INT3: "Expression of opinions is easy on the social media sites of brand X."	0.875				2.770
	INT4: "The social media sites of brand X interact regularly with its followers and fans."	0.824				2.138
	INT5: "The social media sites of brand X enable to share and update about existing products."	0.858				2.607
Personalization (PER)	PER1: "The social media sites of brand X in accordance with my interests."	0.858	0.878	0.917	0.733	2.296
	PER2: "I feel that my needs are satisfied using the social media sites of brand X."	0.892				2.746
	PER3: "The social media sites of brand X facilitate a personalized search for information."	0.841				2.067
	PER4: "I get a rich personal shopping experience through the social media sites of brand X."	0.833				1.966
	TRE1: "The information shared in the social media sites of brand X is up-to-date."	0.829				1.932
Trendiness (TRE)	TRE2: "The use of the social media sites of brand X is fashionable."	0.855	0.877	0.916	0.731	2.241
	TRE3: "Content visible on the social media sites of brand X is the latest trend."	0.867				2.388
	TRE4: "Anything trendy is available on the social media sites of brand X."	0.868				2.386
	ENT1: "The social media sites of brand X is enjoyable."	0.829				1.905
Entertainment (ENT)	ENT2: "Utilizing the social media sites of brand X is exciting."	0.828	0.836	0.890	0.670	1.918
	ENT3: "The content shared on the social media sites of brand X seem interesting."	0.817				1.752
	ENT4: "It is fun to collect information on products through the social media site of brand X."	0.799				1.694
	EWM1: "I would recommend my friends to visit the social media sites of brand X."	0.858				2.507
	EWM2: "I would encourage my friends and acquaintances to use the social media sites of brand X."	0.875				2.712
Electronic Word-of-Mouth (EWM)	EWM3: "I would like to share my purchase experiences with friends and acquaintances on the social media sites of brand X."	0.855	0.897	0.924	0.709	2.468
	EWM4: "I would like to pass information on brand, product, or services from the social media sites of brand X to my friends."	0.809				2.003
	EWM5: "I would like to upload content from the social media sites of brand X on my social media homepage (Facebook, Instagram, etc.)."	0.812				2.042
	PQ1: "Bio cosmetics will have a benefit that suits my needs."	0.811				1.885
	PQ2: "Bio cosmetics are better in quality than general cosmetics."	0.790				1.833
Perceived Quality (PQ)	PQ3: "I am happy with the quality of bio cosmetics."	0.815	0.857	0.897	0.636	1.925
	PQ4: "I have no problem with the quality of bio cosmetics."	0.776				1.739
	PQ5: "The overall quality of bio cosmetics is excellent."	0.794				1.802
	PV1: "Bio cosmetics performance meets my expectations."	0.909				3.278
	PV2: "Bio cosmetics are more beneficial to my skin more than conventional ones."	0.898				3.066
Perceived Value (PV)	PV3: "Bio cosmetics represent excellent value for money."	0.894	0.923	0.945	0.812	2.922
	PV4: "Overall, bio cosmetics deliver me good value."	0.903				3.122
	PT1: "Bio cosmetics have integrity."	0.868				2.400
	PT2: "Bio cosmetics are trustworthy."	0.881				2.654
	PT3: "I can trust using bio cosmetics."	0.879				2.607
Perceived Trust (PT)	PT4: "I highly trust bio cosmetics."	0.868	0.897	0.928	0.764	2.396
	CS1: "Using organic products makes me feel good and satisfied."	0.885				3.069
	CS2: "I think it is a wise decision to buy bio cosmetics."	0.900				3.453
	CS3: "Experiencing bio cosmetics was exactly what I needed."	0.877				3.055
	CS4: "I will recommend the bio cosmetics to others."	0.897				3.331
Customer Satisfaction (CS)	CS5: "Overall, I am satisfied with bio cosmetics."	0.875	0.932	0.949	0.787	2.904
	PI1: "I have a great interest to buy bio cosmetics in the future."	0.909				4.002
	PI2: "I will pay for bio cosmetic someday."	0.902				3.956
	PI3: "There is a significant possibility that I would buy bio cosmetics."	0.890				3.664
	PI4: "I have a firm intention to buy bio cosmetics."	0.884				3.286
Purchase Intention (PI)	PI5: "Even if another product has the same features, I would prefer to use bio cosmetics."	0.900	0.950	0.960	0.800	3.861
	PI6: "Even if there is another product as good quality as bio cosmetics, I prefer to use bio cosmetics."	0.880				3.367

Notes. CA = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted; VIF = Variance Inflation Factor.

respective latent constructs. This demonstrates that the model exhibits a satisfactory level of convergent validity, supporting the appropriateness of the constructs employed in the analysis.

Discriminant validity is essential to confirm that each construct within a model is empirically unique (Hair, Babin, et al., 2019). In this study, it was assessed through two recognized methods: the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio.

First, based on the Fornell-Larcker criterion (Fornell & Larcker, 1981), discriminant validity is established when the square root of each construct's Average Variance Extracted (AVE) exceeds its correlations with other constructs. As shown in Table 3, this criterion was met across all constructs, suggesting that each construct is more closely associated

with its own indicators than with those of other constructs, thereby confirming satisfactory discriminant validity.

Second, to reinforce the assessment, the HTMT ratio was applied. According to Henseler et al. (2015), an HTMT value below 0.90 is required to confirm discriminant validity, values above this threshold may suggest that constructs are not sufficiently distinct. As presented in Table 4, all HTMT values among the constructs ranged from 0.685 to 0.891, remaining well within the acceptable threshold. This further verifies that discriminant validity was successfully established for all first-order constructs.

Table 3
Fornell-Larcker criterion.

	CS	ENT	EWM	INF	INT	PI	PQ	PER	PT	PV	TRE
CS	0.887										
ENT	0.678	0.818									
EWM	0.663	0.761	0.842								
INF	0.690	0.632	0.618	0.835							
INT	0.689	0.651	0.644	0.775	0.846						
PI	0.838	0.669	0.643	0.696	0.646	0.894					
PQ	0.779	0.672	0.678	0.656	0.656	0.781	0.797				
PR	0.640	0.694	0.740	0.649	0.624	0.634	0.657	0.856			
PT	0.785	0.701	0.721	0.716	0.679	0.819	0.737	0.692	0.874		
PV	0.821	0.687	0.723	0.715	0.690	0.835	0.785	0.683	0.805	0.901	
TRE	0.662	0.709	0.730	0.704	0.697	0.626	0.688	0.753	0.684	0.703	0.855

Notes. INF = Informativeness; INT = Interaction; TRE = Trendiness; PER = Personalization; ENT = Entertainment; EWM = Electronic Word-of-Mouth; PQ = Perceived Quality; PV = Perceived Value; PT = Perceived Trust; CS = Customer Satisfaction; PI = Purchase Intention.

Table 4
Heterotrait-Monotrait (HTMT) ratio.

	CS	ENT	EWM	INF	INT	PI	PQ	PER	PT	PV	TRE
CS											
ENT	0.767										
EWM	0.724	0.877									
INF	0.755	0.731	0.691								
INT	0.752	0.750	0.715	0.865							
PI	0.890	0.751	0.695	0.755	0.698						
PQ	0.870	0.794	0.772	0.747	0.746	0.864					
PER	0.707	0.809	0.834	0.732	0.701	0.693	0.757				
PT	0.858	0.809	0.803	0.800	0.755	0.887	0.839	0.780			
PV	0.885	0.781	0.793	0.787	0.756	0.891	0.880	0.759	0.884		
TRE	0.731	0.827	0.821	0.795	0.784	0.685	0.792	0.856	0.770	0.780	

Notes. INF = Informativeness; INT = Interaction; TRE = Trendiness; PER = Personalization; ENT = Entertainment; EWM = Electronic Word-of-Mouth; PQ = Perceived Quality; PV = Perceived Value; PT = Perceived Trust; CS = Customer Satisfaction; PI = Purchase Intention.

4.1.2. Second-order measurement model assessment

After establishing the validity and reliability of the first-order measurement model, the analysis proceeded to assess the second-order construct (higher-order construct, HOC) to confirm the collective influence of its underlying dimensions. This step, as emphasized by Hair, Babin, et al. (2019), is essential to verify that the higher-order construct adequately captures the variance shared across its first-order components. In this study, Social Media Marketing Activities (SMMAs) were conceptualized as a reflective-reflective higher-order construct, composed of six first-order dimensions: Informativeness, Interaction, Trendiness, Personalization, Entertainment, and Electronic Word-of-Mouth (E-WOM).

Consistent with the guidelines of Becker et al. (2012), the evaluation of a reflective-reflective higher-order construct applies the same reliability and validity standards as those used for first-order reflective constructs. As presented in Table 5, all first-order dimensions of SMMAs exhibited strong outer loadings, ranging from 0.846 to 0.888, surpassing the recommended threshold of 0.708 (Hair, Risher, et al., 2019). This indicates that each dimension contributes significantly to the higher-order construct. Furthermore, the internal consistency of the construct

Table 5
Reliability and convergent validity of HOC.

Constructs	Items	Outer Loadings	CA	CR	AVE	VIF
Social Media Marketing Activities (SMMAs)	INF	0.846	0.931	0.946	0.744	2.574
	INT	0.848				2.607
	PER	0.861				2.559
	TRE	0.888				2.860
	ENT	0.860				2.481
	EWM	0.870				2.620

Notes. CA = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted; VIF = Variance Inflation Factor.

was confirmed with a Cronbach's alpha of 0.931 and a composite reliability of 0.946, both of which surpass the minimum threshold of 0.7 (Hair, Risher, et al., 2019). These results demonstrate strong reliability and consistency in measuring SMMAs as a higher-order construct. Moreover, convergent validity was evaluated using the Average Variance Extracted (AVE), with a recommended minimum threshold of 0.5 (Fornell & Larcker, 1981; Hair, Risher, et al., 2019). The AVE value for SMMAs was 0.744, demonstrating that the higher-order construct captures a considerable amount of variance in its associated dimensions, thereby validating convergent validity.

To ensure the discriminant validity of the higher-order construct, both the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio were applied. As shown in Tables 6 and 7, the Fornell-Larcker criterion results indicate that the square root of the AVE for SMMAs was greater than its correlations with other constructs, thus supporting discriminant validity. Similarly, the HTMT values remain below the recommended threshold of 0.9, ranging from 0.804 to 0.887, reinforcing the construct's discriminant validity (Henseler et al., 2015). Consequently, in the second stage of the discrete two-stage approach in PLS-SEM, the second-order construct of SMMAs successfully

Table 6
Fornell-Larcker criterion of HOC.

	CS	PI	PQ	PT	PV	SMMAs
CS	0.887					
PI	0.838	0.894				
PQ	0.779	0.781	0.797			
PT	0.785	0.819	0.737	0.874		
PV	0.821	0.835	0.785	0.805	0.901	
SMMAs	0.777	0.757	0.775	0.811	0.812	0.862

Notes. SMMAs = Social Media Marketing Activities; PQ = Perceived Quality; PV = Perceived Value; PT = Perceived Trust; CS = Customer Satisfaction; PI = Purchase Intention.

Table 7
Heterotrait-Monotrait (HTMT) ratio of HOC.

	CS	PI	PQ	PT	PV	SMMAs
CS						
PI	0.890					
PQ	0.870	0.864				
PT	0.858	0.887	0.839			
PV	0.885	0.891	0.880	0.884		
SMMAs	0.835	0.804	0.867	0.887	0.876	

Notes. SMMAs = Social Media Marketing Activities; PQ = Perceived Quality; PV = Perceived Value; PT = Perceived Trust; CS = Customer Satisfaction; PI = Purchase Intention.

demonstrated discriminant validity, furthering the convergent validity and reliability of the measurement model.

4.2. Evaluation of the structural model

The evaluation of the structural model is a critical component in understanding the relationships among constructs in a study (Bagozzi & Yi, 1988; Malhotra et al., 2017). This process is fundamentally grounded in the principles of multiple regression analysis, as outlined by Hair, Babin, et al. (2019).

4.2.1. Multicollinearity assessment

Firstly, before analyzing the structural relationships, a check for multicollinearity is necessary to confirm that the path coefficient estimates are not adversely affected by redundant explanatory variables. Multicollinearity may inflate or deflate the relationships among variables, potentially resulting in biased parameter estimates (Hair, Babin, et al., 2019). To address this, the Variance Inflation Factor (VIF) served as the primary metric for detecting multicollinearity. According to Hair, Hollingsworth, et al. (2017), VIF values below the threshold of 5 indicate that multicollinearity is not problematic. In this study, as shown in Table 2, all VIF values ranged from 1.694 to 4.002, which are well within the acceptable range. The diagnostic outcomes demonstrate that multicollinearity is negligible, it can be concluded that the dataset is free from potential threats or biases, thereby validating the reliability of the path estimates.

4.2.2. Hypothesis testing

Following the verification of multicollinearity, hypothesis testing was conducted using bootstrapping with 1000 resamples, as recommended by Hair et al. (2021), to ensure robust estimation of standard errors and significance levels. The findings from the structural model, as detailed in Table 8 and Fig. 2, demonstrate that each proposed hypothesis was empirically substantiated, thereby confirming the

Table 8
Hypothesis testing result.

Hypothesis	Paths	Original Sample (O)	Standard Deviation (S.D.)	T Statistics	P Values	2.5 % CI	97.5 % CI	Results
H1	SMMAs → PQ	0.775	0.033	23.196	0.000	0.701	0.830	Accepted
H2	SMMAs → PV	0.312	0.082	3.785	0.000	0.164	0.478	Accepted
H3	SMMAs → PT	0.811	0.027	30.520	0.000	0.746	0.853	Accepted
H4	PQ → PV	0.299	0.060	4.970	0.000	0.185	0.404	Accepted
H5	PQ → CS	0.277	0.083	3.343	0.001	0.110	0.430	Accepted
H6	PQ → PI	0.146	0.065	2.254	0.025	0.009	0.269	Accepted
H7	PV → CS	0.387	0.078	4.948	0.000	0.225	0.536	Accepted
H8	PV → PI	0.253	0.094	2.707	0.007	0.084	0.451	Accepted
H9	PT → PV	0.331	0.079	4.191	0.000	0.150	0.468	Accepted
H10	PT → CS	0.268	0.072	3.721	0.000	0.124	0.407	Accepted
H11	PT → PI	0.267	0.079	3.372	0.001	0.126	0.422	Accepted
H12	CS → PI	0.307	0.102	3.004	0.003	0.084	0.486	Accepted

Note. In two-tailed tests, statistical significance is determined when $p < 0.05$, corresponding to a t-value > 1.96 . Notes. SMMAs = Social Media Marketing Activities (Informativeness, Interaction, Trendiness, Personalization, Entertainment, Electronic Word-of-Mouth); PQ = Perceived Quality; PV = Perceived Value; PT = Perceived Trust; CS = Customer Satisfaction; PI = Purchase Intention.

theoretical relationships outlined in the conceptual framework.

The analysis showed that social media marketing activities (SMMAs) have a significant and positive influence on perceived quality, perceived value, and perceived trust. Specifically, SMMAs strongly influence perceived quality (PQ) (H1: $\beta = 0.775, p < 0.001, 95\% \text{ CI } [0.701, 0.830]$), perceived value (PV) (H2: $\beta = 0.312, p < 0.001, 95\% \text{ CI } [0.164, 0.478]$), and perceived trust (PT) (H3: $\beta = 0.811, p < 0.001, 95\% \text{ CI } [0.746, 0.853]$). These results highlight the role of SMMAs in shaping customer perceptions, with effective social media strategies enhancing quality, value, and trust in brand engagement.

Furthermore, perceived quality (PQ) demonstrated significant effects on perceived value (H4: $\beta = 0.299, p < 0.001, 95\% \text{ CI } [0.185, 0.404]$), customer satisfaction (CS) (H5: $\beta = 0.277, p = 0.001, 95\% \text{ CI } [0.110, 0.430]$), and purchase intention (PI) (H6: $\beta = 0.146, p = 0.025, 95\% \text{ CI } [0.009, 0.269]$). This indicates that higher perceived quality strengthens perceived value, enhances customer satisfaction, and increases the likelihood of purchase. Similarly, perceived value (PV) exerts a significant impact on customer satisfaction (H7: $\beta = 0.387, p < 0.001, 95\% \text{ CI } [0.225, 0.536]$) and purchase intention (H8: $\beta = 0.253, p = 0.007, 95\% \text{ CI } [0.084, 0.451]$), indicating that customers who perceive higher value from a product or service are more likely to be satisfied and develop stronger purchase intentions.

Perceived trust (PT) was another key determinant, significantly impacting perceived value (H9: $\beta = 0.331, p < 0.001, 95\% \text{ CI } [0.150, 0.468]$), customer satisfaction (H10: $\beta = 0.268, p < 0.001, 95\% \text{ CI } [0.124, 0.407]$), and purchase intention (H11: $\beta = 0.267, p = 0.001, 95\% \text{ CI } [0.126, 0.422]$). These results highlight the importance of trust in shaping how customers evaluate the value of products, how satisfied they feel, and their willingness to make purchases. Finally, customer satisfaction (CS) demonstrated a significant positive effect on purchase intention (H12: $\beta = 0.307, p = 0.003, 95\% \text{ CI } [0.084, 0.486]$), reinforcing the critical role of satisfaction in driving consumer purchase behavior.

Overall, the findings suggest that SMMAs significantly drive consumer satisfaction and purchase intention in the bio-cosmetics industry, with perceived quality, value, and trust serving as critical consumer perceptions that explain how social media marketing translates into positive behavioral outcomes. These insights emphasize the strategic importance of social media marketing in strengthening consumer relationships within a competitive market.

4.2.3. Evaluation of explanatory power (R-square) and predictive power (Q-square)

The research model's explanatory power was assessed by analyzing R-squared (R^2) and adjusted R-squared (adjusted R^2) values, following the recommendations of Chin (1998). Although there are no universally fixed benchmarks for R^2 values, prior studies by Henseler et al. (2009)

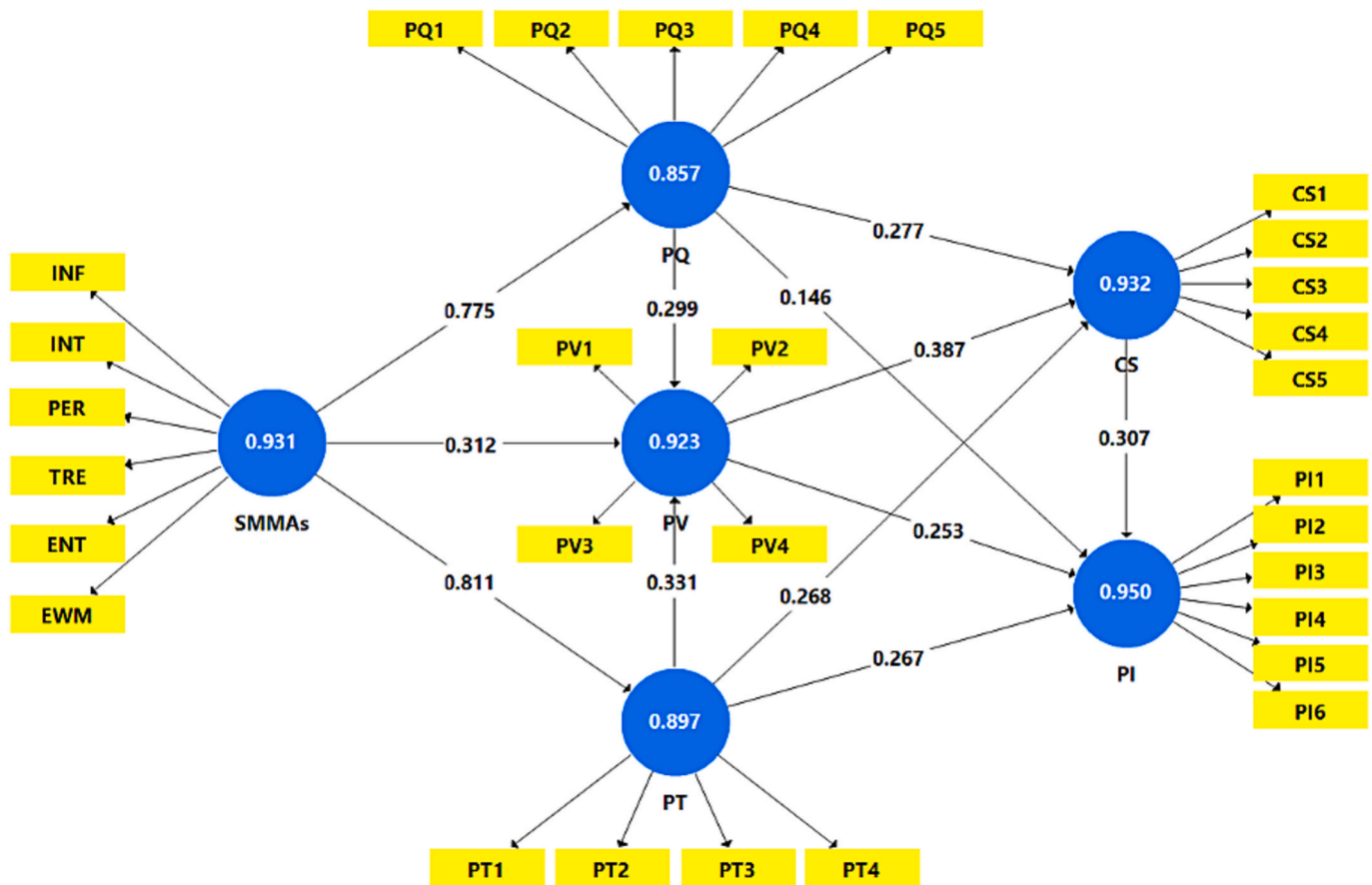


Fig. 2. Results of PLS-SEM analysis.

and Hair, Babin, et al. (2019) suggest that R^2 values of 0.25, 0.50, and 0.75 can be interpreted as representing weak, moderate, and substantial levels of explanatory power, respectively. In particular, R^2 values exceeding 0.50 are generally considered indicative of a well-fitted and reliable model. As presented in Table 9, the R^2 values obtained in this study range from 0.590 to 0.667, while the adjusted R^2 values fall between 0.558 and 0.664. These results confirm that the research model demonstrates moderate explanatory power. In other words, the independent variables incorporated in the model explains a significant portion of the variance in the dependent constructs, thereby demonstrating the model's effectiveness in capturing consumer satisfaction and purchase intention in the bio-cosmetics domain.

In addition, the predictive accuracy of the model was assessed using the Q-squared (Q^2) coefficient, which measures its capability to forecast data points not included in the estimation sample. The Blindfolding technique with an omission distance of 7 was applied to compute Q^2 values. According to Becker et al. (2013), a Q^2 value above zero suggests that the model demonstrates predictive relevance, with larger values indicating enhanced predictive performance. The results reveal that the Q^2 values in this study range from 0.395 to 0.456 (as reported in

Table 9
R-squared and Q-squared values.

	R Square	R Square Adjusted	Q Square
PQ	0.600	0.599	0.374
PV	0.755	0.753	0.607
PT	0.657	0.656	0.497
CS	0.745	0.743	0.580
PI	0.802	0.799	0.633

Notes. PQ = Perceived Quality; PV = Perceived Value; PT = Perceived Trust; CS = Customer Satisfaction; PI = Purchase Intention.

Table 9), all of which are well above zero and exceed the minimum threshold for predictive accuracy (Hair, Babin, et al., 2019; Henseler et al., 2009). These findings reinforce the model's robustness in explaining and predicting consumer satisfaction and purchase intention in the bio-cosmetics industry.

4.2.4. Evaluation of effect size (f^2)

The evaluation of effect size (f^2) provides an important complement to the analysis of R^2 and Q^2 by quantifying the relative contribution of each predictor variable to the explained variance of the endogenous constructs (Cohen, 2013; Hair Jr et al., 2021). Whereas R^2 reflects the overall explanatory power of the model and Q^2 addresses its predictive accuracy, f^2 isolates the incremental effect of each exogenous construct. This allows for a more precise assessment of which predictors exert meaningful influence on perceived quality, perceived value, perceived trust, customer satisfaction, and purchase intention (Henseler et al., 2009). Following Cohen's (2013) guidelines, f^2 values of 0.02, 0.15, and 0.35 are considered small, medium, and large, respectively. However, in complex models with multiple interrelated constructs, even small f^2 values may represent theoretically and practically significant effects (Chin, 1998).

The results presented in Table 10 reveal substantial variation in the magnitude of predictor effects across the hypothesized relationships. The most notable findings are the very large effects of SMMAs on perceived trust ($f^2 = 1.916$) and perceived quality ($f^2 = 1.501$), both far surpassing the threshold for a large effect. These results underscore the pivotal role of SMMAs in shaping consumer trust and quality perceptions within the bio-cosmetics industry, suggesting that marketing activities on social platforms are not merely peripheral but rather central drivers of consumer evaluation processes. Conversely, the relationship between perceived quality and purchase intention exhibits only a small effect (f^2

Table 10
Effect size (f^2) values.

Hypothesis	Paths	f^2 (effect size)
H1	SMMAs → PQ	1.501
H2	SMMAs → PV	0.109
H3	SMMAs → PT	1.916
H4	PQ → PV	0.133
H5	PQ → CS	0.106
H6	PQ → PI	0.034
H7	PV → CS	0.160
H8	PV → PI	0.076
H9	PT → PV	0.140
H10	PT → CS	0.091
H11	PT → PI	0.106
H12	CS → PI	0.122

Notes. PQ = Perceived Quality; PV = Perceived Value; PT = Perceived Trust; CS = Customer Satisfaction; PI = Purchase Intention.

= 0.034). This indicates that although perceived quality is relevant, its direct contribution to purchase intention becomes limited once other factors such as perceived value and customer satisfaction are considered. This highlights the pathways through which quality perceptions shape consumer decision-making.

Moderate effects are observed in the paths from perceived value to customer satisfaction ($f^2 = 0.160$) and from perceived trust to perceived value ($f^2 = 0.140$), reflecting their meaningful role in the structural framework. Several other paths, including SMMAs to perceived value ($f^2 = 0.109$), perceived quality to customer satisfaction ($f^2 = 0.106$), and perceived trust to purchase intention ($f^2 = 0.106$), fall within the small effect range. While modest in size, these effects remain statistically relevant and contribute incrementally to the model's explanatory power.

Overall, the findings suggest that the model's predictive strength is driven primarily by a few high-impact relationships, particularly those involving SMMAs, while the smaller effects serve a complementary role in shaping consumer attitudes and intentions. This pattern validates the robustness of the structural model and emphasizes the strategic importance of social media marketing in fostering trust and enhancing perceptions of quality, which ultimately stimulate customer satisfaction and purchase intention in the bio-cosmetics sector.

5. Discussion

This study provides important insights into the role of SMMAs, framed within the S-O-R paradigm, in shaping consumer perceptions, satisfaction and purchase intentions in the bio-cosmetics industry. The results demonstrate that effective SMMAs significantly enhance consumers' perceptions of quality, value, and trust, which in turn foster greater customer satisfaction and stronger purchase intentions. Conversely, brands that fail to engage meaningfully on social media are less able to shape consumer attitudes or stimulate purchasing behavior. These findings not only corroborate previous research on the influence of SMMAs in consumer behavior but also extend its implications to the bio-cosmetics sector, where product authenticity, ethical standards, and transparency are especially critical to consumer decision-making.

5.1. The pivotal role of SMMAs in enhancing perceptions of quality, value, and trust

The results demonstrate that SMMAs are instrumental in influencing consumer perceptions of product quality (H1). Through consistent delivery of high-quality content, including product demonstrations, user testimonials, and behind-the-scenes insights, brands foster a sense of reliability, transparency, and superior quality (Merdiaty & Aldrin, 2022). This is especially crucial in the bio-cosmetics sector, where consumers place a strong emphasis on ingredient authenticity, eco-friendliness, and safety. When brands consistently highlight the benefits of natural ingredients, eco-friendly sourcing, and scientific

validation, they reinforce consumer confidence in product effectiveness (Sasounian et al., 2024). The finding extends previous research (e.g., Antczak, 2024; Merdiaty & Aldrin, 2022) by emphasizing how interactive social media content can serve as a quality signal, influencing even skeptical consumers who scrutinize claims of “organic” and “natural” products.

Moreover, the study confirms that SMMAs positively influence perceived value (H2), illustrating that when brands effectively communicate their product benefits, especially regarding sustainability, ethics, and efficacy, consumers are more inclined to view these products as worth their investment. This finding reinforces the notion that perceived value in the bio-cosmetics market extends beyond function and price considerations to include intangible elements such as environmental impact and health safety (Suphasomboon & Vassana-dumrongdee, 2022). For example, when brands openly highlight their dedication to environmentally friendly manufacturing, responsibly sourced materials, and the enduring advantages of organic ingredients, they can effectively elevate consumers' perceived value of their products (Golob et al., 2022). In line with this, consumers exposed to higher levels of SMMAs tend to perceive the brand's products as advantageous and in harmony with their individual values, thereby reinforcing the role of social media marketing as a value-enhancing tool (Sarwar et al., 2023). A novel insight here is that the interplay of value and ethics communicated via social media amplifies the perceived benefits, making bio cosmetics more appealing even to price-sensitive consumers.

The research also highlights that trust (H3) is a key outcome of effective social media marketing strategies. The results reveal that high levels of SMMAs significantly strengthen the trust relationship between brands and consumers, while low engagement tends to breed skepticism and diminish confidence in the brand's credibility. This result aligns with previous research suggesting that trust is cultivated through regular and meaningful interactions, timely responses, transparency regarding product ingredients, and the proliferation of positive electronic word-of-mouth (eWOM) within the online community (Radita & Latifah, 2025). Trust plays an especially critical role in the bio-cosmetics sector, where consumers often question the safety of products, the authenticity of ethical claims, and the effectiveness of natural ingredients (Khan et al., 2024). By actively engaging with consumers, openly sharing information about their production processes, and addressing customer concerns promptly, brands demonstrate transparency and reliability, thereby reinforcing consumer trust and strengthening long-term relationships (Ceyhan, 2019). Given that consumers of bio cosmetics are often skeptical due to concerns about false claims or “greenwashing,” trust becomes a non-negotiable factor influenced directly by SMMAs.

5.2. The interconnections between perceived quality, value, trust, and consumer responses

In addition to the direct effects of SMMAs, this study validates the interrelationships between perceived quality, value, trust, satisfaction, and purchase intention. First, the results offer robust support for H4, confirming that perceived quality has a significant and positive impact on perceived value. This finding highlights that when consumers perceive a bio-cosmetic product as high quality, demonstrated through transparency in organic ingredients, dermatological safety certifications, and positive user reviews they are more likely to view it as worth their investment (Sharma & Narang, 2024). This relationship is particularly pronounced in Vietnamese society, where collective decision-making and social validation significantly influence how consumers evaluate and perceive product quality (Nguyen et al., 2020). This collective mindset is further reinforced by the ‘word-of-mouth’ culture prevalent in Vietnamese social media platforms, where consumers actively seek peer recommendations and share experiences about bio-cosmetic products. In the bio-cosmetics industry, where consumers are highly attentive to factors such as natural formulations, ethical sourcing, and proven efficacy, the link between quality and value becomes even more

pronounced (Ajayi et al., 2024). Products that meet stringent safety and effectiveness standards not only justify premium pricing but also reinforce consumers' belief that they are making a meaningful and beneficial purchase (Ginting & Heryjanto, 2023).

Moreover, the analysis validates H5, demonstrating that perceived quality significantly enhances customer satisfaction. When consumers feel assured that a bio-cosmetic product meets or surpasses their expectations regarding safety, performance, and ethical values, their overall satisfaction increases (Shim et al., 2024). This observation aligns with previous studies suggesting that brands that commit to delivering high-quality, ethically sourced, and authentically natural products can foster greater consumer satisfaction (Tahir et al., 2024). Satisfied consumers are more inclined to form a positive perception of the brand and exhibit loyalty over time. The findings also validate H6, indicating that perceived quality significantly and positively impacts consumers' purchase intentions. Consumers who believe that a brand offers superior quality, especially in terms of organic, cruelty-free, and dermatologist-tested formulations, are more likely to convert their interest into actual purchases (Alnuqaydan, 2024). This underscores the importance for bio-cosmetic brands to consistently communicate and demonstrate their commitment to quality through transparent ingredient lists, third-party certifications, expert endorsements, and authentic customer testimonials (Nguy et al., 2023). Ultimately, reinforcing perceptions of high quality not only enhances brand value and satisfaction but also directly drives consumers' willingness to buy.

The study finds strong support for H7, demonstrating that perceived value has a significant and positive influence on customer satisfaction. When consumers recognize that a brand offers superior benefits—such as high-quality natural ingredients, fair pricing, and long-term skincare advantages—they are more inclined to experience satisfaction with their purchase, strengthening their trust in the brand and fostering loyalty (Qiao et al., 2022). This reinforces the importance of value-driven strategies, where offering not only affordable but also high-performing and ethically made products can improve the overall customer experience (Nuseir et al., 2023). By emphasizing aspects such as promotional deals, personalized product recommendations, and added environmental benefits, brands can elevate consumers' perception of value and, consequently, increase satisfaction. Furthermore, the study validates H8, showing that perceived value significantly and positively effect on purchase intention. Consumers are more inclined to purchase when they believe that the products they are considering offer excellent quality at a reasonable price, alongside added ethical and environmental benefits (Zahro & Paramita, 2025). This finding is especially important in the bio-cosmetics market, where consumers often balance a desire for premium natural ingredients with sensitivity to price. Thus, brands must strategically position their products to highlight not only their uniqueness and effectiveness but also their affordability to motivate purchase decisions (Goyal & Jerold, 2023).

In addition to the role of perceived quality and value, trust emerges as a pivotal factor influencing consumer perceptions and behavior. The study strongly supports H9, affirming that perceived trust significantly enhances perceived value. When consumers trust a brand, believing in its honesty, transparency, and ethical commitments, they are more likely to view its products as worthwhile and valuable. Furthermore, the study reveals that Vietnamese consumers place heightened emphasis on brands that demonstrate understanding and respect for local beauty standards and traditional herbal wisdom, which has been passed down through generations (Hoang & Bui, 2024). Trust reduces doubts and perceived risks, especially in the bio-cosmetics sector, where product safety, ingredient authenticity, and ethical standards are critical concerns (Aryoko & Dirgiatmo, 2025). In the Vietnamese context, this is amplified by the growing middle class's increasing awareness of global beauty trends while maintaining strong ties to traditional beauty practices (Ehlert, 2021). Therefore, cultivating trust through transparent communication, verified certifications, and consistent engagement can enhance consumers' perceived value of a brand's offerings (Holloway,

2025).

Moreover, H10 is supported, confirming that trust significantly and positively influences customer satisfaction. The study reveals that Vietnamese consumers tend to place greater trust and feel satisfied with brands that actively engage in social causes relevant to local communities, such as environmental conservation and support for traditional artisans (Le et al., 2021). When consumers are confident that a brand delivers on its promises, regarding organic and cruelty-free ingredients, effective formulations, and ethical sourcing, they experience greater satisfaction (Purnamasari et al., 2025). Trust also nurtures an emotional connection between consumers and brands, fostering long-term loyalty and deeper customer relationships (Mandung, 2024). The research highlights how Vietnam's unique social media landscape, characterized by high engagement rates and strong influence of social media personalities, shapes trust-building mechanisms differently from Western markets (Pham et al., 2024). The study also confirms H11, showing that trust significantly and positively influences purchase intention. When consumers trust a brand, their confidence in the product's safety, efficacy, and ethical standards increases, making them more likely to proceed with a purchase (Handoyo, 2024). This finding aligns with previous research emphasizing that trust is a crucial factor in overcoming purchase hesitation, especially in industries where product authenticity and potential health risks are major concerns (Soleimani, 2021).

5.3. Customer satisfaction as a key driver of purchase intention

The study provides strong support for H12, emphasizing that customer satisfaction is a pivotal factor with a direct impact on purchase intention. When consumers find satisfaction in a brand's offerings, they are significantly more likely to repurchase, endorse the brand through recommendations, and engage in positive word-of-mouth communication (Li et al., 2024). This effect is particularly strong in the bio-cosmetics industry, where trust, product efficacy, and ethical values significantly shape consumer buying choices and brand loyalty (Farhat et al., 2025). In a social media-driven market, high satisfaction leads to stronger brand advocacy, reducing consumers' perceived risk and reinforcing repurchase behavior (Miao et al., 2021). Additionally, satisfaction fosters emotional loyalty, which goes beyond transactional relationships and builds a deeper emotional bond with the brand. Customers with emotional loyalty are more resilient to competitor offerings and price fluctuations, making them less likely to switch to rival brands (Dam & Dam, 2021). This highlights the importance of consistent product quality, excellent customer service, and post-purchase engagement to sustain purchase intent over time (Aji & Nurlinda, 2024). Conversely, dissatisfaction can drive consumers away, leading to negative reviews and decreased market credibility (Filho & De Araújo Barcelos, 2020). Thus, brands must prioritize customer satisfaction through innovation, transparent communication, and responsive support to maintain strong purchase intentions and long-term business success.

Overall, this study demonstrates that SMMA play a critical role in shaping consumer perceptions and driving purchase decisions in the bio-cosmetics industry, as explained through the S-O-R framework. The findings directly address the research objectives outlined in the Introduction by showing that the six SMMA dimensions significantly affect perceived quality, perceived value, and trust, which subsequently enhance customer satisfaction and purchase intention. Importantly, the analysis reveals the interrelated nature of these consumer perceptions, with trust emerging as the most influential factor. This result aligns with prior research highlighting the centrality of trust in sustainability-oriented markets (Chrisniyanti & Fah, 2022; Pop et al., 2020). At the same time, the findings extend existing literature (e.g., Jamil et al., 2022; Yadav & Rahman, 2018) by illustrating how personalization, informativeness, and other SMMA dimensions operate collectively within the context of bio-cosmetics. Beyond confirming these relationships, the study also demonstrates strong explanatory power and predictive relevance of the proposed model, indicating that consumer

perceptions serve as effective pathways through which SMMAs translate into favorable behavioral outcomes. By situating these insights within the S-O-R framework, the study not only validates its empirical applicability but also validates its empirical applicability. Moreover, it highlights consumer perceptions as key explanatory mechanisms, thereby advancing theoretical understanding of digital marketing in value-driven sectors and offering practical guidance for developing more targeted, credible, and transparent social media strategies. Together, these contributions underscore the academic and managerial significance of SMMAs as both a theoretical construct and a strategic tool for fostering sustainable consumer engagement in niche markets.

6. Implications

6.1. Theoretical implications

This study offers several noteworthy theoretical contributions to the literature on social media marketing and sustainable consumption, particularly in the bio-cosmetics industry. First, by conceptualizing SMMAs as a higher-order construct encompassing informativeness, interaction, personalization, trendiness, entertainment, and electronic word-of-mouth, the research advances understanding of how multi-dimensional social media marketing tactics collectively influence consumer perceptions. The validation of SMMAs as a second-order formative construct with strong reliability and convergent validity offers a robust framework for scholars to assess social media strategies in future marketing studies, especially in the context of emerging markets.

Second, the findings confirm the central role of SMMAs in shaping key consumer cognitive and affective evaluations, namely perceived quality, perceived value, and perceived trust. These results highlight the mechanisms by which effective social media engagement transcends traditional marketing communication to build deeper brand-consumer connections grounded in authenticity, transparency, and value co-creation, thereby deepening brand-consumer relationships. This study extends existing models by demonstrating how these perceptions channel the impact of social media efforts into consumer outcomes, thereby enriching theoretical perspectives on consumer behavior in digital environments that emphasize bio-cosmetics products.

Third, this study frames these mechanisms within the S-O-R paradigm. In this framework, SMMAs represent external stimuli (S), consumer perceptions of quality, value, and trust constitute the internal organismic states (O), and satisfaction together with purchase intention form the behavioral responses (R). Positioning the model within S-O-R provides a theoretically grounded explanation of how marketing stimuli are cognitively and affectively processed before translating into behavioral outcomes. This contribution not only reinforces the psychological underpinnings of the proposed model but also extends the application of S-O-R theory into sustainability-driven markets such as bio-cosmetics.

Fourth, the study empirically demonstrates that perceived quality, value, and trust do not operate in isolation but interact dynamically to enhance customer satisfaction and purchase intention. This integrated model expands the theoretical discourse on sustainable product consumption by linking quality and ethical considerations with emotional satisfaction and buying intentions, providing a nuanced understanding of consumer decision-making pathways in the bio-cosmetics market. It supports and extends prior conceptualizations of multi-dimensional perceived value and trust as critical antecedents to sustainable consumption intentions rooted in social media marketing.

Finally, the model's moderate to substantial explanatory and predictive power establishes a reliable theoretical foundation for future research examining digital marketing in promoting ethical and sustainable consumer practices. It encourages scholars to adopt similarly holistic approaches that capture the complexities of consumer engagement with socially and environmentally responsible brands through social media platforms.

6.2. Practical implications

From a managerial perspective, the study offers several actionable insights for marketers, brand managers, and business strategists operating in the bio-cosmetics industry. First, the confirmed positive influence of SMMAs on perceived quality, value, and trust underscores the necessity for brands to develop holistic and well-rounded social media marketing strategies. These strategies should integrate all six dimensions of SMMAs — informativeness, interactivity, personalization, trendiness, entertainment, and e-WOM — to effectively shape favorable consumer perceptions. Marketers should prioritize the creation of informative and transparent content that emphasizes the natural, safe, and eco-friendly attributes of their products, supported by entertaining and trendy formats to sustain audience engagement.

Second, the crucial influence of perceived trust underscores its role as a pivotal consumer perception that strengthens brand credibility and reduces uncertainty in purchase decisions. This can be achieved through transparent communication about ingredient sourcing, ethical production processes, and environmental impacts, as well as through authentic storytelling and behind-the-scenes content. Brands should also use interactive and personalized content to address specific concerns and preferences of different consumer segments, especially the increasingly influential group of environmentally conscious buyers.

Third, given the strong impact of e-WOM, brands must actively encourage, monitor, and optimize customer feedback and testimonials on social media channels. Positive consumer-generated content not only enhances trust but also significantly influences other consumers' perceptions of quality and value, thus directly boosting purchase intentions. Motivating satisfied customers to share their experiences and addressing feedback swiftly and professionally are effective strategies to uphold a strong and positive brand reputation.

Moreover, since customer satisfaction has a direct and significant effect on purchase intention, brands must maintain post-purchase engagement and offer excellent customer support through social media. This includes personalized follow-ups, loyalty programs, and responsive customer service that address any issues swiftly, thus enhancing customer satisfaction and encouraging repeat purchases.

Finally, as the study highlights the interconnected nature of perceived quality, value, and trust, marketing strategies should be comprehensive and integrated, rather than focusing on individual elements in isolation. Successful social media campaigns should not only highlight product benefits but also build brand trust and clearly communicate value propositions. For instance, campaigns that combine educational content (emphasizing product quality and benefits), customer testimonials (boosting trust), and limited time offers (enhancing perceived value) are likely to be more effective in driving purchase decisions.

7. Limitations and future research directions

Despite the valuable insights generated, this study has several limitations that open avenues for future research. First, the study relied on a convenience sampling method, which, while suitable for exploratory research, may introduce sampling bias and limit the representativeness of the findings. Future research could address this limitation by employing probability-based sampling techniques, thereby improving the external validity and generalizability of results.

Second, the empirical data were collected primarily from consumers in Vietnam, a developing market characterized by distinctive cultural, economic, and digital environments. This contextual focus enhances the relevance of the findings for emerging economies but restricts their applicability to other regions. Comparative studies that incorporate multiple countries or cross-cultural settings would be valuable for assessing whether the observed relationships hold consistently across different consumer markets, particularly between developed and developing economies.

Third, the present model examined perceived quality, perceived value, and perceived trust as key explanatory constructs of how social media marketing influences consumer outcomes, yet other psychological and behavioral constructs such as brand loyalty, perceived risk, environmental concern, or social identity, may also shape the relationship between social media marketing and consumer decision-making. Future studies could extend the model by incorporating these additional constructs to capture a more holistic view of consumer pathways and to strengthen the explanatory power of the framework.

8. Conclusion

This study offers an in-depth exploration of how Social Media Marketing Activities (SMMAs) shape consumer behavior in the bio-cosmetics industry by influencing perceptions of quality, value, and trust, which subsequently drive satisfaction and purchase intention. Grounded in the Stimulus-Organism-Response (S-O-R) framework, the study conceptualizes SMMAs as external stimuli that affect internal consumer evaluations (organism) and ultimately lead to behavioral responses (satisfaction and purchase intention). Through employing a quantitative research design with data collected from 342 consumers who have purchased and used bio cosmetics and analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM), the study offers robust empirical evidence supporting the proposed model. The study addressed two key objectives: first, to evaluate how six SMMA dimensions, including informativeness, interactivity, personalization, trendiness, entertainment, and eWOM, affect consumer perceptions and behavioral outcomes; and second, to assess the explanatory power of the model in capturing these dynamics.

The results confirmed that all six SMMA dimensions significantly contribute to shaping consumer perceptions of quality, value, and trust, which in turn strongly influence satisfaction and purchase intention. Among these, trust emerged as a particularly critical factor, reflecting the sensitivity of the bio-cosmetics sector to credibility and transparency. The acceptance of all twelve hypotheses demonstrates the robustness of the model and affirms the multidimensional role of social media marketing in guiding consumer decision-making. Importantly, the study's findings indicate that SMMAs not only function as direct engagement tools but also operate as strategic mechanisms that build consumer confidence and foster sustainable behavioral outcomes.

From a theoretical perspective, this research contributes to the advancement of social media marketing literature by extending the SMMA framework to the bio-cosmetics industry—an emerging, sustainability-driven sector where trust and value play central roles. By incorporating both cognitive (perceived quality and value) and affective (trust and satisfaction) mechanisms, the study provides a more integrated understanding of how social media marketing shapes consumer behavior. Positioning these dynamics within the S-O-R model further clarifies the process through which digital marketing stimuli (SMMAs) influence internal evaluations (quality, value, trust) and ultimately lead to behavioral outcomes (satisfaction and purchase intention). The findings also highlight the interdependent nature of SMMA dimensions, offering a more nuanced theoretical perspective that enriches current understanding of consumer engagement in digital contexts. From a practical standpoint, the study offers actionable guidance for managers and marketers in the bio-cosmetics industry. A balanced emphasis on all six SMMA dimensions is essential to effectively shape consumer perceptions and strengthen purchase intentions. In particular, strategies that enhance informativeness and trust-building, coupled with initiatives to encourage positive e-WOM, are crucial for developing strong consumer-brand relationships. Personalization and interactivity can foster deeper engagement and relevance, while trendiness and entertainment help sustain consumer interest and emotional connection. Together, these elements form a holistic digital marketing strategy that is well-suited to the growing consumer demand for sustainable and ethically produced cosmetics.

Despite its contributions, this study is not without limitations. The reliance on convenience sampling may restrict the representativeness of the findings, suggesting that probability-based methods could strengthen future research. The focus on Vietnam provides valuable insights into an emerging market, yet the generalizability to other cultural or economic contexts remains limited; cross-cultural or multi-country investigations are recommended. Moreover, while the model emphasizes perceived quality, value, and trust, other constructs such as brand loyalty, perceived risk, or environmental concern may further enrich explanatory power. Finally, as digital marketing evolves, future research should explore how emerging technologies, including artificial intelligence (AI), augmented reality (AR), and virtual influencers, reshape consumer engagement with bio-cosmetics.

In conclusion, this study has achieved its objectives by demonstrating the significant role of SMMAs in shaping consumer perceptions and driving satisfaction and purchase intention in the bio-cosmetics industry. By integrating six core dimensions of social media marketing into a comprehensive framework, and situating this framework within the S-O-R paradigm, it contributes both theoretical insights and practical strategies. As the demand for sustainable and ethical products continues to expand, effectively leveraging SMMAs will be vital for bio-cosmetic brands seeking to build trust, foster satisfaction, and secure consumer loyalty in an increasingly competitive marketplace.

CRedit authorship contribution statement

Thi Thuy An Ngo: Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Gia Khuong An:** Writing – review & editing, Writing – original draft, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Dang Khoa Dao:** Writing – review & editing, Writing – original draft, Visualization, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ngoc Quynh Nhu Nguyen:** Writing – review & editing, Writing – original draft, Resources, Investigation, Formal analysis, Data curation, Conceptualization. **Bao Han Phong:** Writing – review & editing, Writing – original draft, Resources, Investigation, Formal analysis, Data curation, Conceptualization. **Ngoc Yen Vy Nguyen:** Writing – review & editing, Writing – original draft, Resources, Investigation, Formal analysis, Data curation, Conceptualization. **Thi Bich Nhu Nguyen:** Writing – review & editing, Writing – original draft, Resources, Investigation, Formal analysis, Data curation, Conceptualization.

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Declaration of competing interest

The authors state that no financial or personal conflicts of interest exist that could have impacted the findings or content of this paper.

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Data availability

Data will be made available on request.

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