

PREDICTING INDONESIAN CONSUMERS ACCEPTANCE AND USAGE TOWARD AR/VR IN LIVE COMMERCE OF BEAUTY PRODUCTS

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Keywords

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ABSTRACT

This research aims to address the challenges associated with the application of augmented reality (AR) and virtual reality (VR) in live commerce for cosmetic products, focusing on the perception of consumers in Indonesia who are still very early or still in the awareness stage of the acceptance and/or application of AR/VR technology in online shopping. The study employs a positivist scientific method to systematically investigate the external variables influencing the adoption of AR and VR technologies in the live commerce beauty industry, identifying five significant determinants: Content Relevance, Performance Expectancy, Hedonic Motivation, Personal Innovativeness, Social Media Influence, and Trust. Effort Expectancy and Trust did not significantly affect Behavioral Intention, while Consumer Readiness (CR) positively affected Behavior Intention (BI), indicating that informed consumers are more likely to adopt AR/VR technologies when exposed to social media influence. The findings suggest several strategies for businesses to enhance consumer adoption, with the goal of converting viewers into buyers. Additionally, developing frameworks to measure the return on investment (ROI) of AR integration in e-commerce could provide valuable insights for businesses, justifying investments and refining strategies for sustainable profitability.

INTRODUCTION

The beauty industry is experiencing a surge in live streaming promotions, particularly among younger consumers who are increasingly comfortable with online shopping. In the US, 40% of consumers report feeling more at ease with online shopping since 2020, leading to live streaming becoming a popular advertising tool for beauty firms (Jareen, 2021). Live broadcasting offers a more immersive shopping experience, allowing customers to interact with products dynamically and personally, which can increase sales and customer engagement. The interactive nature of live streaming helps build emotional connections with brands, enhancing consumer satisfaction and loyalty (Arisman & Imam, 2022). Beauty brands can leverage this by providing live product demonstrations, offering consumers a clearer understanding of their products' qualities and benefits (Xin, 2020).

Indonesia's eCommerce market, accompanied by a rising trend in live streaming within the beauty industry, is projected to experience significant growth, with revenue reaching US\$120 billion by 2025, US\$147 billion in 2026, and US\$174 billion by 2027. By 2028, eCommerce sales in the country are expected to surpass US\$204 billion, reflecting a substantial increase compared to previous

years (Uzunoglu, 2024). This growth is driven by customers' desire to research products before purchasing. Live streaming offers a more inclusive and participatory shopping experience by providing guides, examples, and professional advice (Sharma, 2023) along with the ability to interact with influencers and specialists in real-time (Xin, 2020).

The global market for live streaming, particularly for direct trading platforms, is predicted to grow at a compound annual growth rate (CAGR) of 21.8%, reaching USD 918.9 million by 2030, this growth is fueled by the creativity of market players and advancements in technology, such as 3D technologies, artificial intelligence (AI), and augmented reality/virtual reality (AR/VR) as reported by Grand View Reports (2024). The integration of these technologies will enhance the live-streaming experience, further driving consumer engagement and boosting the potential for higher sales in the beauty sector. Beauty majors' cosmetics education can benefit from the application of Mixed Reality (MR) systems that combine AR and VR technology. As stated by Yun & Hwang (2023), these systems offer training settings that are both realistic and interactive, hence augmenting the learning process and application abilities.

While influencers remain influential on platforms like Instagram, the over-saturation of sponsored content can lead to consumer indifference, reducing the effectiveness of endorsements (Amin et al., 2022; Chen, 2024). To overcome this challenge, brands should focus on creating personalized and engaging shopping experiences that go beyond influencer partnerships, including the use of augmented and virtual reality (AR/VR) technologies and AI for product recommendations (Hilken et al., 2022). AR/VR technologies enable customers to virtually try on beauty products, enhancing the shopping experience and increasing purchase intention (Guo & Zhang, 2024). The use of AR/VR in influencer marketing is also expected to grow significantly, as social media advertising increasingly adopts these technologies. The AR/VR market, valued at over \$29.5 billion by 2020, is expected to expand further, with global demand anticipated to increase by 9.64% annually between 2024 and 2028, reaching US\$58.3 billion by 2028 (Evolve Digitals, 2020; Statista, 2024). The beauty industry is leveraging AR/VR technologies, such as Burberry Beauty's facial tracking technology, to create more lifelike virtual try-on experiences, stimulating customer curiosity and enhancing enjoyment, which in turn boosts purchase intentions (Holition, 2020). The impression of realism, vividness, and beauty in augmented reality (AR) experiences promotes exploration and has a direct impact on purchasing decisions (Wang, Ko, & Wang, 2021).

A large body of research has developed several ideas and models for the adoption and application of new technologies. These models and ideas help us understand why individuals accept or reject innovations (Kalinkara & Talan, 2022), for instance: the diffusion of innovations theory (IDT) which commonly employed in this subject (Demir, 2006; Sahin, 2006); the Theory of Reasoned Action (TRA) based on social psychology (Usluel & Mazman, 2010); and Technology Acceptance Model-2 (TAM-2) research by (Venkatesh & Davis, 2000) which explains how consumers accept and utilize technological information or systems whose perceived usefulness and perceived ease of use are the two main metrics used to evaluate user behavior and attitudes towards technology use (Al-Emran & Shaalan, 2021). TAM, which Davis developed in 1989, is a version of TRA designed expressly for technology adoption. It highlights perceived utility and perceived usability as the primary determinants of technology adoption. While TAM's simplicity is appreciated, contextual factors, cultural variety, and social impact are ignored, which oversimplifies the adoption process (Davis, 1989). (Bagozzi, 2007) argues that TAM's emphasis on perceived usefulness and simplicity of use limits its ability to predict adoption of technology across different settings and user types. (Venkatesh, Morris, Davis, & Davis, 2003) integrated IDT, TRA, and TPB to create the Unified Theory of Acceptance and Use of Technology (UTAUT), an optimization of the Technology

Acceptance Model (TAM) that proposes four core variables (performance expectancy, effort expectancy, convenience, and community influence) and four moderators (age, gender, experience, and voluntariness) (Wen, Sotiriadis, & Shen, 2023). However, in consumer contexts, UTAUT2 model, (Venkatesh, Thong, & Xu, 2012) seems to be more extensively utilized and thorough in collecting many facets of technology acceptance. (Saprikis, Avlogiaris, & Katarachia, 2020) stated that UTAUT2 offers a strong framework with proven components including performance, effort, social impact, facilitating factors, and hedonic motives for researchers looking to examine AR/VR adoption in online purchasing.

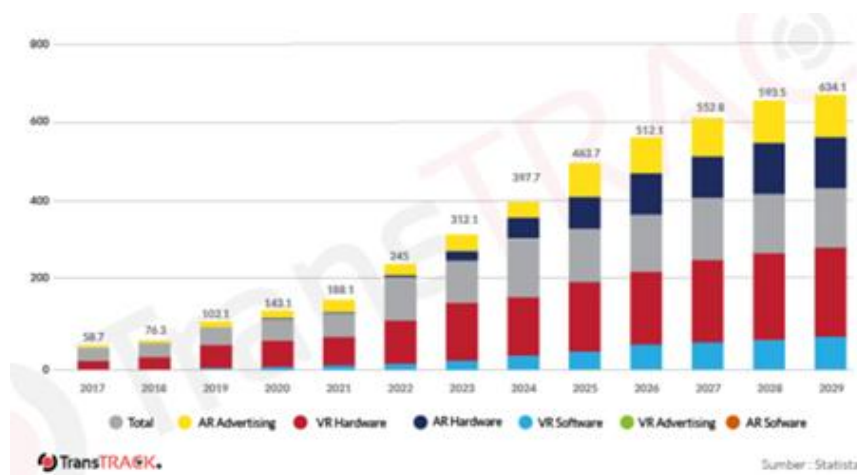


Figure 1. Demand AR/VR beauty market growth in Indonesia
 Source: Mihmidati (2024)

Despite the significant growth of AR/VR application in the global market, AR/VR technology for beauty product live streaming is still in its infancy in Indonesia (Habibah, Pujiarti, Widyanti, & Soetisna, 2021). However, as shown in Figure 1, there is potential increase of AR/VR demand in Indonesia. Though potential of AR/VR applications in a variety of fields, including advertising, education, and professional employment is high, it is still not clear if Indonesian consumers will take to these technologies as part of their lifestyle (Baroroh & Agarwal, 2022). There are still few studies that discuss about the reason social media users in Indonesia have not used AR/VR technology, especially in the context of live commerce. To address this issue, this paper focuses on the perception of consumers in Indonesia who are still very early or still in the awareness stage of the acceptance and or application of AR/VR technology in live streaming to buy beauty products.

A thorough knowledge as (Wen et al., 2023) stated of consumer behaviors is necessary to tackle this issue, particularly regarding how they see the adoption and use of digital technologies like augmented reality (AR) and virtual reality (VR). In order to ascertain the level of acceptance or adoption of this new technology by Indonesian e-commerce consumers, given its recent implementation in the country's e-commerce sector, it is imperative to build a TAM theory (Iisnawati et al., 2023). Although the main factors such as perceived ease of use and perceived usefulness in TAM model significantly influence customer's buy intentions in live streaming e-commerce, the current analysis has certain limitations. In the other hand, the UTAUT2 model incorporates a broader range of constructs that better capture the complexities in the digitalization era and provide a more comprehensive understanding of consumer behavior, particularly in the adoption of AR/VR technology (Wen et al., 2023). Therefore, this research will reconstruct a relevant and personalized UTAUT2 model, but not to revalidate the entire model. Accordingly, only four of the eight primary

variables—Performance Expectancy (PE), Effort Expectancy (EE), Hedonic Motivation (HM), and Behavioral Intention (BI)— which will be used in this research. While for the other factors, Price Value (PV) is typically left out of consumer mobile technology adoption studies (Tamilmani, Rana, Dwivedi, Sahu, & Roderick, 2018); and (Saprikis et al., 2020) findings indicate that Social Influence (SI) and Facilitating Condition (FC) variables have no direct impact on behavioral intention. Subsequent studies could consider exploring additional factors such as the role of social media influence and the moderating roles of consumer demographics and psychographics (Zhang, Wang, & Ariffin, 2024) as well as individual innovativeness (Lu, Yao, & Yu, 2005). Performance expectancy, personal innovativeness, and engagement all have a substantial impact on the decision to utilize AR/VR technology (Wen et al., 2023). Accordingly, the researchers incorporate additional aspects as contributions factors of purchase intention, such as Consumer Readiness (CR), Personal Innovativeness (IN), Social Media Influence (SMI), and Trust (T).

This research aims to address the challenges associated with the application of augmented reality (AR) and virtual reality (VR) in Indonesia's beauty sector by identifying the key factors that significantly influence consumer adoption of these technologies in live commerce. Additionally, the study seeks to recommend effective strategies to enhance the use of AR and VR in live commerce for beauty products, with the goal of converting viewers into buyers.

This research contributes to the understanding of augmented reality (AR) and virtual reality (VR) applications in the beauty sector in Indonesia by identifying key factors that significantly influence consumer adoption of these technologies in live commerce settings. By addressing the specific challenges faced in this sector, the study aims to provide actionable recommendations for strategies that can enhance the utilization of AR and VR, ultimately facilitating the conversion of viewers into buyers. This contribution is vital for businesses looking to leverage innovative technologies to improve customer engagement and drive sales in the increasingly competitive beauty market.

METHODS

This research employs a positivist scientific method to systematically investigate the external variables influencing the adoption and application of AR/VR technology in live commerce for cosmetic products. A structured research design guides this study, facilitating the exploration of factors affecting AR/VR adoption in Indonesia's beauty sector. Utilizing a quantitative approach, the research aims to establish clear connections among various factors impacting consumer behavior. Surveys were administered to 402 Indonesian customers selected through purposive sampling, specifically targeting individuals familiar with online shopping and live commerce. This sample size aligns with literature recommendations for studies using structural equation modeling (SEM), ensuring robust and generalizable results.

The study adapts the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model, focusing on key factors such as Performance Expectancy, Effort Expectancy, Hedonic Motivation, and Behavioral Intention, while also considering external influences like Consumer Readiness, Personal Innovativeness, Social Media Influence, and Trust. Hypotheses were developed to assess the positive impacts of these variables on Behavioral Intention to use AR/VR in beauty product live streaming. The analysis includes pre-testing for validity and reliability, employing SEM for hypothesis testing to uncover intricate relationships among variables. Each hypothesis is evaluated through path coefficients and significance levels, with p-values indicating statistical significance. Overall, SEM serves as a reliable statistical method for examining multiple relationships among latent constructs, providing a comprehensive framework for the research.

RESULTS

Respondent Socio-Demographic Profile

Table 1 demonstrates the respondents’ demographic profile. The results show that 96.5% were female and 3.5% male. The majority (84%) were age around 18 – 27 years old. Regarding their place of residence and based on the Hellenic Statistical Authority places’ classification (2011), more than half of the respondents live in big cities in Indonesia: followed by those living in Jakarta (22.2%), Bandung (17.7%), Semarang (20.4%), Surabaya (17.2%), Bali (11.5%), Medan (6%), Yogyakarta (4.7%) and a small town (0.3%).

Table 1. Respondent Socio-Demographic Profile

Respondent Profile		
Gender	Female	96.5%
	Male	3.5%
Age	< 17 years old	0.25%
	18 – 27 years old	84%
	28 – 44 years old	15.5%
	> 45 years old	0.25%
Domicile	Jakarta	22.2%
	Bandung	17.7%
	Semarang	20.4%
	Surabaya	17.2%
	Bali	11.5%
	Medan	6%
	Yogyakarta	4.7%
	Others	0.3%
Income (Monthly)	< IDR 5,000,000	31.7%
	IDR 5,000,000 – IDR 20,000,000	67.1%
	> IDR 20,000,000	1.2%
Preferred Platform Live Commerce	Shopee	56.9%
	Tik Tok	43.1%
Frequency of Online Shopping for Beauty Products	1 time per month	36.9%
	2 – 4 per month	62.8%
	> 4 per month	0.3%
Beauty Spending (Monthly)	< IDR 500,000	43.1%
	IDR 500,000 – IDR 2,000,000	53.6%
	> IDR 2,000,000	3.2%

Measurement model analysis result

To assess the validity and dependability of model constructs, Structural Equation Modeling-Partial Least Squares (SEM-PLS) employs several statistical tests. The matrixes that are relevant in exploratory research include Composite Reliability (CR) values exceeding 0.7 are considered indicative of strong reliability and are acceptable. Similarly, Variance Inflation Factor (VIF) values below 5 are regarded as acceptable. For outer loadings, values above 0.7 are preferred, while Cronbach's Alpha is deemed appropriate for exploratory studies if it exceeds 0.6. Additionally, the Average Variance Extracted (AVE) is acceptable when its value is greater than 0.5. The constructs of the model are assessed to see if they satisfy established reliability and validity standards by comparing each of these criteria to standard thresholds. The confirmatory model which includes 26 items that represent the eight underpinning constructs shown in table 2.

Table 2. Reliability and Validity Result

Variable Indicator	Code	AVE	Cronbach's Alpha	Composite Reliability	Outer Loadings	VIF
Consumer Readiness	CR1	0.677	0.762	0.863	0.825	1.590
	CR2				0.834	1.678
	CR3				0.809	1.433
Performance Expectancy	PE1	0.794	0.869	0.920	0.910	3.960
	PE2				0.931	4.399
	PE3				0.829	1.662
Effort Expectancy	EE1	0.732	0.832	0.891	0.863	4.967
	EE2				0.853	4.867
	EE3				0.851	1.343
Hedonic Motivation	HM1	0.829	0.897	0.936	0.864	2.067
	HM2				0.941	3.861
	HM3				0.925	3.845
Personal Innovativeness	IN1	0.732	0.817	0.891	0.877	2.056
	IN2				0.848	1.818
	IN3				0.841	1.688
Social Media Influence	SM1	0.619	0.794	0.866	0.863	2.066
	SM2				0.783	1.773
	SM3				0.730	1.431
	SM4				0.764	1.478
Trust	T1	0.672	0.743	0.856	0.940	3.376
	T2				0.893	2.697
	T3				0.864	2.130
Behavioral Intention	BI1	0.645	0.817	0.879	0.793	1.776
	BI2				0.795	1.819
	BI3				0.819	2.174
	BI4				0.806	2.122

All the variables produce findings that satisfy the established criteria, according to the validity and reliability interpretations shown in Table 2. The Consumer Readiness variable exhibits good internal consistency and convergent validity, as confirmed by Cronbach's Alpha (0.762), Composite Reliability (0.863), and AVE (0.677). The model's significant AVE score of 0.794, Cronbach's Alpha of 0.869, and Composite Reliability of 0.920 all support the Performance Expectancy (PE). Effort Expectancy (EE) and Hedonic Motivation (HM) also meet the standards, with AVEs of 0.732 and 0.829, respectively, and Cronbach's Alpha and Composite Reliability values over 0.7. This indicates their high degree of reliability in supporting hypothesis testing.

Furthermore, the Personal Innovativeness (IN) measure exhibits sufficient validity and reliability; the signals of the variables correlate favorably and are dependable, as seen by their AVE of 0.732, Cronbach's Alpha of 0.817, and Composite Reliability of 0.891. The Social Media Influence (SMI) variable shows acceptable reliability with a somewhat lower AVE of 0.619, but it still has a Composite Reliability of 0.866 and a Cronbach's Alpha score of 0.794. In contrast, the Trust (T) variable exhibits a somewhat high degree of consistency in the assessment of its indicators, with an AVE of 0.672 and a Cronbach's Alpha of 0.743. Subsequently, the behavioral intention variable exhibits comparable positive outcomes, with an AVE of 0.645, a Composite Reliability of 0.879, and a Cronbach's Alpha of 0.817. This model's variables all produce findings that meet recognized

reliability and validity criteria. Considering each of these variables has a strong model output, they can all proceed on to the next stage of the execution procedure for the hypothesis testing.

Structural model analysis result

This section investigates at the correlations between the latent variables to see how they influence Behavioral Intention (BI) in order to determine the structural model. The purpose of the structural model is to evaluate the suggested hypotheses using path coefficients, T-statistics, and P-values that were acquired from the SEM-PLS analysis. This procedure offers data supporting the acceptance or rejection of each hypothesis and aids in understanding if each independent variable significantly effects the dependent variable (Behavioral Intention). The path coefficient analysis elucidates the direction and intensity of these associations, which are critical in assessing the model's explanatory capacity. Based on these statistical measures, research interpret the hypothesis testing results as shown in Figure 2 and Table 3.

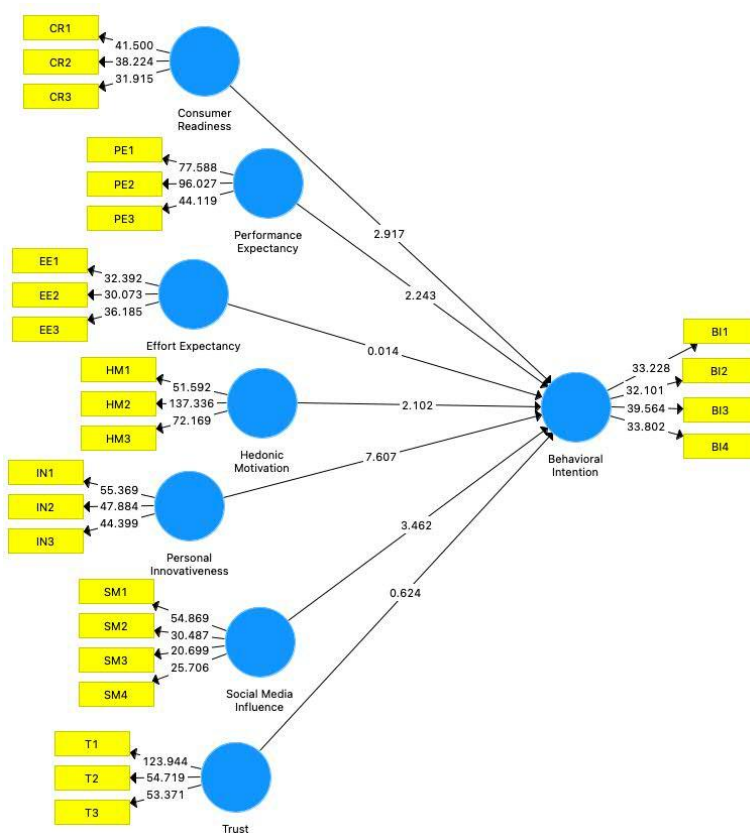


Figure 1. Structural Model Analysis Results

Table 1. Hypothesis Testing Result

Hypothesis	T statistic	P values	Path	Result
H1	2.917	0.004	CR → BI	Accepted
H2	2.243	0.025	PE → BI	Accepted
H3	0.014	0.989	EE → BI	Rejected
H4	2.102	0.036	HM → BI	Accepted
H5	7.607	0.000	IN → BI	Accepted
H6	3.462	0.001	SM → BI	Accepted
H7	0.624	0.533	T → BI	Rejected

P < 0.05

H1: Consumer readiness have a positive significant impact on the behavioral intention to use AR/VR in live streaming for beauty products.

With a path coefficient of 0.175, a T-statistic of 2.917, and a P-value of 0.004, the association between behavioral intention and consumer readiness is not significant at the 0.05 level of significance. This implies that Consumer Readiness has a highly positive and significant impact on Behavioral Intention. It has been determined upon that H1 is acceptable.

H2: Performance expectancy have a positive significant impact on the behavioral intention to use AR/VR in live streaming for beauty products.

The path coefficients for behavioral intention and performance expectation are 0.106, 2.243 for the T-statistic, and 0.025 for the P-value, all of which are less than 0.05. This indicates that behavioral intention is favorably and strongly influenced by performance expectation. As a result, the H2 hypothesis is accepted.

H3: Effort expectancy did not have a positive significant impact on the behavioral intention to use AR/VR in live streaming for beauty products.

The path coefficient of -0.001, T-statistic of 0.014, and P-value of 0.989 indicate a strong correlation between Effort Expectancy and Behavioral Intention that is much higher than the 0.05 threshold. This indicates that behavioral intention is largely unaffected by effort expectation. Thus, it can be concluded that hypothesis H3 is rejected.

H4: Hedonic Motivation have a positive significant impact on the behavioral intention to use AR/VR in live streaming for beauty products.

Hedonic motivation has a route coefficient of 0.111, a P-value of 0.036 (less than 0.05), and a T-statistic of 2.102. This illustrates that hedonic motivation has a significant and favorable influence on behavioral intention. As a result, hypothesis H4 is accepted.

H5: Personal Innovativeness have a positive significant impact on the behavioral intention to use AR/VR in live streaming for beauty products.

Considering a path coefficient of 0.374, a T-statistic of 7.607, and a P-value of 0.000, Personal Innovativeness has a strong and statistically significant positive impact on Behavioral Intention. Hypothesis H5 has been settled accepted.

H6: Social media influence has a positive significant impact on the behavioral intention to use AR/VR in live streaming for beauty products.

There is a significant positive impact on behavioral intention as indicated by the path coefficient of 0.195, T-statistic of 3.462, and P-value of 0.001 in the association between social media influence and behavioral intention. Consequently, hypothesis H6 is accepted.

H7: Trust did not have a positive significant impact on the behavioral intention to use AR/VR in live streaming for beauty products.

Despite a T-statistic of 0.624, a P-value of 0.533, and a path coefficient of -0.029, Trust has a significant value over 0.05. This demonstrates that behavioral intention is not greatly impacted by trust. As so, hypothesis H7 is rejected.

Discussion

The study finds that factor Consumer Readiness (CR) positively influences Behavioral Intention (BI), with informed consumers more likely to adopt AR/VR technologies. (Pantano & Timmermans, 2014) support this, highlighting that readiness accelerates AR/VR adoption across industries, including retail. The study also found that factor Performance Expectancy (PE) significantly influences Behavioral Intentions (BI), as users adopt technologies expecting enhanced performance. Suh & Chang (2006) support this as it found VR's telepresence effect improves attitudes, buying intentions, and product quality perceptions, particularly in live streaming, where real-time interactions foster trust. Interestingly, the results show that factor Effort Expectancy (EE) did not significantly impact Behavioral Intention (BI). This indicates that in this case, customers' intentions are not directly shaped by how easy they perceive the technology or service to use. When users are accustomed to AR/VR, Effort Expectancy (EE) becomes less critical in their decision to adopt it. Recent studies support these findings. Jajić et al. (2022) observed that younger, digitally savvy generations are driving AR adoption, reducing the significance of effort expectancy. This is likely because modern technology is simple to use and has become a regular part of daily life, making effort expectancy less relevant.

Later, the study shows that factor Hedonic Motivation (HM) significantly influences Behavioral Intention (BI), suggesting that consumers are more likely to adopt a product or service if they find it enjoyable. As evidenced by studies like Hsu et al. (2021) which found that hedonic motives drive sustained use of AR apps such as YouCam Makeup, where visual and interactive elements enhance user satisfaction. This is especially relevant in the context of live streaming; hedonic factors drive user engagement through real-time interactions with hosts or products. AR/VR features create immersive experiences, such as virtual product trials with host recommendations, surpassing static images or videos. Studies by Watson et al. (2018) and Gabriel et al. (2023) highlight how AR/VR's novelty and interactivity enhance purchasing experiences, especially in beauty marketing.

Subsequently, these studies found that factor Personal Innovativeness (IN) strongly impact Behavioral Intention (BI), as individuals open to new technologies are more likely to adopt AR/VR. According to Kim et al. (2019), Personal Innovativeness (IN) is an anchoring factor that reinforces people's intention to move from traditional technologies to AR/VR services. This highlights the significance of personal innovativeness in decisions about the adoption of new technologies. And related to studies by Wen et al. (2023), behavioral intentions toward the use of AR and VR technologies are strongly predicted by Personal Innovativeness (IN), particularly when it comes to the use of new technologies in a variety of industries, including the beauty industry. According to an additional research study, Personal Innovativeness increases the perceived advantages and usability of technology, which in turn affects user behavior toward adoption of AR (Jackson et al., 2013). Thereafter, the analysis found that factor Social Media Influence (SMI) significantly affects Behavioral Intention (BI), indicating that consumers are more likely to adopt AR/VR technologies when exposed to social media influence.

Studies by Alamäki et al. (2023) and Wang et al. (2021) show that consumers are more likely to share AR content on social media and are influenced by positive emotional experiences. In regard to studies conducted by Yuan & Lou (2020), influencers and social media can alter consumers' opinions about emerging technologies like AR and VR, which will increase their adoption across a range of industries, including the beauty industry. Afterward, interestingly, factor Trust (T) was found to have no strong impact to Behavioral Intention (BI). Similar with studies Anifa & Sanaji (2022) show that trust has minimal impact on behavioral intentions. Factors like ease of use and satisfaction are more influential, especially among digitally literate groups like Gen Z. For these consumers,

functionality and user experience outweigh concerns about trust, emphasizing other drivers like social media influence and innovation. Further research by Voicu et al. (2023) and Gabriel et al. (2023) supports the idea that consumers' adoption of AR/VR technologies in beauty shopping is influenced more by perceived utility, usability, and entertainment value than by trust. For example, consumers are more focused on how these technologies enhance their shopping experience, rather than concerns about security or risks. Additionally, studies by Kristi & Kusumawati (2021) and Hajli et al. (2017) reveal that factors such as social presence and platform familiarity have a stronger influence on purchase intentions than trust.

CONCLUSION

This research explores consumer behavioral factors that influence the adoption of AR/VR technologies in the live commerce beauty industry, identifying five key determinants: Content Relevance, Performance Expectancy, Hedonic Motivation, Personal Innovativeness, and Social Media Influence, while noting that Effort Expectancy and Trust did not significantly impact Behavioral Intention. The study highlights the potential of AR/VR integration to enhance customer experience, satisfaction, and sales, and introduces consumer readiness as a crucial factor, emphasizing the need for mental and technological preparedness among consumers. It suggests practical strategies for businesses, including targeting tech-savvy consumers with educational initiatives, promoting the benefits of AR/VR features, and leveraging social media for enhanced engagement. The research also calls for a focus on enjoyable, user-friendly experiences, rather than solely emphasizing trust. Acknowledging limitations in addressing long-term engagement and cultural influences, the study encourages future research in these areas, as well as the development of frameworks for measuring the ROI of AR/VR integration in e-commerce to provide valuable insights for justifying investments and refining strategies.

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