

Beauty Meets Bytes: Revolutionizing Cosmetic Marketing with AI & ML in the Indian Market

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Abstract: The cosmetic industry has undergone significant transformation with the advent of Artificial Intelligence (AI) and Machine Learning (ML). These technologies have enhanced consumer experiences by personalizing product offerings, improving marketing strategies, and streamlining customer engagement. This paper explores the use of AI and ML in four critical areas of cosmetic marketing: virtual testing of products, product customization, face mapping for personalized recommendations, and the communication, promotion, and sales channels. Furthermore, the paper examines how ML algorithms predict consumer behavior, optimize marketing efforts, and maximize customer satisfaction. The study has focused on major brands in India L'oreal and Lakme with other brands in the cosmetic marketplace for women like Sugar Cosmetics, Lotus Herbal and Forest Essentials. The paper has assessed the usage of AI and ML by these brands for customer engagement and marketing. Global giant brands like L'oreal with their global presence were found to be heavily focused on integrating AI and ML at all levels with the consumer, probably due to the financial resources for the investment. Lakme, an established profitable brand from India was found to engage with consumers to a greater extent as compared to newer brands like Forest Essentials, Sugar and Lotus Herbal. All brands were found to have significant level of AI and ML engagement, though the technology used was found to differ.

Keywords: Artificial Intelligence, Machine Learning, TAM, consumer, cosmetic

1. Introduction

Marketing strategies today incorporate technological tools with traditional strategies to maximise the reach to the consumer. Artificial Intelligence (AI) and Machine Learning (ML) driven marketing strategies have globally revolutionised the cosmetic industry with targeted product development and improved personalization. (Wilendra et al 2024) . User friendly interfaces, interactive recommendation engines , prolific algorithms and data scraping have radically transformed the buying behavior in the cosmetic industry and impacting the marketing strategies which companies are targeting the consumers online. (Shreya et al 2024). The development of AI and ML for marketing cosmetics has created multitudinous opportunities for companies to develop their efficiency in identifying prospective consumers, effective in assessing the requirements of the consumer and to customize the products so that personalization is possible for each user.

User engagement through technology to customize searches, preferences, content and consumer experiences give deeper insights to consumer preferences and enable optimization of marketing strategies and campaigns for cosmetic brands.

1.1 TAM model

Technology Acceptance Model (TAM) is a widely accepted theoretical framework to study individuals' acceptance of information systems, including artificial intelligence (AI) and machine learning in various fields such as e-commerce, telecommunications, and construction. TAM is effectively being used to determine effective strategies



that can target the consumer. (Musa et al 2024) . TAM is globally accepted in the context of the beauty and cosmetic industry and for the applicability of MI and ML in its adoption by consumers. The TAM model enables deeper understanding of adoption of the technologies by the consumer for customization and user interaction.

AI and ML have benefits in customization and accurate analysis viz skin tones for a consumer. Satisfaction and simplicity of user interfaces enable widespread usage of the technology on mobile phones or laptops.

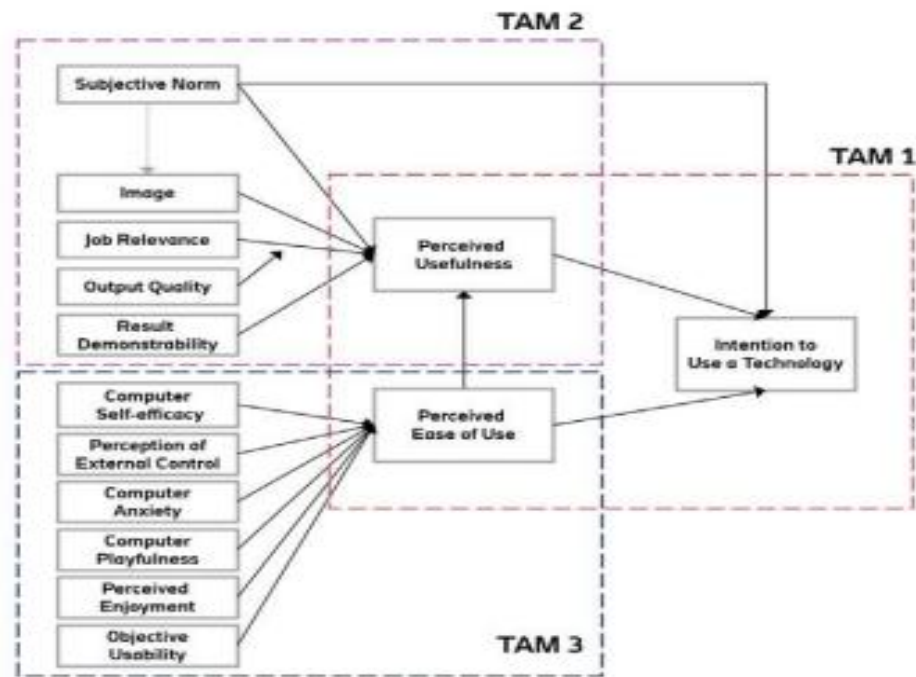


Table 1.1 :TAM model: Technological Acceptance Model for Cosmetic Consumers : Figure 1: Masita Y. et. al (2024) Davis (1989)

AI and ML applications globally incorporate virtual trial technology with effective user experiences for makeup products at their convenience, without having to physically visit retail stores and try products. Virtual trial experience using TAM has been applied for product categories such as lipsticks, hair and eye cosmetics. User friendly technology provides AI to analyze specific data like for skin care cosmetics and recommending relevant products based on the data. Chatbots can be automated to assess the user needs and provide relevant information. Use of AI and ML has started to revolutionize product customization, user interaction, operations and marketing efficiency in the cosmetic industry.

2. AI Parameters in Cosmetic Marketing Strategy

2.1 Virtual Testing of Products

Virtual testing of cosmetic products allows consumers to try before they buy without physical application. AI-powered augmented reality (AR) platforms enable virtual try-ons, allowing users to test various makeup shades, skin tones, and styles through their smartphones or desktop devices. These virtual try-ons are based on AI technologies that use computer vision to analyze facial features and simulate the application of products in real-time.

- **Technology Integration:** Platforms like Sephora Virtual Artist, L'Oréal's ModiFace, and Estée Lauder's AR try-on use AI to deliver precise virtual testing experiences. These platforms adjust to skin tones, facial shapes, and other unique attributes, providing a highly personalized experience.

- **Consumer Experience:** Virtual testing not only enhances the shopping experience but also helps customers make better-informed purchasing decisions, reducing product return rates and increasing sales conversion.

2.2 Customized Products

Customization has become a key trend in the beauty industry, allowing consumers to create products tailored to their individual preferences. AI enables this through data-driven algorithms that consider skin type, tone, preferences, and environmental factors when recommending custom formulations.

- **Personalization through AI:** Brands like SkinCeuticals and Function of Beauty offer personalized skincare and haircare products. Using AI-powered quizzes, customers can input their skin concerns or hair needs, and the system uses this data to formulate a unique product suited to their individual needs.
- **Dynamic Formulations:** AI can also monitor the user's skincare progress through periodic assessments, adjusting product formulations over time to maintain optimal results.

2.3 Face Mapping for Recommendations

AI-powered face mapping tools use computer vision and deep learning to analyze a user's face, identifying key areas of concern such as wrinkles, acne, or dark spots. These tools recommend targeted products based on the face mapping analysis, providing consumers with solutions suited to their unique facial features.

- **AI & Skin Analysis:** Platforms such as Olay's Skin Advisor and L'Oréal's Perso offer personalized skin assessments by using AI to analyze skin conditions and offer tailored product suggestions, including skincare routines for different skin types.
- **Enhancing Product Recommendations:** Face mapping enables a more accurate understanding of skin needs, allowing brands to recommend not just individual products, but complete skincare routines. This leads to increased customer satisfaction as their specific needs are addressed more effectively.

2.4 Channels for Communication, Promotion, and Sales

AI is transforming the way brands communicate with and promote products to consumers. Through AI-driven chatbots, virtual assistants, and personalized email campaigns, cosmetic brands are able to engage customers at scale while maintaining a personalized touch.

- **AI Chatbots:** Many cosmetic companies use AI-powered chatbots to provide customer service, recommend products, and even complete transactions. For example, Sephora's Sephora Virtual Artist and chatbots on e-commerce websites answer questions, suggest products, and guide customers through the purchasing process.
- **Promotion and Advertising:** AI-driven marketing tools enable highly targeted digital advertising based on user behavior, demographics, and preferences. Social media platforms, such as Instagram and TikTok, have leveraged AI to help brands tailor ads to users' interests, optimizing campaign performance.
- **Omnichannel Sales:** AI is central to optimizing sales across multiple touchpoints—whether in-store, online, or through mobile apps—ensuring a consistent and personalized experience across all channels.

3. ML Parameters in Consumer Marketing Strategy

3.1 Product and Routine Recommendations

Machine learning algorithms use historical data and consumer behavior patterns to recommend products and routines that are most suited to individual customers. By analyzing purchase history, product ratings, and customer feedback, ML models can identify patterns that help predict the most effective products for specific customer needs.

- **Customer Segmentation:** ML enables more granular customer segmentation based on skin type, age, gender, purchase behavior, and more. This segmentation allows brands to personalize product recommendations and routines, thereby maximizing product effectiveness and customer satisfaction.
- **Adaptive Algorithms:** These algorithms can evolve over time based on new data, adjusting recommendations and routines to keep pace with changes in consumer preferences or skin conditions, ensuring that the customer receives the best possible product match.

3.2 Forecasting Consumer Purchases and Customer Lifetime Value (CLV)

ML algorithms are crucial in forecasting consumer behavior, including predicting future purchases and estimating the Customer Lifetime Value (CLV). By analyzing past transactions, browsing behavior, and engagement metrics, ML models can forecast when a customer is likely to purchase next, what they might buy, and the overall value they are expected to bring to the brand.

- **Sales Forecasting:** Using historical sales data, ML models can predict future demand, helping brands manage inventory and optimize product supply chains. This minimizes stockouts and overstock situations, leading to more efficient business operations.
- **CLV Prediction:** By analyzing factors such as purchase frequency, brand loyalty, and product preferences, ML can help calculate the CLV for each consumer, allowing brands to allocate resources more effectively toward high-value customers.

3.3 Customer Retention and Other Business Metrics

ML is a powerful tool for enhancing customer retention and improving overall business metrics. By continuously analyzing customer engagement and satisfaction levels, ML algorithms help brands identify at-risk customers and implement targeted retention strategies.

- **Churn Prediction:** ML algorithms can identify patterns that suggest when a customer is likely to disengage from the brand. This enables businesses to implement proactive retention tactics, such as personalized offers, loyalty rewards, or re-engagement campaigns.
- **Optimizing Marketing ROI:** By analyzing the performance of different marketing channels and campaigns, ML allows brands to optimize their marketing strategies, ensuring the highest possible return on investment (ROI).

3.4 Marketing Strategies and TAM with AI and ML

Leveraging technology with AI and ML has enabled companies to drive marketing strategies with data driven competitive engagement. Companies using AI- and ML data-driven technologies are twenty three times more able to convert and six times more able to retain the customers .

4. Research Methodology

This research adopts a qualitative approach, by comparing the AI and ML tools used by Major Cosmetic Brands viz; L'oreal Paris, Lakme, Sugar, Lotus and Forest Essentials analyse the impact on consumers in various aspects of likelihood, satisfaction and purchasing decisions.

1. **Case Study Analysis:** Examining industry leaders such as L'Oréal, Lakmé, Sugar, and Lotus to assess AI and ML implementation.
2. **Interviews:** The real time survey of the women consumers using and buying any products of the specified brands was conducted.
3. **Data Analytics:** Analyzing data from AI-powered algorithms like ModiFace and trend analysis tools such as NVIDIA's generative AI and the technology used across the major brands.

4.1 Problem Statement

Considering the increasing awareness about AI and ML in the field of marketing, it is inevitable to take a close look at the impact of AI and ML in the cosmetic industry. The research paper aims to understand how AI transforms consumer experiences and influences brand strategies by utilizing key areas of cosmetic marketing, such as virtual testing, product customization, face mapping for recommendations, and communication channels. The research seeks to investigate how Machine Learning (ML) algorithms are used to personalize product and routine recommendations, based on data-driven insights into customer behavior, preferences, and needs. The researcher also focuses on evaluating the effectiveness of face mapping tools powered by AI in providing tailored skincare and cosmetic product recommendations, and their influence on customer satisfaction and product efficacy.

5. Data Analysis

Table 5.1: Comparison showing the use of AI and ML technologies of Lakme and L'oreal Paris

Parameters	Loreal	Lakme
Product Sampling with Virtual Try on with AI and AR	Diagnostic science with <i>Modiface AI algorithm</i> : Virtual Try on face detection technology on website and mobile without <i>Sign in data</i> for user	Define U : with Lakme multi layer sticks with <i>Perfect Corp</i> technology AI
Artificial Intelligence-powered algorithm	<i>Modiface</i> for skin analysis:Skin type, condition, detects seven aging signs: under-eye wrinkles, lack of firmness, fine lines, lack of radiance, dark spots, deep wrinkles and pores.	Lakme <i>Skin pro</i> backed by AI for skin analysis intelligent AI-based platform built with data from over 30 million faces, analyses skin and provides recommendations of products
Generative AI for predictive analytics	Engaging marketing content & 3D models of products with <i>Nvidias Omniverse</i>	Trend analysis with AI for trending products of the brand with AI.
Trend analysis through ML	<i>Trendspotter</i> : Analyze social media trend signals of 3500 sites and <i>Artefact</i> for current and future global and Indian market trend detection	Marketing strategy with AI on trends focussed on Indian market
Product search recommendation through ML	Noli: Loreal backed startup for AI-Powered Recommendation Engines powered by ML	Comprehensive analytics backed by ML from Indian market trends in social media and search engines
Predictive Product forecasting through ML search data	searches on website , tie up with major e retailers ,Consumer reviews, opinions and comments	AI with predictive analytics for product forecasting, strong tie ups with e retailers
Channel sales and Promotion with AI	geo -location based technology, marketing automation for e-commerce to engage online shoppers during the mega sales	Tie up with e- retailers and omni channel marketing
AI powered Product customization & Personalization	<i>Perso</i> : technology for custom product formulation and dispensing	Product recommendation no product customization yet
Pattern recognition	Personalised rewards: based on website	Generalized rewards and offers, linkage to

for buying behavior	questionnaire, past buying behavior and search data	social media sites for trend and pattern recognition
Chatbot recommendation and engagement	<i>Beauty Genius</i> : Virtual beauty advisors 24/7 for customer engagement and product recommendation	AI powered chatbot from Lakme Salon for customer engagement and product recommendation

Table 5.2: Comparison showing the use of AI and ML technologies of Sugar, Lotus and Forest Essentials

Parameters	SUGAR Cosmetics	Lotus Herbals	Forest Essentials
AI-Powered Personalization	Strong use of AI for personalized recommendations via website & app.	Moderate use of AI for personalized product suggestions.	Limited AI use; focuses more on Ayurveda-based customization.
Virtual Try-On (AI/AR)	Offers AI-powered virtual try-on tools for lipsticks & foundations.	Limited virtual try-on features.	No virtual try-on; emphasizes in-store experience.
Chatbots & Customer Support	AI chatbots for 24/7 customer queries & assistance.	Uses basic AI-driven chat support.	Primarily relies on human customer service with minimal AI integration.
Predictive Analytics	Uses ML for demand forecasting & inventory management.	Uses ML for sales predictions & marketing trends.	Less focus on predictive analytics, relies on traditional forecasting.
AI in Marketing & Advertisements	Strong AI-powered ad targeting, influencer collaborations, & social media campaigns.	Moderate AI integration in digital ads & campaigns.	Limited AI use; relies on heritage branding & storytelling.
ML for Product Development	Uses ML-driven consumer feedback analysis to develop new shades/products.	Uses ML to analyze trends for herbal formulations.	Less ML integration; focuses on Ayurvedic research & traditional methods.
AI in Pricing & Discounts	Uses AI for dynamic pricing & discount optimization.	Limited AI-based pricing strategies.	Pricing remains traditional; premium pricing strategy.
E-commerce & AI Integration	Strong AI-driven e-commerce experience, including voice search & recommendations.	Uses AI for search optimization but not extensively.	Minimal AI integration in e-commerce, focuses on boutique retail experience.
Sustainability & AI Use	AI-powered sustainability tracking in the supply chain.	Uses AI to optimize sustainable sourcing.	Focuses on traditional Ayurvedic methods rather than AI for sustainability.

A survey was conducted on whether L'Oréal Group's customers would recommend using the product based on a scale of -100 to 100. The survey was conducted with women respondents over a 12 month period with 200 respondents. The recommendation is based on whether the product range would add value to themselves and to others and is an indicative metric for trends corroborating the data backed by AI and ML. Amongst global brands in India, L'oreal leads followed by Lakme. The two brands were taken due to the large consumer base for the study. Loreal and Lakme, were found to have very invested heavily in usage of AI and ML in comparison to the other brands as Loreal is a brand with a global presence and is a cosmetic giant in terms of profitability and reach and Lakme in India is a

very established and profitable brand in comparison to the other brands who are key recent entrants into the market with lower levels of profitability

Table 5.3: Trend analysis : Product recommendation of various Loreal products over a period of 12 months from January to December 2024

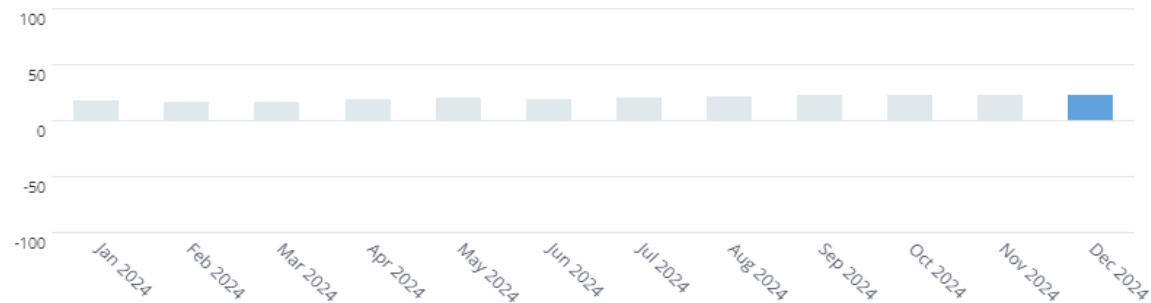


Table 5.4 Trend analysis: Product recommendation of various Lakme products over a period of 12 months from m February 24 to December 2025

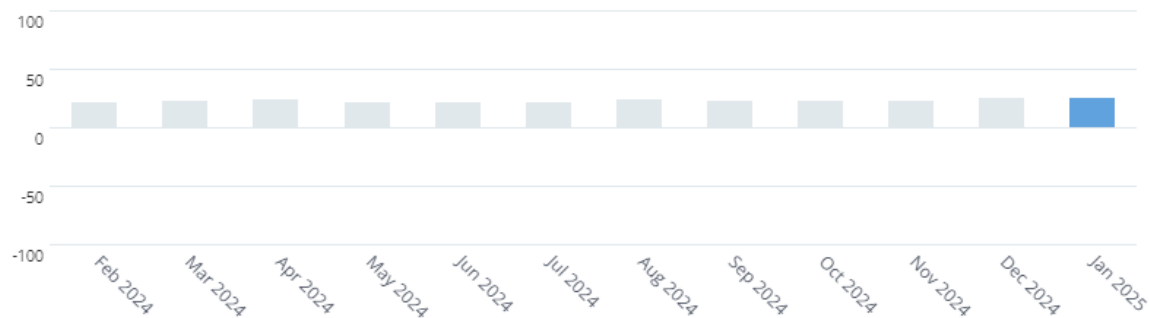
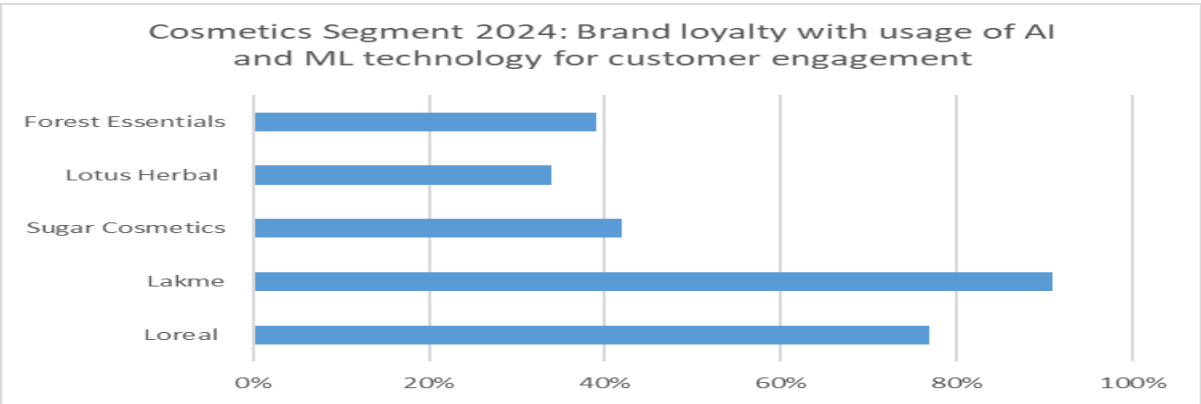
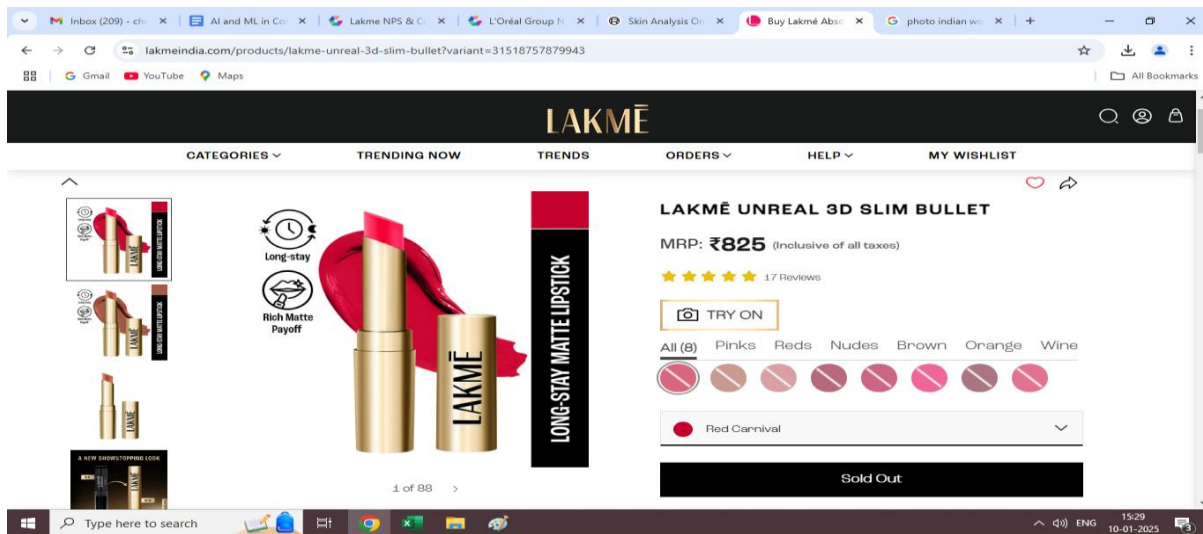


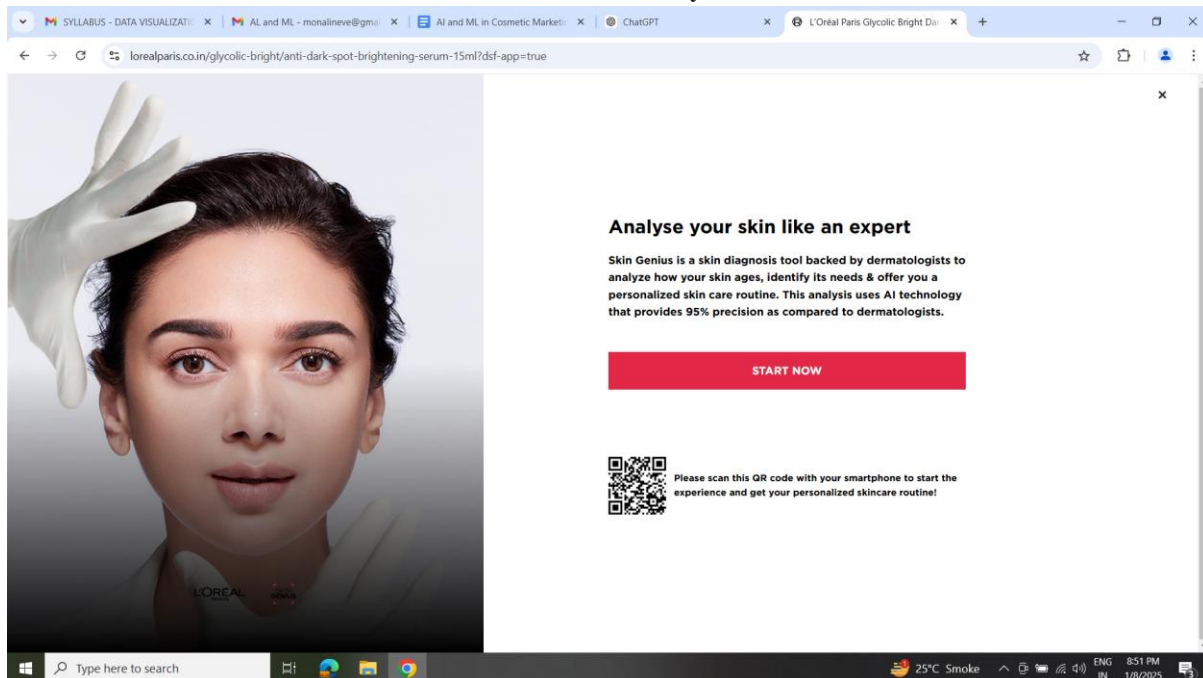
Table 5.5 : Virtual Try-On option under all product categories for the brand Lakme with a user friendly virtual interface



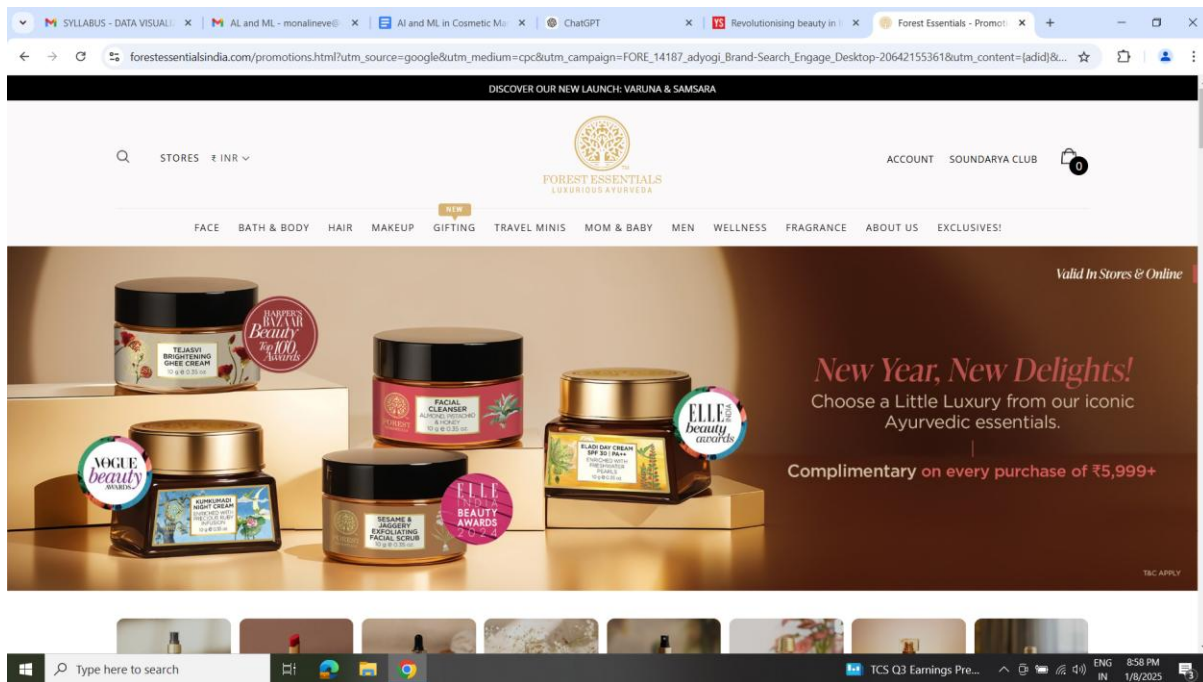
5.6.1 : Lakme uses AI and ML technology to help their consumers to test which products are well suited for them with option under each product



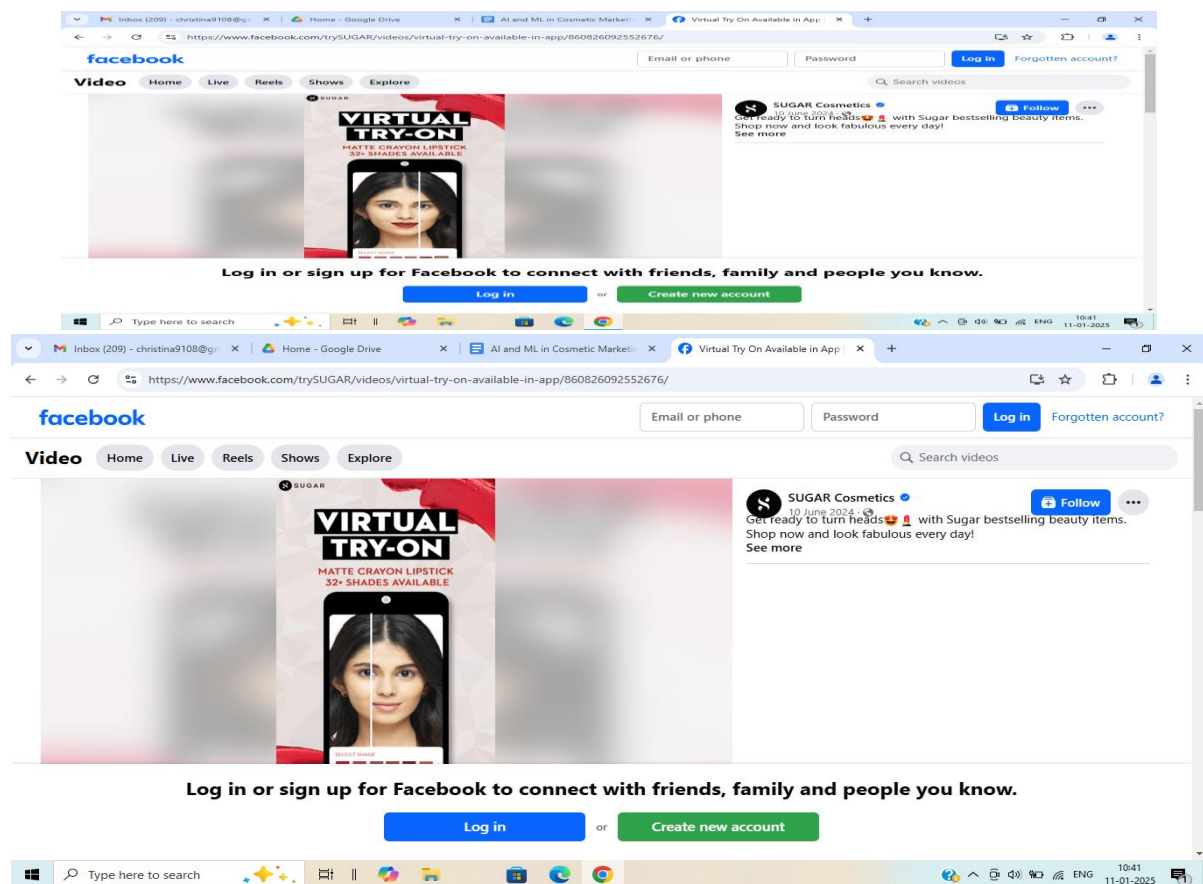
5.6.2 : L'oreal Paris uses AI and ML technology to help their consumers to test which products are well suited for them- Skin analysis with AI



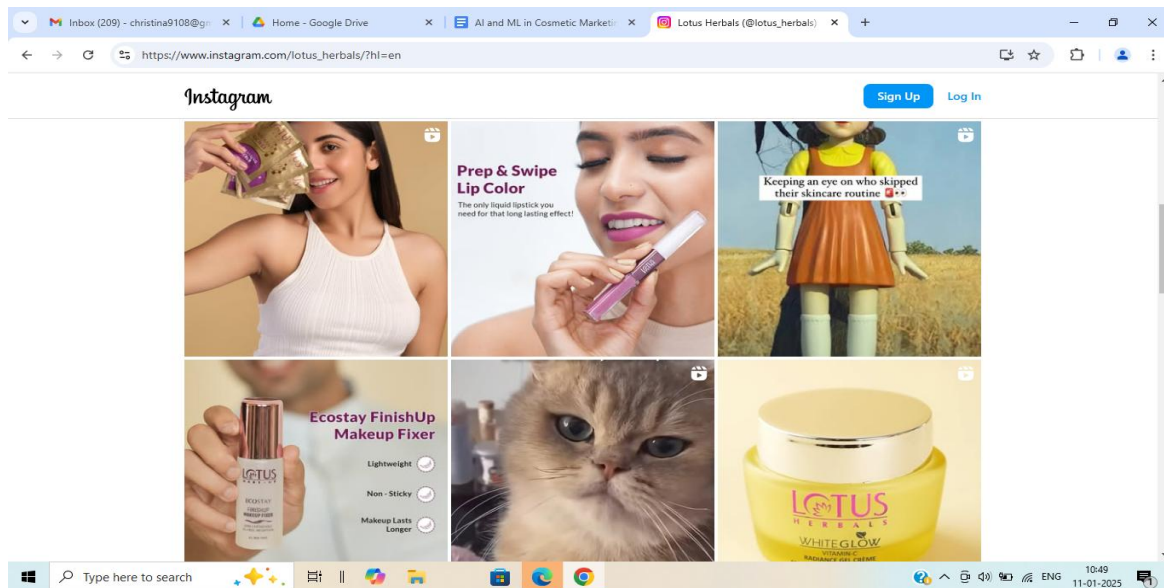
5.6.3 Forest Essentials uses a questionnaire method to suggest the suitable products. The responses are then analysed by the algorithm to give appropriate suggestions.



5.6.4 Sugar cosmetics has interactive presence on social media platforms and virtual try on technology



5.6.5 Lotus Herbals has interactive presence on social media platforms but does not have virtual try on options and lesser AI technology on their website



Based on the TAM model following are the observed points:

1. Perceived Usefulness (PU) of AI & ML in Cosmetic Marketing:

Based on the interviews it has been observed that 73% consumers find AI-driven trails very useful in decision-making. As these technologies like Modiface, Perso and ML algorithms are used to give personalized recommendations, the satisfaction level is increased. This has resulted in reducing the churn rates.

2. Perceived Ease of Use

The AI- powered virtual try-ons and AI based face mapping has significantly helped to make the buying decisions. The virtual try-ons make it easy to choose the products for the consumers. With the help of face coding apps it has been observed that the average time spent on beauty brands websites having AI and ML technologies has been increased by 15% compared to e-commerce platforms.

3. Intention to Use AI-enhanced technologies:

Based on the interview of the consumers, it has been noted that they find it easy and they are intended to use AI- driven technologies for trials and purchasing products. The premium segment is more interested in AI-driven technologies giving recommendations on the usage of the products.

6. Results

The research has focused on major brands in India like L'oreal and Lakme with other brands in the Indian cosmetic marketplace for women like Sugar Cosmetics, Lotus Herbal and Forest Essentials. The paper has assessed the usage of AI and ML by these brands for customer engagement and marketing . Global giant brands like L'oreal with their global presence were found to be heavily focused on integrating AI and ML at all levels with the consumer, probably due to the financial resources for the investment. Lakme, an established profitable brand from India was found to engage with consumers to a greater extent as compared to newer brands like Forest Essentials, Sugar and Lotus Herbal. All brands were found to have significant level of AI and ML engagement, though the technology used was found to differ.

7. Conclusion

AI and ML have transformed cosmetic marketing by offering highly personalized experiences, improving product discovery, and enhancing consumer engagement. As AI technology continues to evolve, its influence in predictive analytics, dynamic pricing, and personalized skincare solutions will grow, shaping the future of the cosmetic industry.

Research shows that AI-powered tools like virtual try-ons, face mapping, and chatbots enhance user experience, refine product recommendations, and boost customer satisfaction. Furthermore, ML-driven analytics help brands anticipate consumer behavior, streamline inventory management, and tailor marketing campaigns.

The study, grounded in the Technology Acceptance Model (TAM), indicates that most consumers find AI-enhanced cosmetic tools beneficial for making informed purchasing choices. Features like virtual try-ons and AI-based suggestions have built consumer trust, lowered churn rates, and increased engagement. Additionally, brands such as L'Oréal, Lakmé, Sugar Cosmetics, Lotus, and Forest Essentials have embraced AI and ML technologies to varying degrees, demonstrating different strategies for product customization, marketing, and consumer interaction.

While AI-driven marketing strategies enhance efficiency and personalization, traditional brands that focus on heritage-based formulations (like Forest Essentials) show limited adoption of these technologies. The results suggest that premium consumers are more inclined to embrace AI-based recommendations, indicating a shift in beauty consumption towards technology-driven solutions.

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