ISSN 2409-2665
Journal of Logistics, Informatics and Service Science
Vol. 13 (2026) No. 11, pp. 28-46
DOI:10.33168/JLISS.2026.1102

Augmented Reality Features, Customer Experience, and Engagement in Retail: An Experience Economy Perspective

Le Thi Hue Linh*, Nguyen Hoang Sinh

Ho Chi Minh City Open University, Vietnam

linh.lth@ou.edu.vn (Corresponding author), sinh.nh@ou.edu.vn

Abstract. Augmented Reality (AR) is increasingly embedded within digital retail environments, yet its role extends beyond a marketing tool toward a technology-mediated service interface that reshapes customer interaction and engagement. Drawing on the Stimulus–Organism–Response (SOR) model and Experience Economy Theory, this study examines how AR features influence customer engagement through experiential mechanisms. The findings reveal that AR features significantly enhance customer experience dimensions, including escapism and aesthetic experience. Among these, escapism emerges as the strongest predictor of customer engagement, highlighting the importance of immersive experiences in AR-enabled retail contexts. Furthermore, customer experience is confirmed as a key mediating mechanism linking AR technological stimuli to engagement outcomes. The results offer both theoretical advancements and practical insights for designing AR-enabled customer experiences that foster sustained engagement.

Keywords: Augmented reality (AR), Customer experience, Customer engagement, Experience economy, Digital Service Systems, Retail Informatics

1. Introduction

Augmented Reality (AR) technologies have rapidly evolved from experimental tools into integral components of contemporary digital environments across domains such as healthcare, education, engineering, and retail. In the retail context, AR applications have been widely adopted by leading brands, including IKEA, Nike, Lego, and Tesco, to enhance online shopping by enabling consumers to visualize, customize, and interact with products virtually. Prior research has demonstrated that AR applications generate positive outcomes in terms of hedonic and utilitarian value, psychological inspiration, and consumer behaviors (Hsu et al., 2021; Nikhashemi et al., 2021). Moreover, studies have shown that AR enhances brand interaction (McLean and Wilson, 2019), facilitates flow experiences that build trust and strengthens consumer engagement (Arghashi and Yuksel, 2022).

Despite the growing body of research on augmented reality (AR), existing studies have predominantly framed AR as a marketing augmentation tool, emphasizing its role in enhancing product visualization, communication effectiveness, and downstream outcomes such as satisfaction and purchase intention. While valuable, this perspective remains limited in capturing the evolving role of AR within digitally mediated retail ecosystems. Emerging research suggests that AR should be understood as an integral component of digital service systems that reshape customer journeys and value creation processes rather than merely supporting communication functions (Hoyer et al., 2020; Flavián et al., 2019). In line with this view, service informatics research highlights that digital interfaces increasingly function as intelligent service platforms enabling real-time interaction, data integration, and adaptive service delivery (Abahussain, 2026; Aljazzaf et al., 2025). Accordingly, AR can be conceptualized as a technology-mediated service interface that fundamentally transforms how customers interact with firms, process information, and co-create experiences.

From a service systems perspective, AR integrates real-time visualization, user input, and personalized content into a unified interaction platform, enabling dynamic and bidirectional engagement (Hilken et al., 2017; Javornik, 2016). However, despite this conceptual advancement, the mechanisms through which AR drives customer engagement remain underexplored. Prior studies have largely focused on direct effects of AR features on cognitive and affective responses such as enjoyment, perceived usefulness, and satisfaction (Smink et al., 2020; Yim et al., 2017), with limited attention to the mediating role of multidimensional customer experience.

This gap is critical, as customer experience comprises distinct dimensions (e.g., escapism, esthetics) that are differentially influenced by technological affordances and do not equally drive engagement (Hoyer et al., 2020). Moreover, existing research often treats experience as a general mediator, overlooking how specific AR features translate into engagement through differentiated experiential pathways. Addressing this gap is essential for advancing a more nuanced understanding of AR-enabled engagement, particularly in emerging markets where AR adoption is rapidly increasing but remains under-theorized from a service systems perspective.

To address this gap, this study integrates the Stimulus–Organism–Response (S–O–R) framework with Experience Economy theory to develop a comprehensive model of AR-driven customer engagement. Within this framework, AR features (i.e., vividness, interactivity, and personalization) are conceptualized as technological stimuli, while experiential states such as escapism and aesthetic experience represent distinct organismic responses. Customer engagement is treated as the behavioral outcome, reflecting the effectiveness of AR-enabled service systems in fostering sustained interaction. By combining these theoretical perspectives, the study advances a more nuanced understanding of AR by distinguishing between different types of experiential values. In particular, it differentiates between immersive, high-participation experiences (escapism) and passive, perceptual experiences (aesthetics), thereby enabling a deeper examination of how AR-mediated interactions influence engagement.

Accordingly, this research pursues three primary objectives. First, it examines how AR application features, as components of digital service interfaces, shape distinct experiential states. Second, it investigates the differential effects of these experiential states on customer engagement, thereby clarifying the mechanisms through which AR-enabled service systems generate behavioral outcomes. Third, it develops and empirically validates a comprehensive model that positions AR as a technology-

mediated interaction platform within interactive retail informatics, rather than merely a marketing tool. By reframing AR in this manner, this study contributes to the literature by bridging marketing, service systems, and information systems perspectives. It provides a theoretically grounded explanation of how AR reshapes customer interaction, enhances information processing, and drives engagement within digital retail environments, thereby offering a foundation for future research on technology-mediated service innovation.

2. Literature review

2.1. Theoretical framework

This study integrates the Stimulus–Organism–Response (SOR) model with Experience Economy Theory to explain how AR-enabled service interfaces shape customer engagement.

The SOR model (Mehrabian and Russell, 1974) provides a foundational mechanism for understanding how environmental stimuli influence behavioral responses through internal psychological states. In the context of digital service systems, technological features function as stimuli (S) that shape users' internal experiences (organism, O), which in turn drive behavioral outcomes (response, R). Prior research in retail and digital environments consistently demonstrates that interactive technologies influence consumer behavior through experiential mediators such as affect, cognition, and immersion (Kim et al., 2020; Xue et al., 2020).

Building on this mechanism, the present study conceptualizes AR application features (vividness, interactivity, and personalization) as stimuli, customer experience as the organism, and customer engagement as the behavioral response. However, while the SOR model explains how the process occurs, it does not specify what constitutes the internal experience. To address this limitation, this study incorporates Experience Economy Theory (Pine and Gilmore, 1998) to define the content of the organism stage.

Experience Economy Theory posits that value creation increasingly derives from staged experiences characterized along two dimensions: participation (active vs. passive) and connection (absorption vs. immersion). These dimensions give rise to four experiential realms: entertainment, education, escapism, and aesthetics. Among these, escapism and aesthetic experiences are particularly relevant in AR contexts, as they both involve immersion and sensory engagement. Escapism signifies active engagement within a virtual environment, whereby users become integral to the experience. In contrast, aesthetic experience denotes passive engagement, whereby users observe and appreciate the environment without influencing it.

In AR-enabled retail environments, especially in fashion and beauty contexts, immersive experience is the core mechanism through which value is created (Daassi and Debbabi, 2021). Therefore, this study focuses on escapism and aesthetic experience as key organism states, representing the experiential pathways through which AR stimuli influence customer engagement. By integrating SOR with Experience Economy Theory, this study provides a theoretically grounded framework that explains both the process (SOR) and experience dimensions of customer responses to AR-enabled service systems.

2.2. Augmented reality

Augmented reality (AR) is a transformative visual technology that empowers consumers to access exclusive and captivating information while experiencing products during the shopping process (Hsu et al., 2021). AR applications provide consumers with the opportunity to enhance the real world with context-specific details or influence their purchasing decisions (Van Esch et al., 2019). The primary objective of AR applications in retail is to influence consumer behavior by enhancing customer experience. It is evident that AR applications contribute to enhancing the overall experience, thereby attracting potential customers and increasing their interaction with products, subsequently raising product awareness and consumer willingness to make purchases (Caboni and Hagberg, 2019).

In recent years, prior research has investigated the advantages of AR technology in retail and the impact of AR technology on customer behavior and attitudes (Caboni and Hagberg, 2019; Lavoye et al., 2021). To the best of our knowledge, only a limited number of studies have explored the impact of AR application features on customer engagement in the retail sector from the perspective of experience

economy theory. On the other hand, previous studies have identified several factors in AR applications that affect customer experience. Among these factors, two particularly important features stand out: vividness and interactivity (Barhorst et al., 2021; McLean and Wilson, 2019; Nikhashemi et al., 2021). These two features significantly contribute to positive customer attitudes and product experiences. Furthermore, personalization has also been examined in the context of AR applications (Hsu et al., 2021). Personalization, integrated with artificial intelligence, enables the selection, adjustment, and recommendation of the right content to the right person, thereby facilitating their use of AR applications (Zanker et al., 2019), and significantly influencing customer experience. To deepen our understanding of customer engagement within the context of experience through AR applications, this study investigates the positive impacts of vividness, interactivity, and personalization on customer engagement, from the perspective of experience economy theory, in the context of fashion and beauty retail.

2.3. Customer experience

Customer experience in this study is conceptualized as the internal psychological state (organism) within the SOR framework, operationalized through the lens of Experience Economy Theory. In digital retail environments, customer experience emerges from interactions between users and technology-mediated interfaces, such as mobile applications, websites, and AR systems (Foroudi et al., 2018). AR applications create embedded and interactive environments where users can visualize, manipulate, and explore products in real time (Hilken et al., 2017). These interactions generate multiple experiential responses simultaneously; however, not all dimensions are equally salient or relevant (Hoyer et al., 2020).

Guided by Experience Economy Theory, this study operationalizes customer experience using two core dimensions: escapism and aesthetic experience, which are most aligned with the immersive nature of AR. These dimensions represent the dominant experiential states triggered by AR features, rather than an exhaustive classification of all possible experiences. Escapism experience captures the extent to which users feel immersed and actively engaged in a virtual environment, losing awareness of the physical surroundings. Aesthetic experience reflects users' appreciation of the visual and sensory qualities of the AR interface in a more passive manner. Together, these dimensions capture both active and passive immersion, aligning with the experiential spectrum proposed by Pine and Gilmore (1998). This approach allows for a precise examination of how AR features translate into specific experiential states, which subsequently drive customer engagement within AR-enabled digital service systems.

2.4. Customer engagement

Customer engagement has recently garnered significant attention in marketing efforts (Harmeling et al., 2017). The recognition of customer engagement has evolved from a functional exchange to a relational exchange and, ultimately, to a transformational exchange. Technological advancements have provided new channels and methods for strengthening relationships with customers. Virtual Reality (VR) and AR technologies enable companies to incorporate interactive features that can be used to connect with customers (Harmeling et al., 2017). Kumar et al. (2010) argued that customers can engage through interaction and create value in various ways beyond making transactions. Additionally, many scholars concur that customer engagement is a multidimensional construct encompassing cognition, affection, and behavior (Harmeling et al., 2017; Islam et al., 2018).

However, several studies indicate that customers primarily respond emotionally to brands. Engagement goes beyond merely reflecting a customer's emotional state with a brand; it involves their regular interaction (Thakur, 2018). L. D. Hollebeek et al. (2014) found that the stronger a customer's engagement with a brand, the more it fosters their emotional engagement with that brand. Consequently, this study concludes that customer engagement primarily results from the affective aspect. When customers encounter touchpoints, interact, and have positive experiences through AR applications, they develop positive emotions such as cheerfulness, happiness, and satisfaction. This leads to their affinity for the brand and the ability to cultivate a strong relationship.

2.5. Hypotheses development and research model

AR attributes and customer experience

Within the SOR framework, AR technological affordances function as stimuli that shape internal experiential states. To specify the nature of these states, this study draws on Experience Economy Theory, conceptualizing customer experience through escapism and aesthetic dimensions, which reflect active and passive immersion, respectively. However, the impact of AR features on these experiential states is contingent upon distinct psychological mechanisms supported by prior research.

Vividness refers to the sensory richness and representational fidelity of AR environments (Flavián et al., 2017; Yim et al., 2017). High vividness enhances sensory realism, enabling users to process information through multiple perceptual channels, thereby increasing telepresence and reducing the perceptual distance between virtual and physical environments (Javornik, 2016). Prior studies show that vivid AR content enhances immersion and experiential value (Gatter et al., 2022; Hilken et al., 2017). In fashion and beauty retail, where product evaluation is highly visual and experiential, vividness plays a critical role in simulating product usage and enhancing experiential authenticity. From an experience economy perspective, such sensory enrichment fosters escapism by enabling users to feel embedded in the virtual environment, while simultaneously enhancing aesthetic experience through visual appeal and environmental harmony.

H1a: Vividness positively influences escapism experience.

H1b: Vividness positively influences aesthetic experience.

Interactivity captures the extent to which users can manipulate and control elements within the AR interface (Barhorst et al., 2021; McLean and Wilson, 2019). Empirical evidence suggests that interactive AR features increase user engagement, flow, and immersion (Daassi and Debbabi, 2021; Yim et al., 2017). In AR retail contexts, interactivity allows users to rotate products, try them virtually, and explore different configurations, thereby facilitating active participation, a core dimension of the experience economy. This active engagement strengthens escapism, as users co-create their experience, while also enhancing aesthetic appreciation through dynamic exploration of the virtual environment.

H2a: Interactivity positively influences escapism experience.

H2b: Interactivity positively influences aesthetic experience.

Personalization refers to the system's ability to tailor content and interface elements based on individual user data (Bilgihan et al., 2016; Parise et al., 2016). Prior research indicates that personalized digital experiences increase perceived value, satisfaction, and emotional attachment (Choi et al., 2017; McLean et al., 2018). In AR environments, personalization enables users to visualize products that match their preferences, body characteristics, or style, thereby reducing cognitive effort and increasing experiential fit. This alignment strengthens escapism by deepening involvement and enhances aesthetic experience by delivering content that resonates with individual tastes. In emerging retail markets, where consumers are increasingly seeking customized and meaningful experiences, personalization becomes a key driver of immersive engagement.

H3a: Personalization positively influences escapism experience.

H3b: Personalization positively influences aesthetic experience.

Customer experience and customer engagement

Based on the SOR framework, experiential states serve as the organism that translates technological stimuli into behavioral responses. Customer engagement represents a multidimensional behavioral outcome encompassing cognitive, emotional, and interactive investment (L. D. Hollebeek et al., 2014). When customers engage with experiential technologies like AR applications, they immerse themselves in a virtual environment, resulting in escapism experiences (Jung et al., 2021). Increased active customer participation leads to heightened escapism experiences, signifying that customers deeply engage with the AR environment's interface or activities (Zhang et al., 2021). Consequently, customers develop positive perceptions and affinity for the company when interacting with the company's products/services, contributing to a positive experience (He et al., 2023; tom Dieck et al., 2018) and fostering strong engagement (Ahn and Back, 2018; L. Hollebeek and Rather, 2019).

Aesthetic experience, while more passive, contributes to engagement through affective evaluation and emotional response. The aesthetic attributes of AR contribute to a sense of harmony and sensory stimulation (Hosany and Witham, 2010). Previous studies have demonstrated that aesthetic experiences significantly influence customers' positive psychological reactions toward firms (Toufani et al., 2017). Enhanced content quality enables consumers to derive aesthetic experiences and positive overall experiences, leading to affective responses to the brand (Ryu and Ryu, 2021). According to the experience economy theory, increased customer participation and connection are likely to result in stronger escapism and aesthetic experiences. When customers interact positively with a brand's products through AR applications, they experience satisfaction and enjoyment due to the benefits offered by the apps. Accordingly, this study formulates the following hypotheses:

H4: Escapism experience positively influences customer engagement.

H5: Aesthetic experience positively influences customer engagement.

The mediation role of customer experience

Drawing on the SOR framework, this study conceptualizes customer experience as the central mediating mechanism linking AR features to customer engagement. Prior research consistently demonstrates that technological attributes influence behavioral outcomes indirectly through experiential and psychological processes (Gibson et al., 2022; Jeannot et al., 2022).

In AR-enabled retail environments, vividness enhances sensory realism, interactivity increases perceived control, and personalization strengthens self-relevance. These mechanisms collectively shape immersive experiences, which in turn drive engagement behaviors. Empirical studies in digital and omnichannel contexts confirm that experience mediates the effects of technological and environmental stimuli on outcomes such as satisfaction, loyalty, and engagement (Bleier et al., 2019; Flavián et al., 2019). Accordingly, this study proposes that escapism and aesthetic experience mediate the relationships between AR features and customer engagement, providing a theoretically grounded explanation of how AR-enabled service systems influence user behavior.

H6a: Escapism experience mediates the relationship between vividness and customer engagement.

H6b: Escapism experience mediates the relationship between interactivity and customer engagement.

H6c: Escapism experience mediates the relationship between personalization and customer engagement.

H7a: Aesthetic experience mediates the relationship between vividness and customer engagement.

H7b: Aesthetic experience mediates the relationship between interactivity and customer engagement.

H7c: Aesthetic experience mediates the relationship between personalization and customer engagement.

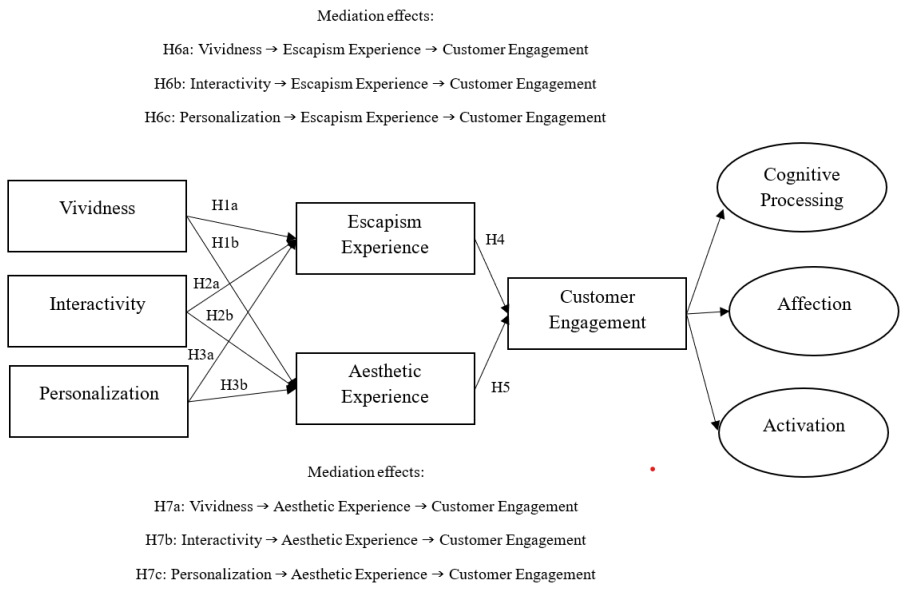


Fig. 1: Research model

3. Methodology

3.1. Preliminary exploratory phase

A qualitative research phase was conducted to ensure the content validity and contextual relevance of the measurement scales. Using purposive and snowball sampling, nine participants with prior AR retail experience were recruited, including one AR expert, six students, and two office workers. This sample reflects young, digitally active users, the primary segment of AR adoption in emerging markets. Data was collected in two stages: an in-depth semi-structured interview with an AR expert, followed by two focus group discussions. The interview protocol included open-ended questions addressing perceptions of AR features, experiential responses, and behavioral outcomes.

A directed content analysis approach was employed, guided by the SOR model and Experience Economy Theory. Predefined categories (AR features, experience, engagement) served as initial codes. Data were segmented and coded based on these categories, with new codes created for uncaptured themes. The results were grouped into three categories: (1) constructs supported by literature only, (2) constructs supported by both data and literature, and (3) emergent constructs. The findings informed the refinement of the research model and measurement scales, leading to the development of a survey instrument for the quantitative phase.

3.2. Quantitative research

For quantitative research, we employed non-probability convenience sampling targeting students, office workers, sellers, managers, leaders, and content creators residing in major cities like Ho Chi Minh City and Hanoi. Following the guideline by J. F. Hair et al. (2019), we aimed for a sample size ranging from 240 to 400 participants due to our 24 observed variables. Data collection was conducted using both online and offline surveys. Measurement scales for vividness and interactivity were adapted from Yim et al. (2017), personalization from Baek and Morimoto (2012); Srinivasan et al. (2002), escapism and aesthetic experiences from Hosany and Witham (2010); Oh et al. (2007), and customer engagement from L. D. Hollebeek et al. (2014); McLean and Wilson (2019). Descriptive statistics were applied for data summary in SPSS, followed by partial least squares structural equation modeling (PLS-SEM) using SmartPLS software for scale and hypothesis testing.

4. Results

4.1. Preliminary exploratory findings

The qualitative findings indicate that vividness, interactivity, and personalization influence user experience (i.e., escapism and aesthetic experiences). Engagement levels were observed across three

distinct dimensions: cognitive processing, affection, and activation. Based on these qualitative insights, the research model was refined to incorporate the three dimensions of customer engagement. Furthermore, the measurement scales were adapted to align with the specific research context and target respondents. The measurement scale for vividness was supplemented with an additional indicator. Additionally, customer engagement incorporated two further sub-constructs, namely cognitive information processing and action, which encompass six measurement items. These specific adaptations are presented in Table 1 below.

Table 1. Refined measurement scales

Variables	Items	Sources	Refine
Vividness	The images displayed are provided through a realistic AR application.	Yim et al. (2017)	Add items
	The visual display provided through this augmented reality app was clear.		
	The visual display provided through this augmented reality app was detailed.		
	The visual display provided through this augmented reality app was sharp.		
	The visual display provided through this augmented reality app was well-defined.		
Interactivity	I was in control of my navigation through the augmented reality technology.		
	I had some control of the augmented reality technology that I wanted to see.		
	I was in control over the pace to watch products.		
	The augmented reality technology had the ability to respond to my specific needs quickly and efficiently.		
Personalization	This AR website/app makes purchase recommendations that match my needs.	(Baek and Morimoto, 2012; Srinivasan et al., 2002)	
	The advertisements and promotions that this AR website/app sends to me are tailored to my situation.		
	This AR website/app makes me feel that I am a unique customer.		
	I believe that this AR website/app is customized to my needs.		
Escapism Experience	I felt I played a different character when experiencing AR.	(Hosany and Witham, 2010; Oh et al., 2007)	
	The AR experience let me imagine being someone else.		
	I completely escaped from my daily routine when experiencing AR.		
	I felt like I was in a different time or place when experiencing AR.		
Aesthetic Experience	The setting of the AR platform was attractive.		
	The setting of the AR platform pays close attention to design details.		
	I felt a real sense of harmony on AR platform.		
Customer Engagement			
Cognition Processing	Using the brand's AR feature on the app gets me thinking about the brand	(L. D. Hollebeek et al., 2014; McLean and Wilson, 2019)	Add construct
	I think about the brand a lot when using the brand's AR feature on the app		
	Using the brand's AR feature on the brand's app stimulates my interest in the brand		
Affection	I feel positive when I use the brand's AR feature on the app		
	I feel good when I use the AR feature on the brand's app		
	Using the brand's AR feature on the app makes me happy		
	I'm proud to use AR app		
Activation	I spend a lot of time using the AR feature on the brand's app compared to other brands.		Add construct
	Whenever I am using the App, I often interact with the brand's AR feature		
	AR app is one of the platforms I usually use when experiencing products.		

4.2. Quantitative research results

For qualitative research results, after excluding invalid responses (missing data or non-AR application users), the final sample comprised 354 respondents. The sample is predominantly composed of young adults, with the majority aged between 22 and 30 years (75.7%), indicating that the study mainly captures perceptions of digitally active consumers. The gender distribution is relatively balanced, with females accounting for 53.95% and males 46.05%.

Regarding educational attainment, most respondents hold a graduate degree (51%), followed by postgraduate qualifications (35%), suggesting a relatively well-educated sample. In terms of occupation, office workers constitute the largest group (38.7%), followed by students (14.1%) and service/sales staff (13%), reflecting a diverse professional background. Income levels are moderately distributed, with the largest proportion earning between 10.5 and 15 million VND (26.27%), followed by those earning above 15 million VND (24.01%).

In terms of AR usage, clothing (25.4%), shoes (23.5%), and cosmetics (23.0%) are the most frequently experienced product categories. Popular AR platforms include Yody (25.6%), L'Oréal (16.4%), and Nike (15.1%). Notably, most respondents report a medium level of AR experience (62.99%), indicating familiarity but not extensive expertise with AR technologies.

Measurement model assessment

Reflective measurement models

Cronbach's Alpha, AVE, and CR assess the internal consistency reliability of each construct (J. Hair et al., 2019). The results indicate that the Cronbach's Alpha for Cognitive Processing (CP) was 0.62 (< 0.7). Consequently, this construct was removed from the model to ensure measurement reliability. Table 2 presents reliability evaluation results after removing the CP variable. Cronbach's alpha values range from 0.80 to 0.87, exceeding the recommended threshold of 0.70. Composite reliability (CR) values are also satisfactory, ranging from 0.87 to 0.92, confirming the robustness of the measurement model. Additionally, Convergent validity is established as all average variance extracted (AVE) values exceed the minimum threshold of 0.50, ranging from 0.62 to 0.79. These results indicate that the constructs explain a substantial portion of the variance in their respective indicators.

Table 2. Cronbach's Alpha, AVE and CR

Variables	Code	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Vividness	VI	0.87	0.91	0.66
Interactivity	IN	0.81	0.87	0.63
Personalization	PE	0.80	0.87	0.62
Escapism Experience	ESC	0.82	0.88	0.66
Aesthetic Experience	AES	0.80	0.88	0.71
Affection	AF	0.85	0.90	0.69
Activation	AC	0.87	0.92	0.79

As shown in Table 3, all outer loadings exceed the recommended threshold of 0.70, indicating strong indicator reliability. The loadings range from 0.75 to 0.91, suggesting that all items contribute significantly to their respective constructs. Variance inflation factor (VIF) values range from 1.45 to 2.63, well below the critical threshold of 5. This confirms the absence of multicollinearity issues among indicators.

Table 3. Outer Loading, VIF

Variables	Item code	Outer Loading	VIF
Vividness (VI)	VI1	0.84	2.35
	VI2	0.83	2.34
	VI3	0.85	2.24
	VI4	0.80	2.10
	VI5	0.76	1.89
Interactivity (IN)	IN1	0.80	1.56
	IN2	0.79	1.68
	IN3	0.78	1.62
	IN4	0.81	1.79
Personalization (PER)	PE1	0.79	1.61
	PE2	0.83	1.77
	PE3	0.79	1.63
	PE4	0.75	1.45
Escapism Experience (ESC)	ESC1	0.81	1.72
	ESC2	0.84	1.98
	ESC3	0.82	1.82
	ESC4	0.76	1.58
Aesthetic Experience (AES)	AES1	0.85	1.63
	AES2	0.84	1.78
	AES3	0.85	1.74
Affection (AF)	AF1	0.80	1.65
	AF2	0.83	2.00
	AF3	0.84	2.22
	AF4	0.85	2.13
Activation (AC)	AC1	0.90	2.53
	AC2	0.91	2.63
	AC3	0.86	1.93

Table 4 reports the discriminant validity assessment using the Fornell–Larcker criterion and HTMT ratios. For the Fornell–Larcker criterion, the square roots of AVE (diagonal elements) are higher than the inter-construct correlations, confirming adequate discriminant validity.

Moreover, all HTMT values are below the conservative threshold of 0.85, further supporting the constructs' distinctiveness. Overall, these results confirm that the constructs are empirically distinct.

Table 4. Discriminant validity assessment

Fornell–Larcker criterion	AC	AES	AF	ESC	IN	PE	VI
AC	0.89						
AES	0.35	0.84					
AF	0.73	0.40	0.83				
CE	0.92	0.41	0.94				
ESC	0.65	0.38	0.59	0.81			
IN	0.58	0.40	0.61	0.53	0.80		
PE	0.53	0.40	0.42	0.50	0.58	0.79	
VI	0.58	0.33	0.55	0.68	0.47	0.40	0.81
HTMT ratio	AC	AES	AF	ESC	IN	PE	VI
AC							

AES	0.42					
AF	0.84	0.49				
ESC	0.77	0.46	0.69			
IN	0.69	0.50	0.74	0.64		
PE	0.63	0.50	0.50	0.62	0.71	
VI	0.67	0.39	0.63	0.80	0.56	0.47

Second-order construct: Reflective-reflective measurement model

The empirical evaluation of the second-order Customer Engagement (CE) construct is shown in Table 5. The outer loadings for its dimensions, Affection (AF) and Activation (AC), are notably high (0.924 and 0.934, respectively), reflecting a strong structural relationship with the higher-order construct. This is further supported by the outer weights, which are statistically significant ($p < 0.001$), robustly confirming that both facets are essential in defining customer engagement. Two dimensions had VIF values below 5, indicating no multicollinearity (J. F. Hair et al., 2019)

Table 5. Customer engagement measurement assessment

Variables	Code	Outer Loading	VIF	Weight	P-Values
Customer Engagement	CE				
Affection	AF	0.924	2.11	0.52	0.000
Activation	AC	0.934	2.11	0.56	0.000

Structural model assessment

The structural model will be assessed using bootstrapping with 5,000 subsamples. To determine the significance of the relationships between variables, we compare the standardized impact coefficient (Original Sample) and p-value to the significance threshold of 0.05 (J. F. Hair et al., 2019). Table 8 presents the results, indicating that all hypotheses are supported with $p < 0.05$ and $T > 1.96$.

Vividness (VI) has a strong positive effect on escapism experience (ESC) ($\beta = 0.52$, $p = 0.000$) and a weaker but significant effect on aesthetic experience (AES) ($\beta = 0.14$, $p = 0.011$). Interactivity (IN) and personalization (PE) both significantly influence ESC and AES, with moderate effect sizes.

Escapism experience (ESC) strongly predicts customer engagement (CE) ($\beta = 0.60$, $p = 0.000$), representing the most influential relationship in the model. Aesthetic experience (AES) also positively affects CE, though with a smaller effect size ($\beta = 0.18$, $p = 0.000$).

Mediation analysis reveals that ESC and AES significantly mediate the relationships between VI, IN, PE, and CE. The indirect effects via ESC are notably stronger than those via AES, highlighting the dominant role of escapism in driving engagement.

Table 6. Hypothesis test

	Hypothesis	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	f^2	Conclusion
H1a	VI -> ESC	0.52	0.53	0.06	8.55	0.000	0.45	Accepted
H1b	VI -> AES	0.14	0.14	0.06	2.54	0.011	0.02	Accepted
H2a	IN -> ESC	0.16	0.16	0.05	3.13	0.002	0.04	Accepted
H2b	IN -> AES	0.20	0.20	0.06	3.32	0.001	0.03	Accepted
H3a	PE -> ESC	0.20	0.20	0.06	3.20	0.001	0.06	Accepted
H3b	PE -> AES	0.23	0.23	0.06	3.86	0.000	0.04	Accepted
H4	ESC -> CE	0.60	0.60	0.04	14.28	0.000	0.58	Accepted
H5	AES -> CE	0.18	0.18	0.05	3.83	0.000	0.05	Accepted
H6a	VI -> ESC -> CE	0.31	0.32	0.04	7.26	0.000		Accepted
H6b	IN -> ESC -> CE	0.10	0.10	0.03	2.97	0.003		Accepted
H6c	PE -> ESC -> CE	0.12	0.12	0.04	3.09	0.002		Accepted
H7a	VI -> AES -> CE	0.03	0.03	0.01	2.13	0.033		Accepted
H7b	IN -> AES -> CE	0.04	0.04	0.02	2.21	0.027		Accepted
H7c	PE -> AES -> CE	0.04	0.04	0.02	2.62	0.009		Accepted

The R^2, Q^2, and SRMR were used to assess the model's fit. Table 7 indicates that the model demonstrates satisfactory explanatory power. The R^2 values are 0.54 for ESC, 0.22 for AES, and 0.47 for CE, suggesting moderate to substantial variance explained. The Q^2 values are all positive (ESC = 0.35, AES = 0.15, CE = 0.40), indicating good predictive relevance. The SRMR value of 0.07 confirms an acceptable model fit.

Table 7. The Model Fit

	R Square	R Square Adjusted	Q^2	SRMR
Escapism Experience (ESC)	0.54	0.54	0.35	0.07
Aesthetic Experience (AES)	0.22	0.21	0.15	
Customer Engagement (CE)	0.47	0.47	0.40	

Common method bias

To assess the potential for Common Method Bias (CMB), both Harman's single-factor test and the full collinearity Variance Inflation Factor (VIF) approach were conducted. The results indicate that CMB does not pose a significant threat to the validity of this study. Table 8 reports the results of Harman's single-factor test. The first factor accounts for 39.74% of the total variance, which is below the critical threshold of 50%, indicating that common method bias is not a serious concern. Furthermore, Table 9 shows that full collinearity VIF values range from 1.31 to 2.47, well below the threshold of 5. This further confirms the absence of common method bias in the data.

Table 8. Harman's single-factor test

Component	Extraction Sums of Squared Loadings					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.73	39.74	39.74	10.73	39.74	39.74

Table 9. Full Collinearity VIF

	AES	CE	DUMMY	ESC	IN	PE	VI
AES			1.31				
CE			2.47				
DUMMY							
ESC			2.40				
IN			2.02				
PE			1.69				
VI			2.03				

5. Discussion

This study contributes to the growing body of literature on augmented reality (AR) by integrating the Stimulus–Organism–Response (S–O–R) framework with Experience Economy theory to explain how technological features translate into customer engagement through differentiated experiential mechanisms. The findings not only validate the applicability of these theoretical lenses in AR contexts but also reveal important asymmetries in how specific stimuli and experiential states operate.

5.1. The effects of AR features on customer experience

From the perspective of the S–O–R model, AR features, including vividness (VI), interactivity (IN), and personalization (PE), serve as external stimuli that shape internal organismic states, namely, the escapism experience (ESC) and the aesthetic experience (AES). The results demonstrate that these stimuli do not exert uniform effects across experiential dimensions, thereby supporting the nuanced view that organismic responses are multi-layered rather than homogeneous.

At the same time, Experience Economy theory provides a complementary lens by distinguishing between different realms of experience. Specifically, escapism corresponds to a high-immersion, active participation experience, whereas aesthetic experience reflects a passive, absorptive experience. This distinction is critical in explaining why certain AR features exert stronger effects on escapism than on aesthetics.

Empirically, vividness exhibits a substantial effect on escapism ($\beta = 0.52$, $f^2 = 0.45$) but only a weak effect on aesthetic experience ($\beta = 0.14$, $f^2 = 0.02$). This finding aligns with both theories. Under S–O–R, vividness enhances sensory richness, thereby intensifying internal psychological states. Under Experience Economy theory, vividness directly facilitates immersive, escapist experiences that require deep sensory engagement and active mental participation. In contrast, aesthetic experience, being more observational, is less dependent on sensory intensity, which explains the weaker effect size. Barhorst et al. (2021) previously established a connection between vividness and customer experience within the context of flow experience, reinforcing the expectation of customers for a sensory-rich virtual environment with realistic product presentations. Such an environment not only enhances their experience but also expedites purchase decisions. Moreover, AR applications in this study are primarily used in hedonic consumption contexts (e.g., fashion, cosmetics), where experiential value outweighs functional value. In such settings, consumers are more motivated to engage with immersive features than to passively appreciate visual aesthetics.

Interactivity shows moderate effects on both escapism ($\beta = 0.16$, $f^2 = 0.04$) and aesthetic experience ($\beta = 0.20$, $f^2 = 0.03$). Within the S–O–R framework, interactivity enhances user control and

responsiveness, contributing to both experiential states. However, Experience Economy theory suggests that interactivity primarily supports active participation, which should theoretically strengthen escapism. The relatively modest effect observed here may indicate that interactivity alone is insufficient to create deep immersion unless combined with vivid sensory cues. Furthermore, the moderate level of AR familiarity (62.99%) among respondents may limit the effectiveness of interactivity. Users who are not fully proficient with AR interfaces may not fully exploit interactive features, resulting in weaker observed effects compared to vividness.

Personalization also demonstrates moderate and relatively balanced effects (ESC: $\beta = 0.20$, $f^2 = 0.06$; AES: $\beta = 0.23$, $f^2 = 0.04$). This pattern suggests that personalization simultaneously enhances both experiential realms. From an Experience Economy perspective, personalization increases perceived relevance and self-involvement, thereby enriching both active (escapist) and passive (aesthetic) experiences. The slightly stronger effect on aesthetics may reflect the visual and self-representational nature of AR applications in this study context. When AR applications allow users to customize by selecting different products in real-time and adapting images, sounds, and colors accordingly (Rese et al., 2017; Smink et al., 2020), it profoundly impacts the overall experience. Customers appreciate tailored product recommendations, which save time and enhance satisfaction, ultimately providing a positive experience.

5.2. The impacts of customer experience on customer engagement

A central finding of this study is the dominant role of escapism in driving customer engagement ($\beta = 0.60$, $f^2 = 0.58$), compared to the much weaker effect of aesthetic experience ($\beta = 0.18$, $f^2 = 0.05$). This result provides strong empirical support for both theoretical frameworks.

Within the S–O–R model, escapism represents a high-intensity organismic state characterized by cognitive absorption and emotional immersion, which naturally leads to stronger behavioral responses. Aesthetic experience, in contrast, is a lower-intensity, evaluative state, which explains its weaker predictive power. From the standpoint of Experience Economy theory, this finding reinforces the hierarchy of experiential value. Escapism belongs to the most immersive and active quadrant, which is associated with the highest level of consumer involvement and memorability. In contrast, aesthetic experiences, while valuable, are inherently more passive and therefore less likely to translate into active engagement behaviors.

The large effect size of escapism ($f^2 = 0.58$) indicates substantial practical significance, suggesting that immersive experiences are the primary mechanism through which AR technologies influence user engagement. In addition, the sample is dominated by younger consumers, who are more likely to seek immersive and entertaining experiences, thereby amplifying the role of escapism. This finding extends prior research by empirically demonstrating that not all experiential dimensions contribute equally to behavioral outcomes. Prior research had explored the relationship between escapism experience and customer engagement within the contexts of tourism and website design (Ahn and Back, 2018; L. Hollebeek and Rather, 2019; Zhang et al., 2021).

5.3. The mediating role of customer experience

The mediation analysis further clarifies the mechanism underlying AR effectiveness. Indirect effects via escapism are substantially larger (e.g., VI → ESC → CE: $\beta = 0.31$, $p < 0.001$) than those via aesthetic experience (e.g., VI → AES → CE: $\beta = 0.03$, $p = 0.033$). This effect is especially evident in AR-assisted shopping for fashion and beauty products, where consumers seek both immersive experiences and visual appeal. Due to its immersive capabilities, AR allows users to virtually try on products and temporarily disengage from their physical surroundings.

This pronounced difference suggests that immersive, high-participation experiences are significantly more effective in translating technological affordances into engagement outcomes. Within the S–O–R framework, this implies that not all organismic states are equally potent in triggering responses. Within Experience Economy theory, it confirms that escapist experiences generate stronger behavioral responses than aesthetic ones, due to their deeper cognitive and emotional involvement.

Furthermore, the central mediating role of experience is consistent with prior research. Previous literature establishes customer experience as a pivotal mediating mechanism; it bridges hedonic factors (mental imagery, entertainment, aesthetics) with decision-making satisfaction (Banik and Gao, 2023), while also transmitting the effects of technological attributes (ease of use, convenience, customization)

on retail app usage frequency (McLean et al., 2018). The findings also corroborate those of Gibson et al. (2022), who identified experience as a mediator between retail environmental factors and customer satisfaction.

5.4. Theoretical implications

By integrating S–O–R and Experience Economy theory, this study proposes a hierarchical mechanism of AR-driven engagement. Technological stimuli first shape distinct experiential states (organism), which then differentially influence behavioral outcomes (response). Among these experiential states, escapism emerges as the most critical pathway, acting as the primary conduit through which AR features translate into engagement.

Importantly, the findings demonstrate that experiential quality is not unidimensional. Instead, different types of experiences vary in their ability to drive engagement, with immersive, participatory experiences being significantly more impactful than passive, observational ones. The results further demonstrate the mediating function of customer experience.

This theoretical integration not only enriches the explanatory power of the S–O–R model but also extends Experience Economy theory into the domain of emerging digital technologies, highlighting the continued relevance of experiential value in technology-mediated consumption.

The research also offers an extension of findings about the influence of AR features on customer engagement specifically within the fashion and beauty sectors in Vietnam. Consequently, the research enhances the understanding of customer behavior about technology adoption in retail in the rising market.

5.5. Managerial implications

This study offers several actionable implications for retailers and managers seeking to leverage AR within digital service systems.

First, managers should reposition AR as a core service interface rather than a marketing add-on. The findings show that AR significantly drives customer engagement through experiential mechanisms, particularly escapism ($\beta = 0.60$). This implies that firms should integrate AR into the customer journey as an interactive service layer, enabling real-time interaction, exploration, and co-creation, rather than using it solely for product visualization.

Second, firms should prioritize immersive design elements, especially vividness, which exhibits the strongest impact on escapism ($\beta = 0.52$; $f^2 = 0.45$). Investments in high-quality 3D rendering, realistic simulations, and sensory-rich interfaces are likely to yield higher engagement returns than focusing solely on functional features.

Third, while interactivity and personalization contribute to both escapism and aesthetic experience (β ranging from 0.16 to 0.23), their effects are moderate. Managers should therefore strategically combine these features with vividness to create synergistic effects, rather than relying on them in isolation.

Fourth, the relatively weaker effect of aesthetic experience on engagement ($\beta = 0.18$) suggests that visual appeal alone is insufficient to sustain customer engagement. Retailers should shift from purely aesthetic design toward experience-centric strategies that foster immersion and active participation.

Finally, from a retail informatics perspective, firms should leverage AR to facilitate dynamic information processing, allowing customers to interact with products, receive personalized feedback, and actively shape their experiences. This transformation from passive consumption to interactive engagement can enhance both customer satisfaction and long-term relationship value.

5.6. Limitations and future research

Despite its contributions, this study has several limitations that should be acknowledged.

First, the use of non-probability convenience sampling in Ho Chi Minh City and Hanoi limits the generalizability of the findings. The sample is heavily skewed toward young, urban, digitally active consumers, particularly those aged 22–25. As such, the results primarily reflect the perceptions and

behaviors of this segment rather than the broader Vietnamese retail population. Future research should employ probability-based sampling techniques and include more diverse demographic groups (e.g., older consumers, rural populations) to enhance external validity and avoid overgeneralization.

Second, the study adopts a cross-sectional design, which restricts the ability to capture causal relationships and the temporal evolution of customer engagement in AR-enabled service systems. Future studies should consider longitudinal or experimental approaches to examine how repeated exposure to AR interfaces influences experiential states and engagement over time.

Finally, the study does not account for heterogeneity across AR platforms and application types. Different AR implementations (e.g., mobile AR, web-based AR, in-store AR) may vary in technological capabilities and user experience, potentially influencing the strength of observed relationships. Future research should conduct comparative analyses across AR platforms or specific use cases to better understand contextual differences.

6. Conclusion

This study reframes augmented reality (AR) as a core component of AR-enabled digital service systems, rather than merely a marketing tool. By integrating the Stimulus–Organism–Response (S–O–R) framework with Experience Economy theory, the findings demonstrate that AR functions as a service informatics interface that transforms how customers interact with, process information about, and engage with retail offerings. The results show that AR features, including vividness, interactivity, and personalization, do not directly drive engagement but operate through distinct experiential states. Among these, escapism emerges as the dominant mechanism ($\beta = 0.60$), significantly outweighing aesthetic experience ($\beta = 0.18$). This highlights that immersive, high-participation experiences are central to fostering engagement in AR-enabled environments. From a retail informatics perspective, AR facilitates interactive and dynamic information processing, enabling customers to actively co-create their experiences rather than passively receive information. This shifts customer–firm interaction toward a more participatory and experience-centric model.

Overall, the study contributes by positioning AR as a technology-mediated interaction platform that integrates experience creation and engagement processes. This perspective provides a stronger theoretical foundation for understanding AR's role in digital retail and offers directions for future research on service system innovation.

Acknowledgements

This research is funded by Ho Chi Minh City Open University under the grant number E2022.06.2.

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