# Artificial intelligence content in skincare marketing: A systematic literature review



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***ABSTRACT***

*This systematic review aims to synthesize recent research on artificial intelligence (AI) content in skin care product marketing by analyzing technological approaches, consumer perceptions, effectiveness, ethical considerations, and identifying research gaps to guide future research. The research method involved a comprehensive systematic search using the Google Scholar database, covering publications from 2018 to 2025. The results of this study show that the application of AI in skin care product marketing focuses on five main areas: (1) personalized product recommendations and diagnostics, (2) conversational AI and chatbots, (3) virtual trials and augmented reality experiences, (4) AI-generated content and synthetic influencers, and (5) predictive analytics and product configuration. The study concludes that AI content in skincare marketing has the potential to enhance personalization and consumer engagement, but widespread adoption requires addressing challenges related to transparency, privacy, authenticity, and inclusivity.*

***Keywords:*** *Artificial Intelligence; Skincare Marketing; Cosmetics; Personalization; Consumer Behavior*

## INTRODUCTION

The beauty and personal care industry has undergone profound digital transformation in recent years, with artificial intelligence (AI) emerging as a pivotal technology reshaping marketing strategies and consumer experiences (Pandya & Padma, 2024; Gambetta et al., 2021). The global skincare market, valued at over $145 billion in 2023, increasingly leverages AI to address consumer demands for personalization, convenience, and data-driven product recommendations (Statista, 2024; Nirmal & Wani, 2025). From AI-powered chatbots providing personalized skincare advice to computer vision systems analyzing facial skin conditions, and from virtual try-on experiences to AI-generated marketing content, AI technologies are fundamentally altering how skincare brands communicate with and serve their customers (Toosi et al., 2024; Wang et al., 2020; Alifah, 2025).

AI in marketing encompasses a broad spectrum of technologies, including machine learning algorithms that predict consumer preferences, natural language processing systems that power conversational interfaces, computer vision for skin analysis and virtual try-ons, and generative AI for content creation including synthetic influencers and automated copywriting (Toosi et al., 2024; Wang et al., 2020). In the skincare sector specifically, these technologies enable brands to offer unprecedented levels of personalization—matching products to individual skin types, concerns, and preferences based on algorithmic analysis of multiple data sources including facial images, purchase history, stated preferences, and ingredient databases (Adawiyah et al., 2024).

The COVID-19 pandemic accelerated digital adoption in the beauty industry, with consumers increasingly turning to online channels and digital tools for product discovery and purchase decisions (Cannella, 2018). This shift created fertile ground for AI applications, as brands sought to replicate and enhance the personalized consultation experience traditionally available only in physical retail environments. Major beauty retailers and brands including L'Oréal, Sephora, Estée Lauder, and others have invested heavily in AI-powered tools such as virtual try-ons, skin diagnostic apps, intelligent recommendation engines, and conversational chatbots (Alifah, 2025; Winarto & Wisesa, 2024).

Emerging applications include AI-generated influencers and synthetic brand ambassadors, which raise new questions about authenticity, transparency, and consumer trust (Ilyas, 2024). Generative AI technologies like GPT models and image synthesis systems enable creation of highly realistic marketing content at scale, transforming content production workflows while introducing ethical considerations around disclosure and manipulation (Wilendra et al., 2024).

Despite the rapid proliferation of AI technologies in skincare marketing, research in this domain remains fragmented across multiple disciplines including marketing, computer science, human-computer interaction, consumer psychology, and ethics. While individual studies have examined specific AI applications or consumer responses, a comprehensive synthesis of the current state of knowledge is lacking (Hegde et al., 2023; Ferrara, 2024; Gambetta et al., 2021. Understanding how AI content influences consumer perceptions, purchase decisions, brand relationships, and even psychological outcomes such as body image and self-esteem in the skincare context is crucial for both academic researchers and marketing practitioners (Salsky, 2020).

The significance of this review extends beyond academic interest. For marketing practitioners, synthesized evidence on AI effectiveness and consumer acceptance can inform strategic decisions about technology investments and implementation approaches. For policymakers and consumer advocates, understanding the ethical

challenges, privacy implications, and potential psychological impacts of AI in marketing is essential for developing appropriate regulatory frameworks. For technology developers, insights into current limitations, bias concerns, and research gaps can guide innovation priorities toward more inclusive and responsible AI systems.

Furthermore, the beauty industry's influence on societal standards, self-perception, and consumer wellbeing makes the ethical deployment of AI particularly important. Research suggests that AI and AR beauty experiences can affect body image and self-esteem, especially among young female consumers (Salsky, 2020). Understanding these impacts is critical for responsible innovation in this space. This systematic literature review aims to synthesize current research on AI content in skincare marketing, examining technological approaches, consumer perceptions, effectiveness, ethical considerations, and identifying research gaps to guide future inquiry.

## LITERATURE REVIEW

### Artificial Intelligence (AI)

The integration of artificial intelligence (AI) in marketing has evolved from rule-based automation to sophisticated data-driven personalization systems that fundamentally reshape consumer-brand interactions (Pandya & Padma, 2024). In the skincare and cosmetics industry, this transformation is particularly pronounced, as AI technologies enable unprecedented levels of product customization, virtual experiences, and personalized recommendations (Gambetta et al., 2021). The rapid adoption of AI tools including machine learning algorithms, natural language processing, computer vision, and generative AI has created new paradigms for consumer engagement, product discovery, and purchase decision-making in beauty marketing (Alifah, 2025).

### AI Applications in Skincare Marketing

Contemporary research identifies several distinct AI applications transforming skincare marketing. Personalization engines leverage deep learning and ingredient analysis to match products with individual skin conditions and preferences, demonstrating improved recommendation relevance over traditional approaches (Nirmal & Wani, 2025). Virtual try-on technologies combine augmented reality (AR) with AI to simulate product effects, enabling consumers to visualize cosmetic outcomes before purchase, which significantly enhances user acceptance and engagement (Toosi et al., 2024). Conversational AI and chatbots serve as beauty advisors, providing real-time consultation and product guidance, though their effectiveness depends heavily on dialogue design quality and domain knowledge integration (Alifah, 2025; Gambetta et al., 2021). Additionally, generative AI tools, particularly large language models like ChatGPT, are increasingly deployed for marketing content creation, customer segmentation, and strategic campaign development in the cosmetics sector (Wilendra et al., 2024).

### Consumer Perception and Acceptance

Empirical studies reveal that consumer acceptance of AI in skincare marketing is mediated by several key factors. Perceived usefulness and ease of use emerge as primary determinants of adoption intention, consistent with technology acceptance frameworks (Nirmal & Wani, 2025; Pandya & Padma, 2024). Trust represents a critical moderator, with consumers expressing concerns about data privacy, algorithmic transparency, and the reliability of AI-generated recommendations (Hegde et al., 2023). Virtual trial quality and realism significantly influence purchase intentions, with higher-quality AR experiences correlating with increased consumer confidence and willingness to buy

(Toosi et al., 2024). Furthermore, digital literacy and self-efficacy moderate adoption patterns, with less tech-savvy consumers placing greater emphasis on interface simplicity and intuitive design (Pandya & Padma, 2024).

### Effectiveness and Outcomes

Measured outcomes from case studies and experimental research demonstrate positive effects of AI implementation on marketing performance metrics. Documented benefits include increased session duration, higher conversion rates, and improved customer engagement following chatbot deployment in e-commerce skincare platforms (Alifah, 2025). Ingredient-aware and vision-based recommendation systems show enhanced alignment with consumer needs compared to conventional filtering methods, resulting in higher customer satisfaction and repeat purchase behavior (Nirmal & Wani, 2025). Large-scale surveys link AI-driven personalization and virtual trials to elevated perceived value and more favorable consumption attitudes (Pandya & Padma, 2024). However, effect sizes vary considerably across contexts, suggesting that implementation quality and consumer segment characteristics significantly influence outcomes.

### Challenges and Research Gaps

Despite promising results, several challenges constrain AI adoption in skincare marketing. Ethical concerns regarding data privacy, algorithmic bias, and transparency remain inadequately addressed, with scholars calling for stronger governance frameworks and disclosure standards (Hegde et al., 2023; Wilendra et al., 2024). Technical limitations persist in AR realism and the clinical validity of automated skin assessments, requiring further validation studies (Toosi et al., 2024). Methodologically, the literature suffers from short evaluation horizons, heterogeneous metrics, and limited longitudinal evidence on long-term brand effects and consumer wellbeing outcomes (Gambetta et al., 2021). Critical research gaps include the need for standardized ROI benchmarks, cross-market generalizability studies, and investigation of potential negative consequences such as privacy erosion and algorithmic discrimination. Future research should prioritize rigorous experimental designs, longitudinal tracking, and development of ethical guidelines for responsible AI deployment in beauty marketing contexts.

## METHOD

### Search Strategy

A comprehensive literature search was conducted in accordance with systematic review guidelines adapted from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Page et al., 2021). The search was designed to maximize the coverage of relevant literature across various disciplines while maintaining feasibility. Although the original protocol planned to include Scopus and Google Scholar, technical limitations in accessing Scopus forced reliance on Google Scholar alone. Google Scholar provides broad coverage of academic literature across various disciplines and publication types, making it suitable for comprehensive systematic reviews (Gusenbauer & Haddaway, 2020). However, this limitation was recognized as potentially affecting the completeness of the search. The search period was from January 2018 to December 2025. The year 2018 was selected as the starting point because it marks the period when AI applications in consumer-facing marketing began to emerge significantly in academic literature, coinciding with the widespread commercialization of machine learning and deep learning tools accessible to the beauty industry (Cannella, 2018). Prior to 2018,

relevant peer-reviewed studies on AI in skincare marketing were scarce, making this an appropriate threshold for capturing the substantive body of literature on this topic.

**Search Terms and Boolean Logic**

The search strategy employed seven thematic searches, each combining relevant term clusters:

- *AI/Technology Terms:* "artificial intelligence" OR "AI" OR "machine learning" OR "deep learning" OR "natural language processing" OR "NLP" OR "computer vision" OR "chatbot" OR "conversational AI" OR "generative AI" OR "neural network" OR "algorithm"
- *Domain Terms:* "skincare" OR "skin care" OR "cosmetics" OR "beauty" OR "cosmetic" OR "facial care" OR "personal care"
- *Marketing Terms:* "marketing" OR "advertising" OR "promotion" OR "personalization" OR "recommendation" OR "customer engagement" OR "consumer behavior" OR "purchase intention" OR "digital marketing" OR "content" OR "influencer"

Seven Thematic Searches Conducted:

1. AI & Skincare Marketing Content: "artificial intelligence" AND "skincare" AND "marketing" AND "content"
2. Personalized Skincare Recommendations: "machine learning" OR "AI" AND "personalized" AND "skincare" AND "recommendation"
3. AI Chatbots & Virtual Assistants: "chatbot" OR "conversational AI" AND "beauty" OR "skincare" AND "customer engagement"
4. Consumer Perception of AI: "consumer perception" OR "consumer attitude" AND "AI" AND "skincare" OR "cosmetics" AND "marketing"
5. Digital Marketing Strategies: "digital marketing" AND "AI" OR "artificial intelligence" AND "cosmetics" OR "beauty" AND "strategy"
6. AI in Advertising: "AI" AND "advertising" OR "promotion" AND "cosmetics" OR "beauty"
7. AI-Generated Content: "AI-generated" OR "generative AI" AND "content" AND "beauty" OR "cosmetics" AND "marketing"

Each search was conducted with date filters (2018-2025) and screened for relevance to the research questions.

**Inclusion and Exclusion Criteria**

Inclusion criteria were: (1) Published between January 2018 and December 2025; (2) Peer-reviewed journal articles, conference papers, dissertations, or reputable grey literature; (3) Focus on AI applications or content in skincare/cosmetics marketing contexts; (4) Empirical studies, case studies, technical papers, or comprehensive reviews; (5) Available in English language; (6) Addresses consumer-facing marketing applications of AI; (7) Discusses consumer perceptions, behavioral outcomes, or ethical considerations related to AI in skincare marketing.

Exclusion criteria were: (1) Publications before 2018; (2) Purely clinical/medical dermatology studies without marketing focus; (3) General AI or marketing papers without specific application to skincare/cosmetics; (4) Opinion pieces or editorials without empirical basis or substantial literature grounding; (5) Duplicate publications; (6) Non-English publications; (7) Studies focused solely on manufacturing, supply chain,

or backend operations without consumer-facing marketing component; (8) Papers not accessible or without sufficient information for quality assessment

**Data Extraction and Synthesis**

A structured data extraction approach was employed to systematically capture:

- Bibliographic information: Authors, year, journal/conference/source, DOI where available
- Study characteristics: Research design, methodology, sample size and demographics, geographic context
- AI application type: Specific technologies examined (ML, NLP, computer vision, generative AI) and use cases (recommendations, chatbots, virtual try-ons, content generation)
- Key findings: Main results related to each research question
- Outcomes measured: Engagement metrics, purchase intention, conversion rates, satisfaction, trust, privacy concerns, psychological impacts
- Theoretical frameworks: Models and theories employed (TAM, UTAUT, trust theory, etc.)
- Challenges and limitations: Technical, ethical, and practical challenges identified
- Research gaps: Future research directions recommended by authors

Data synthesis employed a thematic analysis approach , an established qualitative synthesis method suited to heterogeneous literature (Braun & Clarke, 2006), Given the heterogeneity of study designs, methodologies, and outcome measures across the literature, a narrative synthesis was deemed most appropriate rather than meta-analysis (Popay et al., 2006). Themes were identified iteratively through close reading of included papers, with patterns emerging across use cases, technologies, consumer responses, and ethical considerations.

**RESULTS AND DISCUSSION**

The comprehensive search across Google Scholar yielded 133 papers initially across seven thematic searches. After systematic deduplication, 109 unique papers remained. Following title and abstract screening against inclusion/exclusion criteria, and subsequent full-text review, a corpus of relevant studies was analyzed for this systematic review. Studies originated from diverse global regions including Asia (particularly Indonesia, Thailand, South Korea, Taiwan), Europe (Finland, Portugal, United Kingdom), North America (United States, Canada), and other regions. This distribution reflects both the global nature of the beauty industry and regional variations in AI adoption, research focus, and regulatory contexts.

The volume of publications increased notably from 2020 onwards, coinciding with the COVID-19 pandemic and accelerated digital transformation in retail. The years 2023-2025 show the highest concentration of publications, reflecting growing academic and industry interest in AI applications, particularly generative AI and synthetic content.

The literature encompasses diverse methodologies including: quantitative surveys examining consumer perceptions, attitudes, and behavioral intentions, case studies of specific brand implementations and e-commerce integrations, technical papers presenting ai system architectures, algorithms, and performance evaluations, mixed-methods studies combining quantitative user testing with qualitative insights, theoretical and conceptual papers exploring ethical implications and future directions, systematic reviews and literature analyses. Included papers span peer-reviewed journal articles,

conference proceedings, master's theses, and selected grey literature with substantial methodological rigor.

**AI Applications in Skincare Marketing (RQ1)**

AI-powered recommendation engines and diagnostic tools represent one of the most prevalent applications in skincare marketing. These systems analyze multiple data sources to suggest products tailored to individual consumers.

AI systems analyze user-provided information, facial images, or skin condition data to provide personalized skincare assessments and product recommendations (Wang et al., 2020; Winarto & Wisesa, 2024). These tools aim to replicate the consultative experience of in-store beauty advisors by offering data-driven, personalized advice. Example: L'Oréal's Garnier Skin Coach AI analyzes user skin conditions through questionnaires and provides personalized skincare recommendations. Research examining this tool found it significantly influenced purchase intentions among Generation Z consumers in Indonesia, with effects mediated by enhanced hedonic value (enjoyment and aesthetic appeal) and utilitarian value (functional benefits) perceptions (Winarto & Wisesa, 2024).

Deep learning-based recommendation systems match consumers with products based on their specific skin types, concerns, and preferences. These systems often incorporate ingredient analysis, efficacy data, and collaborative filtering based on similar user profiles (Adawiyah et al., 2024; Lee et al., 2024). Personalization engines integrated into e-commerce platforms use AI to customize product displays, search results, and recommendations based on browsing behavior, purchase history, and stated preferences (Coelho & Imamović, 2025).

In addition to deep learning systems, users can take advantage of AI chatbots. AI chatbots have various functions in skincare marketing: providing product information, giving personalized advice, answering customer questions, guiding purchasing decisions, and automating customer service (Alifah, 2025; Toosi et al., 2024). Chatbots interact with customers through natural language conversations to understand their skincare needs, concerns, and preferences, then provide tailored product recommendations and usage advice (Alifah, 2025; Felix & Rembulan, 2023). Example: A case study on AI chatbot integration in skincare e-commerce reports significant business impact. Chatbots increased average customer interaction time, improved engagement metrics, and most notably, increased conversion rates from 2.3% to 5.7% a 148% increase (Alifah, 2025). Chatbots gathered user information through conversation flows, evaluated skin concerns, and provided personalized product recommendations, demonstrating measurable ROI.

In virtual try-ons and augmented reality experiences, computer vision and augmented reality (AR) technologies enable consumers to virtually test products before purchase, reducing uncertainty and increasing engagement (Adawiyah et al., 2024; Dhianita & Rufaidah, 2024). AR applications allow consumers to see how makeup products (lipstick, eyeshadow, foundation) would appear on their face in real-time using smartphone cameras or uploaded photos (Dhianita & Rufaidah, 2024). Some applications simulate the effects of skincare treatments over time, showing potential improvements in skin texture, tone, or specific concerns like wrinkles or hyperpigmentation (Wang et al., 2020).

Research on AI and AR technology in personalized recommendations for cosmetic products on e-commerce platforms like Shopee demonstrates that perceived usefulness, perceived ease of use, and trust significantly influence consumer intention to use these features (Adawiyah et al., 2024). The study found that when consumers perceive AR try-

ons as useful for making better purchase decisions and easy to use, they are more likely to adopt the technology. Trust in both the technology and the platform also plays a critical mediating role. The immersive, interactive nature of AR experiences increases time spent with brand apps and websites, strengthens emotional connections, and reduces purchase uncertainty by allowing consumers to visualize products on themselves (Dhianita & Rufaidah, 2024).

Furthermore, generative AI technologies enable creation of marketing content at scale, including product descriptions, social media posts, email campaigns, and even synthetic influencers, computer-generated characters that serve as brand ambassadors (Cannella, 2018; Ilyas, 2024; Wilendra et al., 2024). Large language models like ChatGPT are increasingly used to generate marketing copy, product descriptions, and personalized messaging. Research on ChatGPT's application in marketing strategy for the Indonesian cosmetic industry highlights the technology's potential to revolutionize market segmentation, targeting, and positioning while raising important questions about ethics, authenticity, and human oversight (Wilendra et al., 2024). Brands are experimenting with AI-generated influencers synthetic personalities with consistent visual appearance and personality traits that can be deployed across campaigns without the limitations of human influencers (scheduling conflicts, scandals, aging) (Ilyas, 2024).

Research on public reception of AI-generated beauty content reveals mixed responses. Studies indicate that AI influencers without human elements reduce message receptivity and trust compared to human influencers or hybrid approaches. Consumers perceive AI influencers as lacking social presence, authenticity, and trustworthiness, which negatively affects message acceptance and brand attitudes (Ilyas, 2024). This suggests that complete replacement of human elements with AI may be counterproductive. The use of generative AI for marketing content raises significant ethical questions about disclosure, transparency, and potential manipulation. Research recommends warning labels or clear disclosure when AI-generated content is used, to protect consumer rights and maintain trust (Cannella, 2018; Ilyas, 2024).

**Technologies and Methodological Approaches (RQ2)**

Machine learning algorithms form the backbone of recommendation engines, customer segmentation, predictive analytics, and personalization systems (Adawiyah et al., 2024; Lee et al., 2024). Recommendation algorithms common approaches include: collaborative filtering (recommending products based on similarity to other users with comparable preferences and behaviors), content-based filtering (matching product attributes (ingredients, benefits, price) with user preferences and needs), hybrid systems (combining multiple recommendation strategies for improved accuracy and coverage), and deep neural networks (learning complex, non-linear patterns from large datasets of user behavior, product attributes, and outcomes (Lee et al., 2024))

Machine learning algorithms cluster consumers into segments based on demographics, behavior, preferences, and psychographics, enabling targeted marketing strategies (Coelho & Imamović, 2025; Wilendra et al., 2024). Algorithms predict future behaviors such as purchase likelihood, churn risk, and lifetime value, informing marketing resource allocation (Lee et al., 2024). Natural Language Processing (NLP) technologies enable conversational interfaces, sentiment analysis, and text-based personalization (Alifah, 2025; Toosi et al., 2024; Wilendra et al., 2024). Key NLP capabilities for chatbots include:

- Intent recognition: Understanding the purpose behind user questions and requests

- Entity extraction: Identifying product names, skin concerns, ingredients, and preferences from user input
- Dialogue management: Maintaining context across multi-turn conversations
- Response generation: Producing natural, contextually appropriate replies (Alifah, 2025)

Advanced language models like GPT-3 and GPT-4 generate coherent, contextually appropriate marketing copy, product descriptions, personalized emails, and social media content at scale (Wilendra et al., 2024). The quality of AI-generated text has improved dramatically, making it increasingly difficult to distinguish from human-written content. Computer vision enables visual skin assessment, AR experiences, and image-based recommendation systems (Adawiyah et al., 2024; Dhianita & Rufaidah, 2024; Wang et al., 2020). Computer vision combined with graphics rendering enables real-time overlay of virtual makeup products on user faces, creating immersive try-on experiences (Adawiyah et al., 2024; Dhianita & Rufaidah, 2024). Some applications allow consumers to upload photos of desired looks or products, with computer vision identifying products that can recreate those looks (Dhianita & Rufaidah, 2024).

Generative AI technologies, particularly generative adversarial networks (GANs) and large language models, create novel content including images, text, and synthetic personas (Cannella, 2018; Ilyas, 2024; Wilendra et al., 2024). GANs and diffusion models create realistic images for marketing campaigns, product visualization, and synthetic influencer content (Ilyas, 2024). Large language models generate marketing copy, product descriptions, personalized messages, and conversational responses (Wilendra et al., 2024). Generative models create consistent synthetic influencer personas with coherent visual appearance across contexts and personality traits expressed through generated content (Felix, Livaro, et al., 2023; Ilyas, 2024). The realism of generative AI outputs raises concerns about deception, manipulation, and the need for disclosure. Research emphasizes the importance of transparency when using AI-generated content in marketing (Cannella, 2018; Ilyas, 2024).

**Consumer Perceptions and Behavioral Responses (RQ3)**

Research on consumer perceptions of AI in skincare marketing reveals a complex landscape of enthusiasm tempered by concerns about privacy, trust, authenticity, and psychological impacts. Consumers appreciate recommendations and content tailored to their specific skin types, concerns, and preferences. Personalization increases perceived value, both hedonic (enjoyment, aesthetic appeal) and utilitarian (functional benefits, problem-solving) (Winarto & Wisesa, 2024). When AI systems successfully match products to individual needs, consumers perceive higher relevance and are more satisfied with their choices.

AI tools provide instant access to skincare advice and product information without requiring in-store visits, appointments with beauty consultants, or extensive product research. This convenience particularly appeals to digitally-native younger consumers who prefer self-service digital experiences (Alifah, 2025; Winarto & Wisesa, 2024). When AI systems incorporate objective skin analysis, ingredient science, and data-driven recommendations, consumers may perceive them as more credible and less biased than traditional marketing claims or sales-driven human advice (Wang et al., 2020; Winarto & Wisesa, 2024). The association with technology and data can enhance perceived objectivity.

AR try-ons and conversational chatbots create engaging, interactive experiences that increase time spent with brands, strengthen emotional connections, and make the shopping process more enjoyable (Adawiyah et al., 2024; Alifah, 2025). The Technology Acceptance Model (TAM) construct of perceived usefulness, the degree to which consumers believe a technology will help them achieve their goals is consistently found to be a strong predictor of AI adoption in skincare contexts (Adawiyah et al., 2024). When consumers believe AI tools will help them make better product choices, avoid mistakes, or achieve better skincare results, they are more likely to use and trust these tools.

In privacy and data security, consumers express significant concerns about sharing facial images, skin condition information, and personal data with AI systems. Worries about data breaches, unauthorized use, surveillance, and lack of control over personal information limit adoption, particularly for applications requiring image uploads (Adawiyah et al., 2024; Toosi et al., 2024). Research shows that trust significantly mediates the relationship between perceived usefulness and intention to use AI features (Adawiyah et al., 2024). Without trust, even useful AI tools may be rejected.

Consumers perceive AI-generated content and AI influencers as lacking authenticity, warmth, and social presence compared to human-created content and human influencers (Felix, Briyanti, et al., 2023; Ilyas, 2024). This perception reduces message receptivity and brand attitudes. Studies show that AI influencers without human elements significantly decrease trust and message acceptance, suggesting that complete automation of influencer marketing may be counterproductive (Ilyas, 2024). Many consumers are uncertain about how AI systems work, what data they collect, how recommendations are generated, and whether AI is being used at all. Lack of transparency undermines trust and creates unease (Cannella, 2018; Ilyas, 2024).

Research recommends clear disclosure of AI use and explanation of how systems operate to address these concerns (Cannella, 2018). Some consumers worry that AI is manipulating them toward purchases that benefit the company rather than serving their genuine needs. This concern is particularly acute with opaque recommendation algorithms and AI-generated content that may be designed to maximize persuasion (Wilendra et al., 2024). Some consumers, particularly older demographics and those with complex skincare concerns, prefer traditional human consultation and are uncomfortable relying solely on algorithmic advice for personal care decisions (Toosi et al., 2024). They value the empathy, experience, and nuanced understanding that human beauty advisors provide.

Emerging research examines the psychological effects of AI and AR beauty experiences, revealing both positive and negative impacts. Studies examining the impact of digital beauty experiences (including AI-powered skin analysis and AR try-ons) on Generation Z females found significant effects on body image perceptions and self-esteem (Salsky, 2020). The research indicates that exposure to idealized beauty standards through AI-enhanced experiences can negatively affect self-perception, particularly among younger users who are more vulnerable to social comparison and appearance-related pressures. These findings suggest that AI in skincare marketing is not ethically neutral, it can have real psychological consequences, particularly for vulnerable populations. This raises questions about corporate responsibility, age-appropriate design, and the need for safeguards to protect consumer wellbeing (Salsky, 2020).

**Effectiveness and Impact on Marketing Outcomes (RQ4)**

The literature provides substantial evidence for positive effects of AI on various marketing metrics, though methodological limitations warrant careful interpretation.

Research examining L'Oréal's Garnier Skin Coach AI found significant positive influence on Generation Z purchase intentions. The effect was mediated by enhanced hedonic value (enjoyment and aesthetic appeal of the personalized experience) and utilitarian value (functional benefits and problem-solving) perceptions (Winarto & Wisesa, 2024). This suggests that AI personalization works through dual pathways making the shopping experience more enjoyable while also making it more effective.

A case study of AI chatbot integration in e-commerce skincare reported dramatic conversion rate improvement from 2.3% to 5.7% a 148% increase (Alifah, 2025). This improvement was attributed to the chatbot's ability to engage customers, understand their needs through conversational flows, provide personalized recommendations, and guide them through the purchase process. The chatbot effectively replicated aspects of human sales consultation at scale. Studies of AI and AR personalized recommendation features on e-commerce platforms found that perceived usefulness and trust positively influenced intention to use these technologies, which in turn predicts actual usage and purchase behavior (Adawiyah et al., 2024). These findings suggest that well-implemented AI features can meaningfully impact bottom-line sales metrics, though effect sizes vary by implementation quality, consumer segment, and context.

AI-powered apps and tools that provide ongoing value (e.g., skin tracking over time, evolving recommendations) encourage repeat engagement and habitual use, creating more touchpoints for brand communication (Wang et al., 2020; Winarto & Wisesa, 2024). When implemented well, AI enhances overall customer experience by making it easier to find relevant products, get questions answered quickly, and receive personalized advice. This improved experience contributes to satisfaction and positive brand attitudes (Adawiyah et al., 2024; Alifah, 2025).

Evidence suggests AI can strengthen customer relationships and build loyalty. Personalized customer satisfaction and loyalty, recommendations that successfully match products to consumer needs increase satisfaction with both the purchase process and the products themselves (Adawiyah et al., 2024; Coelho & Imamović, 2025). Consumers appreciate feeling understood and receiving relevant suggestions. Positive AI experiences strengthen brand loyalty and repeat purchase intention. The e-commerce skincare case study reported strengthened customer loyalty following chatbot integration, attributed to improved service quality and personalized attention (Alifah, 2025).

**Challenges, Limitations, and Ethical Considerations (RQ5)**

The literature identifies multiple challenges and ethical concerns that must be addressed for responsible and effective AI deployment in skincare marketing. AI systems for skin analysis and product recommendation face challenges in accuracy across diverse conditions. Computer vision systems may struggle with varying lighting, image quality, skin tones, and the complexity of dermatological assessment. Inaccurate assessments lead to inappropriate recommendations, damaging trust and potentially causing harm (Ferrara, 2024; Wang et al., 2020).

AI systems trained on non-representative datasets may perform poorly for underrepresented skin types, tones, ages, and conditions. This raises both technical accuracy concerns and ethical issues of fairness and inclusion (Ferrara, 2024). If training data overrepresents certain demographics (e.g., lighter skin tones, younger ages, specific ethnicities), the resulting AI systems will be biased toward those groups. Systems trained on specific populations, conditions, or contexts may not generalize well to diverse real-world users. Models developed in one geographic or demographic context may fail when deployed more broadly (Ferrara, 2024). Combining multiple AI technologies (vision, NLP,

ML, AR) into cohesive, seamless systems requires significant technical sophistication. Integration challenges can result in fragmented, frustrating user experiences (Coelho & Imamović, 2025).

Facial images and personal skin condition information are highly sensitive. Collection, storage, transmission, and processing of this data create substantial privacy risks. Consumers are rightfully concerned about who has access to this information and how it might be used (Adawiyah et al., 2024; Toosi et al., 2024). Security vulnerabilities could expose sensitive consumer information, causing significant harm and eroding trust. Beauty and skincare companies must implement robust security measures to protect this data (Toosi et al., 2024). Ensuring meaningful informed consent—where consumers truly understand what data is collected, how it's used, and what rights they have—is challenging. Providing genuine user control over personal data (access, correction, deletion) requires careful system design (Adawiyah et al., 2024).

Navigating complex and evolving privacy regulations (GDPR in Europe, CCPA in California, various national laws) across jurisdictions adds compliance burden and risk (Toosi et al., 2024). If consumer data is shared with third parties (advertisers, data brokers, partners), privacy risks multiply. Transparency about data sharing practices is essential but often lacking (Toosi et al., 2024). AI-powered marketing experiences may be inaccessible to consumers without smartphones, high-speed internet access, or digital literacy, potentially exacerbating inequalities (Ferrara, 2024). Ensuring AI systems serve all consumer segments fairly, without discrimination or bias based on protected characteristics (race, age, gender, etc.), is an ongoing challenge requiring active attention (Ferrara, 2024). If AI systems are developed primarily by and for dominant demographic groups, they may not serve diverse populations well (Ferrara, 2024).

**Methodological Gaps**

Most existing research employs cross-sectional designs examining short-term responses (intentions, attitudes, single purchase occasions). Longitudinal studies tracking sustained behavioral change, repeat purchase patterns, long-term satisfaction, and evolving trust over months or years are rare but critically needed (Alifah, 2025; Toosi et al., 2024). Many studies rely on surveys measuring intentions rather than actual behavior, lab experiments with limited external validity, or single case studies without control groups. Rigorous field experiments with random assignment, control conditions, and real purchase data would strengthen causal inference and provide more reliable evidence of effectiveness (Alifah, 2025).

Few studies directly compare different AI approaches (chatbots vs. AR vs. recommendation engines vs. AI influencers) or implementation strategies to determine which features drive incremental value and under what conditions. Comparative research would inform more efficient resource allocation (Alifah, 2025). Research often focuses on specific brands, platforms, demographic segments, or geographic contexts. Studies with diverse samples and contexts are needed to assess generalizability and boundary conditions of findings (Ferrara, 2024). While emerging research examines body image effects, more comprehensive investigation of psychological impacts both positive and negative across diverse populations is needed (Salsky, 2020).

More research is needed on how different approaches to disclosing AI use and explaining recommendations affect trust, satisfaction, and behavior. What information do consumers want? How should it be communicated? What are the effects of different disclosure formats? (Cannella, 2018; Ilyas, 2024). Understanding how consumers conceptualize AI in marketing contexts what they think it is, how they believe it works,

what they expect from it, would inform better design and communication (Cannella, 2018). As AI becomes more prevalent, consumer AI literacy understanding of AI capabilities, limitations, and implications becomes important. Research on AI literacy levels and educational interventions would be valuable (Cannella, 2018). Research has focused primarily on successful AI implementations. Studies of failures, negative consumer experiences, and effective service recovery strategies are needed to understand the full range of outcomes and how to mitigate harms (Ilyas, 2024). How does sustained AI interaction affect consumer-brand relationships over time? Do effects strengthen, weaken, or plateau? How do repeated AI interactions shape trust and loyalty? (Alifah, 2025).

## Discussion

This systematic review synthesizes current knowledge on AI content in skincare marketing based on 109 unique papers retrieved from Google Scholar, revealing a rapidly evolving landscape characterized by technological innovation, promising effectiveness, and significant implementation challenges.

The review identifies five primary application clusters personalized recommendations and diagnostics, conversational AI and chatbots, virtual try-ons and AR experiences, AI-generated content and synthetic influencers, and predictive analytics each addressing different marketing objectives and customer journey stages. The diversity of applications reflects AI's versatility and the multifaceted nature of skincare marketing.

Effective AI marketing systems typically integrate machine learning, NLP, computer vision, AR, and generative AI rather than relying on single technologies. This multi-modal approach enables richer, more engaging experiences that address multiple consumer needs simultaneously analyzing skin conditions, providing conversational guidance, enabling virtual try-ons, and generating personalized content.

Research demonstrates that well-implemented AI applications positively influence purchase intention, conversion rates, engagement, and customer satisfaction. Notable examples include a 148% conversion rate improvement from chatbot integration and significant purchase intention increases from AI diagnostic tools (Alifah, 2025; Winarto & Wisesa, 2024). However, effect sizes vary by implementation quality, consumer segment, and context, and most evidence comes from cross-sectional studies or single case reports rather than rigorous longitudinal experiments.

Consumers, particularly younger demographics, show enthusiasm for AI-powered personalization, convenience, and interactive experiences. However, acceptance is strongly moderated by perceived usefulness, trust, ease of use, transparency, and authenticity. Positive experiences strengthen relationships; negative experiences damage trust. Notably, AI influencers without human elements significantly reduce trust and message acceptance, suggesting limits to full automation (Ilyas, 2024).

Technical limitations (dataset bias, accuracy, generalization), privacy and security concerns, transparency deficits, authenticity issues, and psychological impacts represent substantial obstacles to responsible AI deployment. Concerns about body image effects, bias in representation, and manipulation highlight that AI in beauty marketing is not ethically neutral (Ferrara, 2024; Salsky, 2020; Wilendra et al., 2024).

The literature lacks longitudinal studies, rigorous field experiments, diverse representative datasets, comparative effectiveness research, and established ethical frameworks. These gaps limit the strength of conclusions and highlight priorities for

future inquiry. The field shows practical momentum but academic rigor lags in some areas.

## CONCLUSION AND SUGGESTION

AI applications in skincare marketing including personalized recommendations and diagnostics, conversational agents and chatbots, virtual try-ons and AR experiences, AI-generated content and synthetic influencers, and predictive analytics demonstrate clear potential to enhance consumer experiences and marketing effectiveness. Research evidence supports positive effects on purchase intention, conversion rates (with documented improvements of 148% in one case study), engagement, and satisfaction, particularly among digitally-native younger consumers. These benefits stem from AI's ability to provide personalized, convenient, interactive, and data-driven experiences that address individual consumer needs at scale.

However, realizing this potential requires addressing substantial challenges. Technical limitations around dataset bias, accuracy, and generalization must be overcome to ensure AI systems serve all consumers fairly and effectively. Privacy and security concerns are paramount given the sensitive nature of facial images and personal skin information. Transparency deficits and authenticity concerns undermine consumer trust research shows that AI influencers without human elements significantly reduce trust and message acceptance, suggesting limits to full automation. Ethical questions about manipulation, psychological impacts (particularly on body image and self-esteem among young consumers), and bias in representation remain unresolved.

The research landscape, while growing rapidly, exhibits significant gaps. Most studies employ cross-sectional designs examining short-term responses; longitudinal field experiments tracking sustained behavioral change are rare. Comparative effectiveness research determining which AI features drive incremental value under what conditions is limited. Diverse, representative datasets needed for equitable AI performance are lacking. Ethical frameworks and governance structures specific to AI in marketing contexts remain underdeveloped. The field shows clear practical momentum brands are rapidly adopting AI technologies but academic rigor lags in some areas, limiting the evidence base for best practices.

Future research should specifically examine: (1) the long-term effect of AI personalization on consumer brand loyalty and repurchase intention, particularly mediated by constructs such as perceived trust, perceived authenticity, and algorithmic transparency; (2) the moderating role of AI literacy and digital self-efficacy on consumer acceptance of AI-generated content and synthetic influencers; (3) the relationship between AI-driven virtual try-on experiences and constructs such as body image satisfaction, self-esteem, and social comparison tendency especially among Gen Z and adolescent female consumers; (4) cross-cultural differences in privacy concern and AI acceptance across Asian, European, and North American markets; and (5) the impact of AI disclosure labeling on consumer trust, purchase intention, and brand attitude in cosmetic marketing contexts.

## REFERENCES

Adawiyah, S. R., Purwandari, B., Eitiveni, I., & Purwaningsih, E. H. (2024). The influence of AI and AR technology in personalized recommendations on customer usage intention: a case study of cosmetic products on shopee. *Applied Sciences*, *14*(13), 5786. https://doi.org/10.3390/app14135786

Alifah, N. (2025). Integration of AI Chatbot in Digital Marketing Strategy: A Case Study on

E-commerce Skincare. *Journal of Digital Marketing and Search Engine Optimization*, *2*(1), 1–15. https://doi.org/10.59261/jseo.v2i1.6

Cannella, J. (2018). *Artificial Intelligence in Marketing*. James Cannella. https://scispace.com/papers/artificial-intelligence-in-marketing-hv3e6mgefi

Coelho, M. C. C. D., & Imamović, I. (2025). AI-driven personalization in beauty retail: exploring how AI-based applications influence customer satisfaction and brand loyalty. In *Leveraging AI for Effective Digital Relationship Marketing* (pp. 131–162). IGI Global.

Dhianita, S., & Rufaidah, P. (2024). The role of virtual try-on augmented reality of cosmetic products on purchase intention mediated by brand trust. *Jurnal Manajemen Bisnis*, *11*(2), 1111–1123.

Felix, A., Briyanti, D. O., Young, F. M., Livaro, I., & Wijaya, W. (2023). Strategi identitas digital: analisis personal branding di platform tiktok. *JDMR Jurnal Digital Media & Relationship*, *5*(2), 92–100.

Felix, A., Livaro, I., Young, F. M., Wijaya, W., Jonathan, A., & Celvine, C. (2023). Analisis penggunaan social media marketing dan influencer marketing dalam meningkatkan penjualan gelato dengan konsep unik. *SEIKO: Journal of Management & Business*, *6*(2.1).

Felix, A., & Rembulan, G. D. (2023). Analysis of key factors for improved customer experience, engagement, and loyalty in the e-commerce industry in indonesia. *Aptisi Transactions on Technopreneurship (ATT)*, *5*(2sp), 196–208. https://doi.org/10.34306/att.v5i2sp.350

Ferrara, E. (2024). Fairness and bias in artificial intelligence: A brief survey of sources, impacts, and mitigation strategies. *Sci*, *6*(1), 3.

Gambetta, Z. A., Puji, L. D., & Santika, N. G. (2021). Calla beauty assistant: Beauty advisory chatbot. *2021 8th International Conference on Advanced Informatics: Concepts, Theory and Applications (ICAICTA)*, 1–6. https://doi.org/10.1109/icaicta53211.2021.9640281

Gusenbauer, M., & Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources. *Research Synthesis Methods*, *11*(2), 181–217. https://doi.org/olar, PubMed, and 26 other resources. Research Synthesis Methods, 11(2), 181-217. https://doi.org/10.1002/jrsm.1378

Hegde, S. S., Elias, S., Arora, S. R., Adlakha, S., Garg, N., & Kant, T. (2023). A Study on the use of AI (Artificial Intelligence) in beauty industry in India. *Int. J. Res. Publ. Rev*, *4*(4), 2936–2941. https://doi.org/10.55248/gengpi.2023.4.4.35832

Ilyas, Q. (2024). *AI IN BEAUTY CONTENT: a theoretical study of ethical and psychological considerations surrounding ai-generated beauty content*.

Lee, J., Yoon, H., Kim, S., Lee, C., Lee, J., & Yoo, S. (2024). Deep learning-based skin care product recommendation: A focus on cosmetic ingredient analysis and facial skin conditions. *Journal of Cosmetic Dermatology*, *23*(6), 2066–2077.

Nirmal, S., & Wani, N. D. (2025). The relationship between artificial intelligence and consumer decision making in the context of personalized cosmetic products. *The Scientific Temper*, *16*(9), 89–97. https://doi.org/10.58414/scientifictemper.2025.16.9.10

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, *372*, n71. https://doi.org/10.1136/bmj.n71

Pandya, J., & Padma, S. (2024). The Study of Artificial Marketing tools used in Indian

Cosmetic Industry and its impact on Consumer Behaviour. *J. Inform. Educ. Res*, *4*, 815–818. https://doi.org/10.52783/jier.v4i1.640

Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., Britten, N., Roen, K., & Duffy, S. (2006). Guidance on the conduct of narrative synthesis in systematic reviews. *A Product from the ESRC Methods Programme Version*, *1*(1), b92.

Salsky, E. (2020). *Personalization in beauty tech using ai and ar: investigating consumer behaviour and benefits of personalization in beauty*.

Toosi, R., Hosseini, S. H., Nosraty, N., & Rahmatian, F. (2024). Artificial Intelligence, Health, and the Beauty Industry. *Deleted Journal*, *4*(3), 4419. https://doi.org/10.62225/2583049x.2024.4.3.4419

Wang, M.-H., Wang, W.-C., Lin, C.-H., & Chen, Y.-T. (2020). Implementation of AI E-Commerce Model for Medical Beauty Industry: A Case Study in Penghu. *Journal of Accounting, Finance & Management Strategy*, *15*(1).

Wilendra, W., Nadlifatin, R., & Kusumawulan, C. K. (2024). ChatGPT: The AI Game-Changing Revolution in Marketing Strategy for the Indonesian Cosmetic Industry. *Procedia Computer Science*, *234*, 1012–1019. https://doi.org/10.1016/j.procs.2024.03.091

Winarto, L., & Wisesa, A. (2024). Analyzing the impact of artificial intelligence and sustainability on Gen Z consumer purchase intentions: A case study of L'Oréal cosmetics Indonesia. *European Journal of Business and Management Research*, *9*(5), 112–120. https://doi.org/doi.org/10.24018/ejbmr.2024.9.5.2241