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The Effect of Augmented Reality in Online Beauty Retail on Brand Perception

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Abstract

One notable innovation is the use of Augmented Reality (AR), which allows consumers to virtually try on products, enhancing the online shopping experience. This study aims to examine the impact of AR usage and consumer engagement on the brand perception of Maybelline products on the Shopee e-commerce platform. Employing a quantitative explanatory research method, data were obtained through an online survey of 200 Shopee users in Indonesia who had interacted with AR features when exploring Maybelline products. The research investigates the relationships between AR, consumer engagement, and brand perception in the context of digital beauty marketing. The findings reveal that both AR usage and consumer engagement have a significant positive effect on brand perception. Moreover, consumer engagement is found to partially mediate the relationship between AR and brand perception. These results highlight the strategic importance of immersive technologies and active consumer involvement in building strong brand impressions. The study contributes to the growing body of knowledge on digital marketing in the beauty industry and offers practical insights for brands aiming to leverage AR tools to enhance customer experience and strengthen brand positioning in competitive e-commerce environments.

Keywords: Augmented Reality; Brand Perception; Consumer Engagement; Beauty Retail; Shopee.

INTRODUCTION

The advancement of digital technology has significantly transformed consumer behaviour, particularly within the beauty retail industry. One of the increasingly popular technologies adopted in beauty product marketing is Augmented Reality (AR). This technology allows consumers to virtually try on products. For instance, through virtual try-on features commonly found on e-commerce platforms such as Shopee. Such innovation not only enhances the shopping experience but is also believed to influence consumers' brand perception.

In the context of the beauty industry, brand perception plays a crucial role in consumer decision-making. Brand perception refers to the way consumers view and interpret a brand based on their experiences, beliefs, and feelings. It encompasses various

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dimensions, including the quality, personality, and overall image of the brand as perceived by the consumer (Kaur & Singh, 2022; Su et al., 2023). The use of AR technology can create interactive experiences that enhance consumers' trust in products. Particularly in product categories such as cosmetics, which rely heavily on visual compatibility with regard to colour and texture.

Maybelline, as a leading global cosmetics brand, has adopted AR features on Shopee's e-commerce platform to enable consumers to virtually try various products. The adoption of this technology is part of the brand's effort to strengthen its appeal amid the increasingly competitive digital market landscape. Shopee itself is one of the largest e-commerce platforms in Southeast Asia, including Indonesia, with an active user base in the beauty product category.

Several studies have provided empirical evidence supporting the effectiveness of AR in digital marketing. AR increases customer interaction and satisfaction by creating realistic product experiences that mimic physical shopping. This leads to higher media usefulness and enjoyment, which in turn boosts consumer engagement and purchase intentions (J. Yang & Lin, 2024). Similarly, Daoud et al. (2023) found that AR significantly enhances brand engagement by providing immersive and interactive experiences. This is particularly effective in the retail and entertainment industries, where users can interact with virtual objects in a physical environment, leading to higher engagement levels, especially among younger audience. Divya Udayan et al. (2020) also noted that AR enabling consumers to experience products and spaces in novel ways. This can create a strong imprint in the customer's mind, making it easier to recall the product.

In addition, Jahan et al. (2025) dan Berg et al. (2025) demonstrate AR significantly improves the shopping experience by providing immersive and interactive product evaluations. For instance, in the retail sector, AR enhances customer perceptions of products, increases interaction, and influences purchase decisions and brand loyalty. Brengman et al. (2019) further argued that mobile AR applications lead to higher levels of engagement, particularly among digitally native consumers who are responsive to innovative retail technologies. This heightened sense of ownership can lead to deeper engagement with the application.

However, while AR offers notable advantages, its effectiveness is contingent upon perceived ease of use, realism, and personalization. Studies by Fan et al. (2020) and Hofmann & Mosemghvdlishvili (2014) showed that technological barriers, perceived unnaturalness, or device limitations can significantly undermine the potential impact of AR on consumer attitudes by affecting user comfort, increasing cognitive load and diminishing the perceived quality and value of the AR experience. Therefore, it is essential to assess AR implementation within specific brand and platform contexts.

This study is conceptually grounded in the Stimulus–Organism–Response (S-O-R) framework, which explains how environmental stimuli influence internal psychological states that subsequently shape behavioral or attitudinal responses. Within this framework, AR functions as the technological stimulus, providing immersive and interactive experiences in the online retail environment. Consumer engagement represents the organism component, reflecting the cognitive, emotional, and behavioral states activated by the AR experience. Brand perception, comprising brand awareness,

brand image, and brand trust, constitutes the response, reflecting consumers' evaluative outcomes toward the brand. By explicitly positioning AR as the stimulus, engagement as the psychological organism, and brand perception as the response, the study clarifies the causal logic underlying the proposed mediation model.

This study aims to explore and analyse the influence of AR on consumer brand perception of Maybelline products on Shopee. It further investigates the mediating role of consumer engagement in this relationship. The findings are expected to contribute to the academic literature in the field of digital marketing and retail innovation, while also offering practical insights for beauty brands in designing immersive, technology-driven consumer experiences.

Beyond a brand or platform specific investigation, this study is conceptualised as a contribution to the broader discourse on digital transformation and consumer behaviour within emerging market contexts. The increasing adoption of AR in online beauty retail signifies a broader transition toward technology enabled e-business models, particularly in mobile-centric economies such as Indonesia. By examining the mechanisms through which AR based experiences influence consumer engagement and brand perception. While Maybelline and Shopee constitute the empirical setting of this study, the results yield insights that are generalisable to other beauty brands, digital retail platforms and emerging market environments characterised by platform mediated commerce, visual product evaluation and trust formation. Accordingly, this study offers implications not only at the brand strategy level but also for advancing understanding of how immersive digital technologies shape consumer behaviour across comparable emerging digital retail ecosystems.

LITERATURE REVIEW

Augmented Reality in Digital Marketing

Augmented Reality (AR) has emerged as a transformative tool in digital marketing, offering interactive and personalized experiences that significantly alter how consumers perceive, interact with, and purchase products. AR significantly enhances the retail experience by providing immersive, interactive and informative product visualizations that help consumers make better purchasing decisions (Desai et al., 2021; Dethe & Joy, 2023).

In the context of digital marketing, AR represents a strategic innovation by shifting brand communication from a one-way interaction to a two-way, interactive, and personalized experience (Thandayuthapani & Thirumoorthi, 2025). This transition allows consumers to engage more deeply with brands through vivid and immersive product simulations.

Two critical components determine the effectiveness of AR: vividness (the richness and realism of sensory stimuli) and interactivity (the user's ability to manipulate virtual content). Smink et al. (2019) and Han et al. (2023), emphasize that both elements contribute positively to perceived enjoyment, usefulness, and brand attitude. Ultimately enhancing purchase intention.

In digital retail, especially within the beauty industry, AR significantly increases experiential value, a key driver of online engagement. Features such as virtual try-ons for lipstick, foundation, or eyeshadow allow consumers to experiment visually using their device cameras. This reduces uncertainty, boosts decision confidence, and lowers return rates (Sridevi et al., 2024).

Moreover, AR fosters emotional engagement by creating more personal and memorable brand experiences. Gallardo et al. (2018) argue that emotionally resonant AR interactions enhance brand connection and loyalty. Factors especially crucial in beauty retail, where brand identity and consumer self-concept often intersect.

Research also shows that AR implementation enhances brand innovativeness perception. Pinheiro et al. (2024) found that brands utilizing AR are viewed as modern creative and consumer-centric (Oyman et al., 2022), particularly appealing to younger, tech-savvy audiences (Daoud et al., 2023). This perception is driven by AR's ability to provide innovative, interactive, and consumer-focused experiences that enhance brand engagement and loyalty. This perception also strengthens brand differentiation and market competitiveness.

However, AR's success in marketing is not guaranteed by its novelty alone. Technological quality plays a pivotal role. Discrepancies between virtual and real results, imprecise facial recognition, or interface glitches can disrupt user experience and damage brand perception (Hilken et al., 2020). Thus, effective AR integration must be supported by reliable and intuitive system design.

In e-commerce environments, AR influences multiple stages of the customer journey, from product exploration to post-purchase engagement. Jahan et al. (2025) demonstrated that AR increases time spent on product pages and reduces decision anxiety. Additionally, when users share their AR experiences on social media, it amplifies brand exposure and stimulates word-of-mouth advocacy.

In Southeast Asia, Shopee has become a prominent platform for AR-based marketing, especially in collaboration with brands like Maybelline. Through AR, consumers can try on Maybelline products virtually, improving confidence in product selection and reinforcing purchase intent. This highlights AR's role not just as a marketing gimmick, but as a strategic lever to enhance customer experience, trust, and long-term brand loyalty in competitive digital ecosystems.

Brand Perception

Brand perception refers to the mental representation that consumers form about a brand based on direct experiences, marketing communication, peer influence, emotional responses, and personal expectations (Kotler & Keller, 2016). In digital environments, especially those shaped by technological immersion like AR brand perception becomes a strategic determinant of competitive advantage. A positive brand perception can influence not only initial purchase decisions (Utomo et al., 2025), but also long-term customer loyalty (Agnihotri, 2022), advocacy (Moncey & Baskaran, 2020), and resistance to competitors (Srivastava, 2019).

Brand perception in this study is conceptualized as a higher-order reflective construct comprising three first-order dimensions: brand awareness, brand image, and

brand trust. Each dimension is measured using reflective indicators adapted from prior validated scales. The reflective specification assumes that the observed indicators are manifestations of the underlying latent construct. Therefore, changes in brand perception are expected to be reflected in corresponding variations in awareness, image, and trust. This operationalization aligns with prior branding research that conceptualizes brand perception as a multidimensional but unified evaluative construct.

In the context of AR-based digital marketing, brand perception is best understood through three interrelated dimensions: brand awareness, brand image, and brand trust. These dimensions collectively form the foundation of consumer–brand relationships and are sensitive to both experiential and technological cues.

Brand Awareness

Brand awareness refers to the extent to which consumers can identify or recall a brand within a particular product category and associate it with specific attributes or needs (Keller, 2013). In AR-enabled marketing platforms, brand awareness is no longer limited to passive visual exposure, it evolves into an active, immersive experience shaped by real-time interaction and personalization.

Lin & Huang (2024) asserts that AR increases brand salience by facilitating active user engagement rather than mere observation, thereby forming stronger cognitive associations with the brand. Similarly, (Daoud et al., 2023) emphasize that AR fosters immersive learning, which enables consumers to better encode and retain brand-related information through multi-sensory interaction. This makes the brand more recognizable during the decision-making process and contributes to top-of-mind awareness in competitive online markets.

Furthermore, Hilken et al. (2017) emphasize that AR enhances memory encoding by combining visual, spatial, and emotional stimuli, making it more likely that the brand will be remembered during the purchase decision process. This is particularly relevant for beauty brands, where visual differentiation plays a crucial role in brand recall among similar product offerings.

Brand Image

Brand image is a multifaceted concept that encompasses various associations consumers hold about a brand, including symbolic meanings, quality perceptions, and emotional impressions (Li et al., 2010; Rossolatos, 2018). AR enables brands to create highly curated and engaging experiences that visually and emotionally convey desired brand values such as innovation, personalization, and sophistication.

(Mishra et al., 2021) highlights that AR experiences not only serve utilitarian purposes but also evoke hedonic responses, which strengthen the perception of the brand as modern and customer-centric. In beauty retail, for example, virtual try-on features can reinforce a brand image associated with convenience, quality, and trendiness.

Research also shows that brand image is significantly influenced by the fit between AR content and the brand's identity. If the AR experience aligns well with the brand’s positioning, it enhances perceived authenticity and congruence, which contributes to a stronger and more favourable image (Alimamy & Al-Imamy, 2022).

Brand Trust

Brand trust is defined as the consumer's belief that a brand will reliably deliver on its promises and act in the consumer's best interest (Fong et al., 2024). In AR-enabled digital environments, trust is largely shaped by the perceived realism and accuracy of virtual simulations.

When AR try-on features accurately represent how a cosmetic product will look in real life, it builds confidence in both the product and the brand. Yim et al. (2017) argue that technological credibility, including seamless interaction, precise rendering (Lee & Ching, 2025) and consistency with actual outcomes is a major driver of trust in technology-mediated retail experiences (Sridevi et al., 2024).

Additionally, emotional satisfaction with the AR experience can indirectly boost brand trust. Consumers who feel in control and emotionally connected to the virtual experience are more likely to transfer that positive sentiment to the brand itself (Handique & Sarkar, 2024; Mostafa & Kasamani, 2021).

Moreover, trust acts as a buffer against potential post-purchase dissonance, especially in high-involvement categories like cosmetics. If AR features deliver realistic previews, consumers are more likely to be satisfied with their purchase and reinforcing their trust in the brand (Lin & Huang, 2024).

Consumer Engagement as a Mediator

Consumer engagement is a multifaceted concept that encompasses the interactions between consumers and organizations, including brands, through various channels. It is characterized by cognitive, emotional and behavioral investments made by consumers in their interactions with brands (Kuroda & Oyabu, 2024; Park & Ha, 2021).

In the digital age, engagement extends beyond mere clicks or views and involves consumers' active involvement, contribution, and co-creation in brand-related activities. This richer form of engagement is vital in digital marketing, where interactivity and personalization determine consumer receptiveness and loyalty.

AR is recognized as a powerful enabler of such engagement, primarily due to its capacity to provide immersive, interactive, and sensory-rich brand experiences. AR enhances user enjoyment (Wang et al., 2025; Wu et al., 2023) and perceived control (Kowalczuk et al., 2021; Pandey & Pandey, 2024), two critical antecedents of psychological engagement. By allowing users to manipulate and personalize products virtually, such as trying on makeup through facial recognition technology, AR fosters a stronger sense of agency and involvement.

In beauty retail, consumer engagement manifests through both exploratory and experiential behaviours. Virtual try-on features allow users to engage playfully with products, simulate various appearances, and share outcomes through social media. This not only deepens the consumer–brand relationship but also drives viral engagement and peer influence, amplifying brand visibility and resonance (Jahan et al., 2025; McLean & Wilson, 2019).

The mediating role of engagement is especially significant in understanding the indirect influence of AR on brand perception. Rather than functioning as a direct persuasive tool, AR enhances brand perception by cultivating rich consumer experiences

that translate into higher brand awareness, a favourable image, and increased trust (Khan & Fatma, 2024; Kurniawan & Mamonto, 2024; Rinaldi et al., 2024). Engagement thus serves as the psychological bridge between AR stimuli and consumer attitudes and behaviours.

Moreover, engaged consumers are more likely to exhibit loyalty intentions, such as repeat purchases, positive word-of-mouth, and advocacy behaviour (Mohanty & Dey, 2020; Nauen & Enke, 2022). These outcomes are not only driven by product satisfaction but also by the emotional and cognitive connections formed during the AR experience. In this way, consumer engagement becomes a valuable intangible asset in building sustainable brand equity.

It is also important to acknowledge that the quality of AR design plays a crucial role in shaping engagement. Technical glitches, poor simulation accuracy, or intrusive interfaces may hinder engagement and dilute the perceived value of the brand interaction (Hilken et al., 2020). Therefore, for engagement to serve as an effective mediator, AR implementations must align with users' expectations of intuitiveness, realism, and value relevance.

In conclusion, AR does not merely provide a novel experience, it fosters an engagement process that strengthens the emotional and cognitive ties between the consumer and the brand. This engagement, in turn, mediates the influence of AR on how consumers perceive the brand, reinforcing the strategic importance of consumer-cantered technological design in digital marketing.

Related Studies

Research on the use of AR in marketing has grown substantially over the past decade, particularly in evaluating its impact on consumer behaviour and perception. AR positively influences brand attitude by providing novel and interactive experiences (Mitrović et al., 2024). For instance, AR advertisements have been shown to improve consumer’s attitudes towards the ad and the brand, mediated by increased curiosity and visual attention. Additionally, AR’S novelty and interactivity contribute to state of flow, which enhances brand experience and equity (S. Yang et al., 2018).

Another study by Marín-Lora et al. (2022) highlighted the importance of visual augmentation quality and user control over personal data in shaping a positive AR experience. The study found that AR is only effective when simulations are accurate and personalization is possible without compromising privacy. These findings suggest that technical reliability and privacy perception significantly influence consumer trust and satisfaction in AR usage.

Han et al. (2023) and Smink et al. (2019) investigated the effectiveness of AR technology in the e-commerce context and concluded that vividness (richness of sensory information) and interactivity (degree of user control over the digital experience) are the two primary dimensions determining the quality of the user experience. When optimized, these dimensions enable AR to create a more enjoyable, memorable, and purchase-motivating online shopping experience.

Ahmad and Ashfi (2024) examined the transformational impact of AR on marketing strategies, highlighting its role in enhancing customer engagement and brand

experience. Their study emphasized how AR integrates virtual elements into the real world to create immersive and interactive experiences that elevate brand communication. Drawing from case studies and current trends, they demonstrated how AR-based campaigns significantly improve brand awareness, stimulate consumer interaction, and foster brand loyalty. Moreover, they discussed the cognitive and emotional dimensions of engagement as key mediators in shaping brand perception. Their findings support the idea that AR not only increases marketing effectiveness through experiential design but also requires attention to ethical and technical considerations, making it a strategic tool for sustainable digital branding.

Zanger et al. (2022) investigated how consumers' affective responses to AR experiences influence their brand attitudes and behavioural intentions. Their study provides empirical evidence that emotional engagement—not just cognitive evaluation—plays a central role in driving positive consumer reactions to AR. By focusing on how affective intensity and arousal during AR experiences impact attitudes and purchase intentions, the study bridges the gap between experiential marketing and emotional psychology. Zanger et al. (2022) emphasize that marketers must design AR campaigns that evoke strong emotional resonance to improve brand liking and future purchase behavior. This aligns with the present study's emphasis on consumer engagement as a mediating factor between AR technology and brand perception. Their findings further reinforce the importance of emotional design in digital AR experiences, particularly in beauty and fashion retail, where sensory immersion is key.

Thakkar, Joshi, and Kachhela (2023) conducted a comprehensive study to explore how AR impacts consumer engagement, brand experiences, and purchase decisions. Their research emphasized that AR enhances marketing effectiveness through immersive and interactive elements that drive cognitive and emotional involvement. The study adopted multiple theoretical frameworks including the Technology Acceptance Model (TAM), Experiential Marketing Model, and Flow Theory to analyse consumer responses to AR campaigns. Key findings indicate that factors such as personalization, novelty, social sharing, and emotional engagement significantly shape consumer interaction with AR content. Moreover, the study highlighted challenges such as privacy concerns and technical limitations, while also pointing out strategic opportunities in AR-driven branding and differentiation.

Kang et al. (2023) explored the impact of AR shopping experiences on consumers' continuance intention and purchase behaviour, focusing on technological characteristics and hedonic motivation. Their study employed an integrated model combining TAM, Stimulus-Organism-Response (S-O-R), and Hedonic Motivation System Adoption Model (HMSAM). Findings indicate that interactivity, vividness, and informativeness in AR positively influence consumer engagement and enjoyment, which in turn enhance satisfaction and continued usage intention. The study also revealed that hedonic motivation acts as a crucial psychological driver of loyalty and brand preference. These insights strengthen the conceptual link between AR-induced engagement and consumer behaviour, particularly in beauty and fashion contexts.

Abrar (2022) investigated the impact of AR on consumer purchase intention, with customer engagement acting as a mediating variable. Using a quantitative method and

data collected from 320 respondents, the study demonstrated that AR positively influences consumers' intention to purchase. Furthermore, customer engagement—defined through emotional, cognitive, and behavioural dimensions—was shown to partially mediate the relationship between AR features and purchase intention.

Diaa (2022) explored how AR influences customer brand engagement (CBE), with a focus on the mediating role of key technology attributes—interactivity, informativeness, and vividness. Using survey data from 235 mobile shopping app users in Egypt, the study employed structural equation modelling and found that AR significantly enhances CBE, particularly when these attributes are well-designed.

Hu and Lee (2025) examined the impact of AR on brand usage intention through the lens of telepresence theory. Their study revealed that AR enhances users' sense of telepresence—defined as the perception of being physically present in a virtual environment—which in turn elevates emotional and cognitive engagement with the brand. Their findings underscore the strategic value of immersive AR design in fostering brand connection and encouraging future usage.

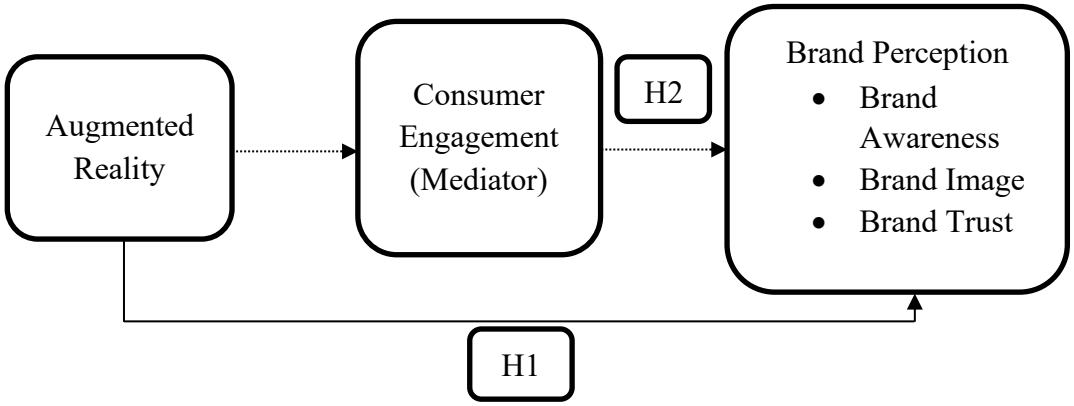
Although these studies provide a strong theoretical and empirical foundation for AR in marketing, there remains a literature gap concerning the specific application of AR on Southeast Asian e-commerce platforms such as Shopee, particularly for global cosmetic brands like Maybelline. Cultural context, online shopping behaviours, and consumer perceptions in markets like Indonesia have not been thoroughly explored. Therefore, this study addresses that gap by specifically examining how AR usage on Shopee affects Maybelline's brand perception, positioning consumer engagement as a mediating variable that bridges the technological experience and consumers' brand responses in the Indonesian context.

Hypothesis:

H1 : The use of Augmented Reality (AR) in marketing Maybelline products on Shopee has a positive effect on consumers' brand perception.

H2 : Consumer engagement mediates the relationship between the use of Augmented Reality (AR) and consumers' brand perception of Maybelline products.

Figure 1. Conceptual Framework



METHODOLOGY

Research Approach and Design

This study adopts a quantitative approach with an explanatory research design to investigate the relationships among AR usage, consumer engagement, and brand perception (comprising brand awareness, brand image, and brand trust). The explanatory design aims to examine theoretically grounded associations among variables within the proposed mediation framework (Creswell, 2018; Sekaran & Bougie, 2016).

To test the hypothesized mediation effect, the study employs regression-based analysis complemented by a bootstrapping procedure using PROCESS Macro (Model 4) in SPSS (Hayes, 2013). Bootstrapping with 5,000 resamples was conducted to estimate the indirect effect and its 95% confidence interval. This approach is widely recommended for mediation analysis because it does not assume normality of the indirect effect distribution and provides more robust statistical inference compared to traditional causal-step methods.

Population and Sampling Technique

The population in this study consists of Shopee users in Indonesia who have used the AR feature for Maybelline products. The sampling technique applied is incidental sampling, a non-probability method in which respondents are selected based on their availability and alignment with inclusion criteria. A total of 200 respondents were collected, meeting the sample size recommendation by Hair et al. (2019) for regression analysis involving more than five variables.

The use of incidental sampling was considered appropriate given the study's focus on users who had prior experience with AR features in the Shopee platform. As AR-based virtual try-on users constitute a specific and experience-dependent subgroup of online consumers, probability sampling was not practically feasible. Nevertheless, it is acknowledged that incidental sampling may limit representativeness and generalizability. The sample may over-represent digitally active and younger consumers, potentially inflating engagement-related responses. Therefore, the findings should be interpreted primarily within the context of active e-commerce users rather than generalized to the entire population of Indonesian consumers. Future studies may employ stratified or probability-based sampling approaches to enhance external validity.

RESULTS

Descriptive Statistics of Respondents

This research involved 200 respondents who have experienced using AR features while shopping for Maybelline products on the Shopee platform. As presented in Table 1, the majority of respondents were female, comprising 80.5% (n = 161), while male respondents accounted for 19.5% (n = 39). This distribution reflects the general demographic profile of beauty product consumers, where women tend to dominate in product trial and engagement, particularly with digital shopping technologies.

In terms of age, the majority of respondents were in the 18–24 age group (61.5%), followed by 25–30 years (22%), below 18 years (13.5%), and 31–40 years (3%). This suggests that young adults, especially those aged between 18 and 30, represent the primary demographic segment engaging with AR features in e-commerce platforms for beauty-related purchases.

Regarding educational background, most respondents were high school graduates (59%), followed by those holding a bachelor's degree (31%), diploma (6%), and postgraduate degrees (4%). This suggests that the AR feature is accessible and utilized by consumers across various educational levels, although it remains most prevalent among users with secondary and undergraduate education.

Occupationally, 40.5% of respondents were university students, 26.5% were private sector employees, and 11% reported other forms of occupation. Additionally, 9% were high school students, 7.5% were unemployed, 4.5% were entrepreneurs, and 1% were government employees. The dominance of students and young professionals suggests a digital-native population with a high degree of familiarity and willingness to explore innovative online shopping technologies such as AR.

Lastly, shopping frequency for Maybelline products on Shopee revealed that 74% of respondents shopped "often," 21% "very often," and only 5% "rarely." These results demonstrate that the majority of respondents are active purchasers of Maybelline on the platform, suggesting a high likelihood of exposure to the brand's AR features within the Shopee e-commerce environment.

Table 1. Respondent Demographic Characteristics (n = 200)

Variable	Category	Frequency	Percentage (%)
Gender	Female	161	80.5
	Male	39	19.5
Age	< 18 years	27	13.5
	18–24 years	123	61.5
	25–30 years	44	22
	31–40 years	6	3
Education Level	High School	118	59
	Diploma	12	6
	Bachelor's Degree	62	31
	Graduate Degree	8	4
Occupation	University Student	81	40.5
	Private Sector Employee	53	26.5
	Entrepreneur	9	4.5
	Government Employee	2	1
	High School Student	18	9
	Unemployed	15	7.5
	Other	22	11
Usage Frequency	Often	148	74
	Very Often	42	21

	Rarely	10	5

Source: Analysed with SPSS ver. 26 (2025)

Validity Test

Validity testing was conducted to assess whether the questionnaire items were able to accurately measure the intended constructs. Instrument validity was evaluated using the Pearson Product Moment correlation method at a 5% significance level. With a total of 200 respondents, the critical r-value was set at 0.113. As presented in Table 2, the correlation coefficients for all measurement items exceeded this threshold, indicating satisfactory item validity across all research variables. Specifically, the AR construct, measured using four items, exhibited correlation values ranging from 0.756 to 0.796. Brand Perception, operationalised through three dimensions—brand awareness, brand image, and brand trust—also demonstrated strong item validity, with correlation values ranging from 0.773 to 0.805 for brand awareness, 0.795 to 0.904 for brand image, and 0.823 to 0.853 for brand trust. In addition, the Consumer Engagement construct, measured using three items, showed correlation coefficients exceeding 0.78. The consistently high correlation values indicate strong associations between each item and its respective construct, thereby confirming the construct validity of the measurement instruments. Consequently, all questionnaire items were retained for subsequent analysis.

Table 2. Validity Test Results

Research Variable	Question	r-Count Value	r-Table Value	Description
Augmented Reality (X)	X1	0.776	0.113	Valid
	X2	0.796	0.113	Valid
	X3	0.756	0.113	Valid
	X4	0.768	0.113	Valid
Brand Perception : Brand Awareness (Y1)	Y1.1	0.805	0.113	Valid
	Y2.2	0.802	0.113	Valid
	Y2.3	0.773	0.113	Valid
Brand Perception : Brand Image (Y2)	Y2.1	0.795	0.113	Valid
	Y2.2	0.904	0.113	Valid
	Y2.3	0.895	0.113	Valid
Brand Perception : Brand Trust (Y3)	X3.1	0.853	0.113	Valid
	X3.2	0.847	0.113	Valid
	X3.3	0.823	0.113	Valid
Consumer Engagement (Mediator)	M1	0.785	0.113	Valid
	M2	0.832	0.113	Valid
	M3	0.87	0.113	Valid

Source: Analysed with SPSS ver. 26 (2025)

Reliability Test

Reliability testing was conducted using Cronbach's alpha to evaluate the internal consistency of the measurement instruments. A Cronbach's alpha value exceeding 0.70

is generally considered acceptable, indicating satisfactory reliability of the constructs (Hair et al., 2010). As reported in Table 3, all constructs in this study demonstrated adequate reliability. The AR construct yielded a Cronbach's alpha of 0.775, Brand Perception exhibited a value of 0.895, and Consumer Engagement recorded a value of 0.772. These results indicate that the measurement items for each construct are internally consistent and suitable for subsequent statistical analysis. Although Consumer Engagement functions as a mediating variable rather than a dependent variable in the model, its reliability level meets the required threshold, confirming its appropriateness for examining the mediating mechanism between AR and Brand Perception.

Table 3. Reliability Test Result

Variable	Cronbach Alpha	Description
Augmented Reality (X)	0.775	Reliabel
Brand Perception (Y)	0.895	Reliabel
Consumer Engagement (M)	0.772	Reliabel

Source: Analysed with SPSS ver. 26 (2025)

Classical Assumption Test

Classical assumption tests were conducted to ensure the suitability of ordinary least squares regression analysis, which requires normality, absence of multicollinearity, and homoscedasticity.

Normality Test

The normality of the regression residuals was assessed using the One-Sample Kolmogorov–Smirnov test, the results of which are reported in Table 4. As shown in the table, the Asymp. Sig. (2-tailed) value is 0.200, which exceeds the commonly accepted threshold of 0.05. The result confirm that the residuals are normally distributed. Accordingly, the normality assumption required for parametric statistical procedures has been satisfied, supporting the appropriateness of applying regression-based hypothesis testing in this study.

Table 4. Normality Test Result One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		200
Normal Parameters[a, b]	Mean	0
	Std. Deviation	.22354372
Most Extreme Differences	Absolute	.052
	Positive	.052
	Negative	-.048
Test Statistic		.052
Asymp. Sig. (2-tailed)		.200[c, d]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

Source: Analysed with SPSS ver. 26 (2025)

Multicollinearity Test

Multicollinearity among the independent variables was assessed using tolerance and Variance Inflation Factor (VIF) values. As presented in Table 5, both AR and Consumer Engagement recorded tolerance values of 0.374 and VIF values of 2.671. These values fall within the acceptable range, as tolerance values above 0.10 and VIF values below 10 indicate the absence of multicollinearity. The results therefore suggest that the independent variables do not exhibit excessive intercorrelation and can be included simultaneously in the regression model without compromising the stability or interpretability of the estimated coefficients.

Table 5. Multicollinearity Test Result

Model		Collinearity Statistics	
		Tolerance	VIF
1	Augmented Reality	.374	2.671
	Consumer Engagement	.374	2.671

a. Dependent Variable: Brand Perception

Source: Analysed with SPSS ver. 26 (2025)

Heteroscedasticity Test

The presence of heteroscedasticity was evaluated using the Glejser test. As shown in Table 6, the significance values for Brand Perception and Consumer Engagement were 0.936 and 0.564, respectively, both of which exceed the 0.05 threshold. These results indicate that the variance of the residuals is constant across observations, suggesting the absence of heteroscedasticity in the regression model. Consequently, the homoscedasticity assumption has been met, further supporting the reliability of the estimated regression results.

Table 6. Heteroscedasticity Test Result

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.472	.304		1.554	.122
	Brand Perception	.001	.014	.010	.080	.936
	Consumer Engagement	.023	.039	.070	.578	.564

a. Dependent Variable: Abs_RES

Source: Analysed with SPSS ver. 26 (2025)

Multiple Linear Regression Analysis

Multiple linear regression analysis was conducted to examine the effects of ARand Consumer Engagement on Brand Perception. The estimated regression model is expressed as follows:

$$Y = 0.320 + 0.658x_1 + 0.259x_2$$

The results indicate that AR has a significant positive effect on Brand Perception (β = 0.658, t = 14.379, p < 0.001). Consumer Engagement also exhibits a significant positive effect (β = 0.259, t = 5.813, p < 0.001). These findings suggest that both AR usage and Consumer Engagement contribute positively to variations in Brand Perception.

Hypothesis Testing

H1: The Effect of Augmented Reality on Brand Perception

The first hypothesis (H1) posits that the use of AR in marketing Maybelline products on Shopee positively influences consumers' brand perception. A multiple linear regression analysis was conducted with Brand Perception as the dependent variable and AR as the independent variable. The results indicate a significance value (Sig.) of 0.000 < 0.05 and a positive regression coefficient of 0.658, confirming a significant positive effect. Therefore, H1 is supported.

H2: The Mediating Role of Consumer Engagement

The second hypothesis (H2) proposes that Consumer Engagement mediates the relationship between AR usage and Brand Perception. To test the indirect effect, a bootstrapping procedure was conducted using PROCESS Macro (Model 4) with 5,000 resamples. The results, presented in Table 7, indicate that the indirect effect of AR on Brand Perception through Consumer Engagement is statistically significant (effect = 0.4735, BootSE = 0.0977), with a 95% confidence interval that does not include zero.

Since the confidence interval excludes zero, the indirect effect is considered statistically significant. In addition, the direct effect of AR on Brand Perception remains significant after including the mediator, indicating partial mediation. Thus, H2 is supported.

Table 7. Bootstrapping Results of Indirect Effect

	Effect	**BootSE**	**BootLLCI**	**BootULCI**
CE	,4735	,0977	,2901	,6762

Source: PROCESS Macro (Model 4), SPSS 26, 5,000 bootstrap resamples.

t-Test

The t-test was conducted to examine the partial effects of each independent variable on Brand Perception. As reported in the coefficients table 8, AR exhibits a t-value of 14.379 with a significance level of p < 0.001, indicating a statistically significant partial effect on Brand Perception. The corresponding regression coefficient (β=0.658) suggests that an increase in AR usage is associated with an increase in Brand Perception, holding other

variables constant. Consumer Engagement also demonstrates a significant partial effect on Brand Perception, with a t-value of 5.813 and a significance level of $p < 0.001$. The regression coefficient for Consumer Engagement (β=0.259) confirm that higher levels of engagement are associated with higher Brand Perception. Taken together, these results show that both independent variables contribute significantly to explaining variations in Brand Perception, thereby providing empirical support for the proposed hypotheses.

Table 8. t-Test Result

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.320	.119		2.688	.008
	Augmented Reality	.658	.046	.680	14.379	0.000
	Consumer Engagement	.259	.045	.275	5.813	0.000

a. Dependent Variable: Brand Perception

Source: Analysed with SPSS ver. 26 (2025)

F-Test

The results of the F-test are presented in Table 9, which reports the simultaneous effect of AR and Consumer Engagement on Brand Perception. As shown in the table 9, the regression model yields an F-value of 497.940 with a significance level of $p < 0.001$, indicating that the model is statistically significant. This result demonstrates that the independent variables, when considered jointly, explain a significant proportion of the variation in Brand Perception. Accordingly, the regression model is considered appropriate for examining the combined influence of AR usage and consumer engagement on consumers' brand perception.

Table 9. F-Test Result

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	50.271	2	25.136	497.940	.000[b]
	Residual	9.944	197	.050		
	Total	60.215	199			

a. Dependent Variable: Brand Perception

b. Predictors: (Constant), Consumer Engagement, Augmented Reality

Source: Analysed with SPSS ver. 26 (2025)

Coefficient of Determination Test (R^2)

The explanatory power of the regression model is reported in Table 10, which presents the coefficient of determination. The results indicate an adjusted R^2 value of 0.833, suggesting that approximately 83.3% of the variance in Brand Perception is explained by AR and Consumer Engagement. The remaining 16.7% of the variance may be attributed to other factors not included in the model. This finding highlights the substantial contribution of AR as a digital experience enhancer and Consumer Engagement as a

mediating behavioural construct in shaping consumers' brand perception within the e-commerce context.

The adjusted R^2 value of 0.833 reveal substantial explanatory power of the model. From a practical perspective, this suggests that AR experience and consumer engagement jointly account for a large proportion of variance in brand perception within the studied context. Such a strong explanatory value may reflect the high salience of immersive digital features in visually driven product categories such as cosmetics, where experiential evaluation plays a central role in shaping consumer judgments.

Given that all variables were collected using self-reported measures, the potential presence of common method variance (CMV) is acknowledged. However, several procedural remedies were implemented, including assuring respondent anonymity and separating measurement sections within the questionnaire. Moreover, the high R^2 value should not be interpreted solely as evidence of methodological inflation, as the theoretical proximity between AR experience, engagement, and brand perception within the S-O-R framework provides substantive justification for strong associations. Nevertheless, future research may incorporate multi-source data or temporal separation to further mitigate CMV concerns.

The overall regression model is statistically significant, as shown in Table 9 ($F = 497.940$, $p < 0.001$). The adjusted R^2 value reported in Table 10 is 0.833, indicating that approximately 83.3% of the variance in Brand Perception is explained by AR and Consumer Engagement.

Table 10. Coefficient of Determination Test Result

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.914[a]	.835	.833	.22468

a. Predictors: (Constant), Consumer Engagement, Augmented Reality

Source: Analysed with SPSS ver. 26 (2025)

DISCUSSION

This study contributes to the stimulus–organism–response (S–O–R) and experiential marketing literature by empirically validating consumer engagement as the psychological "organism" linking AR stimuli to brand-related responses. By situating the analysis within an emerging market context, the findings extend prior research on digital transformation and e-business adoption under conditions characterised by platform-mediated retailing and trust asymmetry.

The adjusted R^2 value of 0.833 demonstrates substantial explanatory power of the proposed model. This suggests that AR experience and consumer engagement jointly account for a considerable proportion of variance in brand perception in online beauty retail. The strength of this relationship may be attributed to the inherently visual and experiential nature of cosmetic products, where immersive evaluation mechanisms play a central role in shaping consumer judgments.

Given that the data were collected using self-reported measures, the potential presence of common method variance (CMV) is acknowledged. Procedural remedies, including respondent anonymity and separation of measurement sections, were implemented to reduce this risk. Moreover, the strong explanatory power observed in the model is theoretically grounded in the proximity of AR experience, engagement, and brand perception within the S–O–R framework. Nonetheless, future research employing multi-source or longitudinal data designs may further enhance methodological robustness.

The applicability of these findings is subject to several boundary conditions. First, the study is embedded within a platform-dependent ecosystem, where Shopee's interface design and algorithmic structure may intensify engagement dynamics. Second, the cosmetics category may amplify AR effects due to its visual and experiential characteristics. Third, the observed relationships may be stronger among digitally literate users who are more comfortable interacting with immersive technologies. These contextual considerations suggest that AR effectiveness may vary across platforms, product categories, and consumer segments.

From a managerial perspective, the findings indicate that AR implementation should move beyond visual novelty and focus on fostering meaningful engagement. Beauty brands operating in digital marketplaces should prioritise interactivity, realism, and usability to enhance brand perception. For platform providers, AR represents a strategic tool for strengthening trust and consumer involvement in environments where physical product evaluation is limited.

At the policy level, the growing reliance on immersive digital technologies highlights the importance of regulatory frameworks addressing data privacy, transparency, and consumer protection in AR-enabled commerce. Establishing clear guidelines may help sustain consumer trust and encourage responsible digital innovation.

CONCLUSION

This study demonstrates that augmented reality (AR) significantly enhances brand perception in online beauty retail, both directly and indirectly through consumer engagement. The findings confirm that engagement functions as a key psychological mechanism linking immersive digital experiences to brand-related evaluations.

By conceptualising AR as a stimulus within the S–O–R framework and empirically validating engagement as the mediating process in an emerging market context, this research advances understanding of how technology-enabled retail environments shape consumer perception. Although the empirical setting focuses on cosmetics within a platform-based ecosystem, the proposed framework offers broader relevance for digitally mediated consumption contexts where visual evaluation and engagement are central to decision-making.

Suggestions

Despite its contributions, this study has several limitations that open avenues for future research. First, the model focuses primarily on AR usage and consumer engagement,

while other relevant variables—such as trust in technology, perceived ease of use, privacy concerns, and perceived product–technology fit—were not incorporated into the analysis. Including these constructs may provide a more comprehensive understanding of brand perception formation in immersive digital environments.

Second, demographic and individual difference factors, such as age, digital literacy, and usage intensity of cosmetic products, may moderate the observed relationships. Future studies could explore these moderating effects to better understand heterogeneity among consumer segments.

Third, the empirical context is limited to a single beauty brand operating within one e-commerce platform. Comparative studies across different brands, platforms, or product categories would enhance the generalizability of the findings and allow for deeper examination of contextual differences in AR effectiveness. Longitudinal or experimental designs may also strengthen causal inference and provide richer insights into consumer behavioral dynamics over time.

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