DOI: https://doi.org/10.62985/j.huit_ojs.vol26.no3E.496

FACTORS AFFECTING CUSTOMER EXPERIENCE WHEN APPLYING VIRTUAL TECHNOLOGY IN THE RETAIL SECTOR IN HO CHI MINH CITY

Bui Thi Ngoc Anh, Nguyen Xuan Quyet*, Ho Nhu Thanh Nhan,
Tran Xuan Tai Chinh, Nong Nguyen Ngoc Linh, Nguyen Nhu Van

Ho Chi Minh City University of Industry and Trade

*Email: *quyetnx@huit.edu.vn*

Received: 12 March 2026; Revised: 25 April 2026; Accepted: 9 May 2026

ABSTRACT

In the context of rapid digital transformation, virtual technology has emerged as a research trend in various fields worldwide. However, in Vietnam, research on virtual technology mainly focuses on entertainment, while studies examining factors affecting customer experience when applying virtual technology in the retail sector are limited. Based on qualitative and quantitative research methods, the authors have identified several factors influencing customer experience when applying virtual technology in the retail sector in Ho Chi Minh City. The study proposes considering the factors: Customer motivation and technological characteristics impacting customer experience. Data were collected from 327 consumers who experienced virtual technology during shopping in Ho Chi Minh City and analyzed using quantitative methods. Based on the empirical analysis results, this study proposes managerial implications to help retail enterprises improve customer experience and increase their competitive advantage through the application of virtual technology, influencing customer purchasing decisions.

Keywords: Customer experience, virtual technology, retail sector, user experience, mobile augmented reality retail applications (MAR apps*).*

1. INTRODUCTION

Retailing is entering an era of technology-infused competition, in which digital touchpoints are no longer peripheral but central to how firms design, deliver, and differentiate value [1]. As consumers spend more time in digitally mediated environments, retailers are increasingly deploying immersive technologies such as augmented reality (AR), virtual reality (VR), and metaverse-enabled interfaces to create richer forms of engagement and to extend the customer journey beyond the constraints of physical stores [2], [3]. These technologies are evolving from novel add-ons into strategically meaningful service interfaces that blend physical and digital cues and enable phygital experiences across search, evaluation, and purchase stages [4], [5].

Among these innovations, mobile augmented reality (MAR) applications have become especially prominent in retail because they allow consumers to overlay digital information onto the physical world in real time. MAR tools (e.g., virtual try-on, AR product visualization) can reduce perceived uncertainty, support product evaluation, and increase decision confidence by enabling consumers to experience products before purchase [6]. Yet the strategic value of MAR ultimately depends not only on adoption, but on how customers

experience these interactions and how that experience translates into satisfaction and purchase-related outcomes.

Customer experience (CNEW) is widely recognized as a holistic and multidimensional phenomenon reflecting customers' cognitive, affective, behavioral, sensorial, and relational responses across firm-controlled and customer-controlled touchpoints. However, research on CNEW using MAR apps remains uneven in both context and conceptualization. Much of the current evidence base is derived from developed markets, where consumers often have higher digital literacy and more stable access to advanced infrastructure, limiting the portability of existing explanations to emerging economies [7]. This imbalance is consequential because the formation of experience in immersive environments is likely shaped by contextual conditions such as retail modernization, technology familiarity, and the maturity of platform ecosystems.

These limitations are particularly salient for Vietnam, an emerging market characterized by a young, digitally engaged population and fast-growing e-commerce, but also shaped by distinct cultural norms and infrastructural realities compared with Western settings [7]. While recent studies have begun to examine immersive retail technologies in Vietnam, the literature still lacks an integrative account of (i) the technological affordances of MAR that make experiences compelling, (ii) the motivational drivers that explain why consumers engage with MAR in the first place, and (iii) how these antecedents jointly produce a multidimensional virtual CNEW and its downstream consequences for satisfaction and purchase intention [3]. Moreover, boundary conditions remain under-theorized: technology-acceptance lenses such as TAM/UTAUT often underplay individual psychological differences, even though traits and capabilities (e.g., emotional intelligence and personality dispositions) may systematically shape how consumers interpret virtual cues and convert experience into behavioral responses, especially in emerging-market contexts [3].

2. THEORETICAL BACKGROUND

2.1. Framework of the SOR model

Incretize the mechanism of virtual experience, this study applies the SOR theoretical framework originally proposed by Mehrabian and Russell. The SOR model asserts that environmental factors stimulate cognitive and emotional states within the body, thereby driving behavioral outcomes in consumers [8].

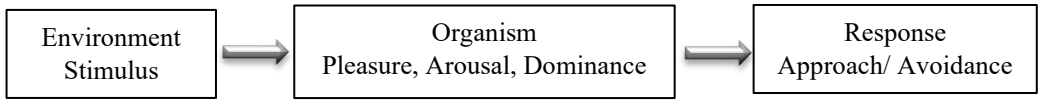

Figure 1. Framework of the SOR model

In the context of virtual retail, the stimuli (S-Stimulus) are formed from the characteristics of technology along with the motivations that drive consumers to use technology. Stimulus from technological characteristics includes three main elements: Immersion, which reflects the ability of technology to stimulate multiple senses of the user, thereby creating a feeling that they are actually present and participating in the virtual environment. Interactivity, which refers to the system's ability to respond quickly and directly to user actions and requests during the experience. Imagination reflects the user's ability to visualize and perceive objects in a virtual environment that do not exist in reality [9], [10].

Żyminkowska et al. [11] pointed out that customer motivations for adopting technology serve as critical stimulating factors. These multifaceted motivations comprise three distinct dimensions: first, hedonic motivation, which involves using technology for enjoyment,

novelty, or intrinsic interest; second, normative motivation, which arises from the desire to conform to social norms, follow trends, and align with peer influences; and third, cognitive motivation, which pertains to the pursuit of utilitarian benefits, such as finding superior products or enhancing shopping convenience and cost-efficiency.

The organism (O) component in this study is conceptualized as a multidimensional virtual experience, reflecting the consumer's internal state. Based on the comprehensive theoretical framework of Gahler et al. [12], customer experience is understood as the subjective, oriented, and multidimensional responses of users when interacting in a virtual environment. This experience includes six distinct components: (1) affective, (2) cognitive, (3) physical, (4) relational, (5) sensorial, and (6) symbolic.

The final stage of that theoretical framework is the Response (R) element, which represents the behavioral outcomes of decisions and intentional actions stemming from the consumer's internal state. During this stage, following the S-O-R model, we can observe consumer approach or avoidance behavior stemming from their processing of environmental stimuli. In the context of virtual retail in Vietnam, this is concretized through two important constructs: customer satisfaction and purchase intention. Satisfaction in the virtual environment is often formed from the degree to which the application operates smoothly, as well as the enjoyment and pleasure felt during the interaction. These are important factors in determining future customer consumption behavior [13]. Therefore, when users achieve a high level of satisfaction, they tend to form purchase intentions, such as intending to buy the product immediately from the retailer [14] or intending to continue using that technology in subsequent purchases [15].

Although the SOR (Stimulus-Organism-Response) theory is a common foundation in behavioral research, this study actively focuses on two components: S (Stimulus) and O (Organism). The reason is that in the context of applying virtual technology in the Ho Chi Minh City retail market, understanding the multidimensional structure of the customer experience (Organism) is more crucial than predicting purchase behavior (Response). By focusing on internal responses, the research provides insight into how technology interacts with user psychology, thereby laying a solid foundation for future behavioral studies.

2.2. Customer experience

Customer experience is the customer's internal response to interaction with a product or service [16], [17] and can be characterized by subjectivity and orientation [12]. Only the individual customer knows exactly what that experience was like for them, and only they can judge the content and value of the experience as negative or positive. This experience is born and exists in the moment of stimulus, directed towards a specific object or event, and the mental response occurs in a single interaction at a single touchpoint [18]. The research by Gahler et al. [12] indicated that customer experience is a multidimensional construct, focusing on customer responses throughout their purchase journey, comprising the following six components:

Affective dimension encompasses customer emotional responses such as excitement, pleasure, relaxation, reassurance, and entertainment during interactions with service providers [12], [19]. Customers often categorize emotional responses into pleasant types such as happiness, love, or unpleasant types such as anger, sadness. This component particularly focuses on pleasure and hedonic engagement in the shopping experience, as Gahler et al. [12] emphasized. Customers experience positive emotions when they rely on technology to efficiently accomplish necessary tasks, even when technology replaces humans [20]. However, customers will react negatively when their cognitive and emotional goals are not met [21]. For example, when customers feel they have to spend more time than necessary using technology, a negative experience emerges, most notably manifested as frustration and

annoyance. Stress can also arise when using technology, appearing when customers don't know how to use it or don't trust it. These stressful experiences diminish both emotional stimulation and customer satisfaction.

Cognitive dimension relates to the effectiveness of accessing products and services; it includes functional information (e.g., service quality) that helps customers evaluate and make purchasing decisions [19]. In relation to intellectual stimulation and learning during interaction, customers use cognitive processes to categorize, confirm, or reject, and synthesize information obtained from interaction with available knowledge [12]. Cognitive experience relates to functional aspects such as usability, usefulness, and product information. In retail applications, this is considered an aspect of the rational experience, often characterized by interactivity and relative advantage [17].

Physical dimension refers to the actions and responses that customers exhibit, such as body movements and postures during interactions (e.g., pleasant feelings while moving through a store or manipulating an app). Unintentional behavioral responses can be immediate actions (e.g., click-through rates) [22]. The behavioral experience relates to the actions and responses that customers exhibit, reflecting their lifestyle, how they interact with others and with the broader environment [23].

Relational dimension relates to how customers perceive their relationships with other actors (employees, other customers, technology) or with entities (brands) during interactions [12]. These relationships can range from fleeting acquaintances to strong bonds, shaping the social context of the interactions customers experience. From this perspective, virtual technology plays a key role [24]. For example, the ability to access information instantly and anywhere, as well as participate in e-commerce, has transformed how people shop – sometimes without even speaking to the service provider [25]. Emerging technologies such as artificial intelligence and chatbots enhance and support the ability of service providers to meet the increasingly diverse needs of customers.

Sensorial dimension reflects the sensory quality of interaction, involving the use of the five external senses (sight, hearing, touch, smell, taste) [12], [17]. In the digital environment, even when limited by direct contact, sensory experience is still stimulated through design elements such as visual aesthetics, color, sound, and application features during interaction. In retail application studies, sensory experience has a significant impact on customer satisfaction, even stronger than cognitive experience [17], [26].

2.3. Antecedents of customer experience

2.3.1. Customer Motivation

In the research flow on user behavior in the digital environment, customer experience is seen as the result of a complex interaction between individual motivations and the specific characteristics of virtual technology. From the user's perspective, studies often apply the theory of utility and hedonism to explain the motivational basis. In this, pragmatic motivations such as convenience, efficiency in information searching, and minimizing purchasing risks play a fundamental role in satisfaction [11], [17].

Customer motivation includes both conscious and unconscious actions, is the main driver of purchasing behavior, and plays a crucial role in influencing customer experience and decision-making. In a technology-driven retail environment, there are three main types of motivation that influence customer experience: hedonic motivation, normative motivation, and cognitive motivation [11], [17].

Hedonic motivation relates to the emotional responses, pleasure, and excitement that customers seek in their interactive experiences with technology [16], [17]. In hyper-personalized retail, customers seek immersive and interactive experiences to enhance enjoyment. Hedonic

motivation are identified as the most influential factor driving consumer experience and adaptive behavior in the retail industry. For example, the feeling of satisfaction in terms of enjoyment is enhanced through the interactive features of mobile applications [26], [27].

H1a: *Hedonic motivation positively impact customer experience*

According to Żyminkowska et al. [11], Cognitive motivation serves as a pivotal antecedent of the customer experience within contemporary retail landscapes. This motivational construct is fundamentally predicated upon core utilitarian values, specifically utility, functionality, and pragmatic practicality. In the process of market engagement, consumers are primarily driven by an inherent need for self-efficacy and systemic efficiency when navigating digital interfaces. Consequently, individuals actively seek convenience, time-optimized solutions, and frictionless decision-making frameworks to streamline their cognitive load. In virtual environments, cognitive motivation manifests as a deliberate pursuit of functional information requisite for rigorous product evaluation and informed selection. The implementation of highly intuitive and application-oriented interactions not only bolsters the consumer's perceived competence but also diametrically reduces structural barriers within the purchase journey. When these dimensions of utility and performance are effectively satisfied, they catalyze a positive psychological state, thereby fostering a synergistic enhancement of the overall customer experience. Thus, the augmentation of cognitive attributes in retail environments is hypothesized to yield a statistically significant and positive influence on consumer perception and brand appraisal."

H1b: *Cognitive motivations have a positive impact on customer experience*

Normative motivation represents a critical social antecedent that modulates the architecture of the customer experience within contemporary retail ecosystems. This construct is predicated upon the individual's psychological imperative for social integration and adherence to the expectations of salient reference groups. Consumers frequently exhibit a propensity for trend-conforming behaviors as a mechanism to affirm their social identity and maintain equilibrium with prevailing societal standards. The susceptibility of consumers to peer opinions underscores that the customer experience is a reflective process of shared social values rather than a solitary phenomenon. By cultivating community-centric touchpoints, retailers facilitate the fulfillment of the consumer's inherent need for social validation and perceived status. Normative motivations play a significant role in sought-after experiences such as the need to communicate or share shopping experiences [28]. Consequently, normative motivation is hypothesized to exert a statistically significant and positive influence on the multi-dimensional customer experience.

H1c: *Normative motivations have a positive impact on customer experience*

In the retail environment, these factors do not operate independently but often intertwine. For example, interactions within mobile applications can influence both the utility and hedonic value for customers [17]. The integration of digital channels also helps create multidimensional experiences encompassing cognitive, emotional, behavioral, sensory, and social responses [29]. Overall, to enhance customer experience, especially in hedonic applications, it is necessary to recognize that experiences are strongly emotional, and the utility customers receive from an experience is the sum total of benefits. Customers perceive a stronger experience when engaging with hedonic applications.

2.3.2. Mobile Augmented Reality (MAR) features

Studies on interactive technologies emphasize the importance of the sense of presence in influencing consumer adoption intentions. Interactive technologies such as AR and VR enable real-time responses between virtual objects and the physical environment. Specifically, through applications from Sephora or IKEA, customers no longer play a passive role but

become active participants in the shopping process, such as "virtual trying on" or customizing product placement in 3D space. This interaction not only enriches the multisensory experience but also serves as a prerequisite for promoting customer adoption intentions in the post-pandemic era [10]. Interactivity has been shown to have a positive impact on shopping behavior. One key result is that integrating interactive features on retail shopping websites provides consumers with a more engaging and immersive shopping experience [30], [31].

H2a: *Interactivity positively impacts customer experience.*

From a user experience perspective, the difference between AR and VR lies in the level of interaction with reality. While AR acts as a digital information overlay on the real world, VR represents the highest form of immersive experience thanks to its ability to establish a separate simulated environment, completely replacing traditional visual and auditory perception. This immersion is amplified through wearable devices such as VR glasses, allowing users to detach from reality and deeply penetrate the virtual store space. Virtual reality (VR) shopping experiences immerse users in the activity they are participating in, which is an enjoyable state with a positive relationship to the behavioral intention of using VR technology to shop. The sense of presence arising from immersion is a functional mechanism that enhances consumer attitudes and behavioral responses to brands [10].

H2b: *Immersion positively impacts customer experience*

The element of imagination reflects the user's ability to visualize and intuitively perceive objects in a virtual environment. Instead of relying on conventional 2D images, the user's imagination is now supported by vivid 3D models that allow them to accurately predict the value and functionality of the product in a real-world usage context. Applications like IKEA “Place” provide an enhanced creative activity by embedding multiple IKEA products such as sofas, chairs, and lamps into a single physical environment of the customer (e.g., a living room). By allowing customers to visualize multiple products, AR helps reduce the effort required to create mental images [32]. When interacting on IKEA, customers can easily arrange, customize, and transform virtual products to suit various physical environments. This interactive representation process allows customers to simulate many different experiences with products and services in a variety of situations. This means that creativity supported by AR has an expressive function [33], [34] in which AR allows customers to experiment with unusual purchasing decisions and differentiate their particular purchasing solution from others [35].

H2c: *Imagination positively impacts customer experience in technology-assisted virtual shopping.*

2.4. Proposed research model

Based on theoretical foundations and research overview, the authors propose the following research model to investigate factors influencing customer experience when applying virtual technology in the retail sector in Ho Chi Minh City.

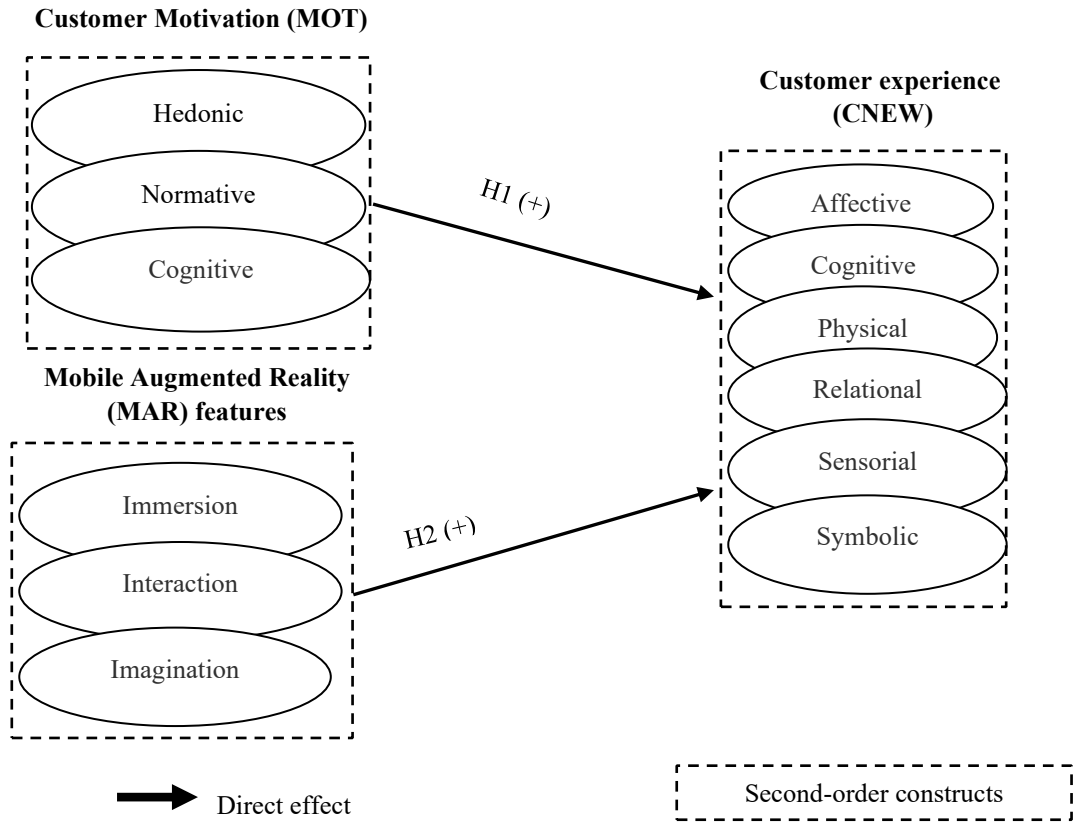

Figure 2. Proposed research model

3. RESEARCH METHODOLOGY

3.1. Research process

By employing a mixed-methods methodology, this research synergizes qualitative insights with quantitative data to provide a comprehensive analysis of the research problem.

Qualitative research: The observed variables in the research model were inherited and adjusted from previous studies to ensure reliability and content validity. Specifically, the preliminary scale used in this study was developed based on foreign studies. In particular, the customer experience variable uses the measurement scale of Gahler et al. [12], the customer motivation variable is used and adjusted from measurement scale of Żyminkowska et al. [11], and the MAR features variable uses the measurement scale of Kim et al. [10]. The authors conducted a preliminary survey of 30 consumers who had experienced AR/VR technology to provide a basis for adjusting and refining the scale for the formal study.

Quantitative research in this study was conducted in two stages: (1) Evaluating the measurement model and (2) Evaluating the structural model. The measurement model was evaluated for internal consistency - Cronbach Alpha, the individual reliability of each scale/variable, average variance extracted (AVE), and discriminant validity using Fornell-Lacker criterion. The significance level of the relationship between the concepts in the research model was evaluated using Bootstrapping with N = 5000 [36]. To predict the model, the following criteria can be used: predictive fit (Q^2), coefficient of determination (R^2), and impact level (f^2).

3.2. Scale measurement

The authors used a 7-point Likert scale to collect the opinions and attitudes of respondents based on the questions and provided answers based on the level of agreement: (1) Completely disagree, (2) Disagree, (3) Partially disagree, (4) Neutral, (5) Partially agree, (6) Agree, (7) Completely agree.

Table 1. Origin of the scales used to measure the concepts in the model

Construct/ Dimension	Coding	Number of items	Source
Customer motivations (MOT)			
Hedonic motivation	MOTA	4	Żyminkowska et al. [11]
Normative motivation	MOTB	4	
Cognitive motivation	MOTC	3	
MAR features			
Immersion	IMM	3	Kim et al. [10]
Interaction	INT	3	
Imagination	IMA	3	
Customer experience (CNEW)			
Affective	AFF	3	Gahler et al. [12]
Cognitive	COG	3	
Physical	BEH	3	
Relational	REL	3	
Sensorial	SEN	3	
Symbolic	SYM	3	

3.3. Formal research sample

Survey sampling criteria: The analysis unit and survey respondents are consumers in Ho Chi Minh City who have experienced virtual technology, specifically VR/AR, during shopping within the past 6 months.

Sampling method: Convenience sampling was chosen as the primary sampling method. The tool used to send out the survey questionnaire was Microsoft Forms. The sample size followed the 10:1 rule [37], with the dependent variable Cnew having the most indicators, comprising 15 observed variables. Therefore, the minimum sample size is 15*10 = 150 samples.

Data analysis was performed using Partial Least Squares Structural Equation Modeling (PLS-SEM), facilitated by SmartPLS 3.2.9 software. This method was selected due to its robustness in managing complex structural models and its superior efficacy in predictive-oriented research. Furthermore, PLS-SEM is particularly well-suited for theoretical development within emerging technological domains, such as virtual reality, where the exploration of nascent relationships is paramount.

Official sample*:* there are 327 valid responses out of 425 participants. This sample size is suitable for the official sample (the minimum sample size of 150 is sufficient).

4. RESULTS

4.1. Characteristics of the research sample

Out of 425 questionnaires collected, 327 valid responses were retained from consumers in Ho Chi Minh City. The gender distribution within the sample is relatively balanced, with females representing a slightly higher proportion at 54.4% (178 respondents) compared to 45.6% for males (149 respondents). Notably, 76.4% of participants fall within the 16 to 30 age bracket. This demographic represents a youthful consumer segment that is highly receptive to new experiences and adept at adopting disruptive technological applications such as AR/VR.

Regarding educational background, the respondents possess high academic qualifications, with 89.6% holding either a Bachelor's or Postgraduate degree. This profile is consistent with the sample's occupational structure, where students (47.7%) and office professionals/ specialists (37.9%) constitute the core components. Although monthly income levels primarily range from 5 to 20 million VND, it is significant that 63% of respondents reported a shopping frequency that "no specific pattern". This evidence points toward a dynamic and impulsive consumption culture, catalyzed by the vibrant retail and e-commerce landscape currently prevalent in Ho Chi Minh City. Collectively, the integration of high digital literacy and fluid purchasing habits provides a robust empirical foundation for analyzing the impact of virtual technologies on contemporary customer experiences. Table 2 provides further details on the characteristics of the selected survey subjects.

Table 2. Descriptive results of participants

Criteria	Items	Number of samples	%
Gender	Male	149	45.6%
	Female	178	54.4%
Age	16-20	58	17.7%
	21-30	192	58.7%
	31-40	51	15.6%
	41-50	19	5.8%
	Age ≥ 51	7	2.2%
Education	Undergraduate	34	10.4%
	University	258	78.9%
	Postgraduate	35	10.7%
Occupation	Student	156	47.7%
	Employee/ Professional	124	37.9%
	Businessperson/ Entrepreneur	29	8.9%
	Housewife	11	3.4%
	Unemployed/ Retired	7	2.1%
Monthly income (*)	Income < 5	84	25.7%
	5 ≤ Income <10	133	40.7%
	10 ≤ Income <20	79	24.1%
	20 ≤ Income <40	22	6.7%

	Income ≥ 40	9	2.8%
Frequency of shopping	1-3 times/ year	18	5.5%
	4-6 times/ year	39	11.9%
	7-10 times/ year	64	19.6%
	No specific pattern	206	63%
Total		N=327	100%

** Million Vietnamese Dong*

4.2. Results of measurement model LOC

Table 3. Results of factor loadings, CR, and CA values

Construct/ Dimension	Factor loading	CA	CR	AVE
Hedonic motivation (MOTA)		0.856	0.903	0.698
1. Enjoyment	0.843			
2. Curiosity	0.842			
3. Learning/acquiring new skills	0.851			
4. Receiving invitations to interesting events	0.805			
Normative motivation (MOTB)		0.834	0.889	0.668
1. Making contacts with other users	0.810			
2. Joining the consumer communities (e.g. brand fans)	0.816			
3. Being respected by others (peers, users)	0.861			
4. Priority in receiving news (e.g. about new products)	0.780			
Cognitive motivation (MOTC)		0.875	0.923	0.800
1. With virtual technology applications, I can shop more efficiently in terms of productivity.	0.879			
2. With virtual technology applications, I can shop more efficiently.	0.912			
3. I find virtual technology applications useful for shopping.	0.891			
Immersion (IMM)		0.893	0.934	0.824
1. I feel like I'm immersed in the virtual environment.	0.923			
2. I feel completely captivated by the virtual environment.	0.922			
3. I feel like I'm in the virtual environment.	0.878			
Interaction (INT)		0.868	0.920	0.792
1. I can easily identify and label the characteristics of virtual applications.	0.869			
2. I can easily select product samples and apply them to these product samples using virtual applications.	0.922			
3. I can easily manipulate virtual applications.	0.879			
Imagination (IMA)		0.867	0.919	0.790
1. Virtual reality applications help me understand retailers' products better.	0.869			

2. Virtual environments help me understand the visual relationship between products and my own image when experiencing products on a virtual reality application.	0.922			
3. Virtual reality environments help me understand the relative position of products on my own body (glasses on my face, lipstick on my lips, etc.).	0.879			
Affective (AFF)		0.874	0.923	0.799
1. Interaction with virtual technology applications on mobile phones (virtual technology) evoked positive emotions.	0.877			
2. I felt positive during my time interacting with virtual technology.	0.904			
3. Interaction with virtual technology put me in a good mood.	0.900			
Cognitive (COG)		0.822	0.894	0.737
1. Exposure to virtual technology has stimulated my curiosity.	0.831			
2. I have learned something beneficial during my time interacting with virtual technology.	0.858			
3. I have gained positive insights during my time interacting with virtual technology.	0.886			
Physical (BEH)		0.796	0.881	0.711
1. My physical responses during my exposure to virtual technology were very pleasant.	0.818			
2. During my exposure to virtual technology, I actively moved in the way I liked.	0.888			
3. During my exposure to virtual technology, I acted proactively in the way I preferred.	0.822			
Relational (REL)		0.764	0.894	0.809
1. I have established a personal relationship with virtual technology.	0.875			
2. My exposure to virtual technology makes me feel like I belong to a community.	0.877			
Sensorial (SEN)		0.874	0.923	0.799
1. Exposure to virtual technology has a positive sensory appeal.	0.883			
2. Exposure to virtual technology has a positive impact on my senses.	0.901			
3. Exposure to virtual technology has positively engaged my senses in various ways.	0.897			
Symbolic (SYM)		0.843	0.905	0.761
1. My exposure to virtual technology made me feel like I was expressing my true self.	0.872			
2. My exposure to virtual technology affirmed my values and beliefs.	0.892			
3. I felt that [the experience partner] truly understood me as a person.	0.853			

Note. AVE = average variance extracted; CA: Cronbach Alpha, CR = composite reliability;

Table 3 presents the results of the convergent validity analysis of the concepts in the research model through the following criteria: Factor loadings, composite reliability (CR), Cronbach's alpha (CA), average variance extracted (AVE).

According to Henseler, Ringle & Sarstedt [38], the closer the factor loadings coefficient is to 1, the higher the reliability of the latent variable. The factor loading ≥ 0.7 is considered acceptable. Composite Reliability (CR) is preferred by many researchers over Cronbach's Alpha because Cronbach's Alpha gives lower reliability ratings compared to CR. According to Chin [39] suggested that in exploratory studies, CR should be 0.6 or higher. For confirmatory studies, a threshold of 0.7 is considered appropriate for the CR index [40]. Many other researchers also agree that 0.7 is a suitable threshold for the vast majority of cases, such as Hair et al. [37] and Bagozzi & Yi [41].

The results of testing all three indicators - Factor loadings, Cronbach alpha, and Composite reliability are as follows: Factor loadings ranged from 0.780 - 0.923 > 0.7; Cronbach alpha ranged from 0.764 - 0.893; the CR had a lowest level of 0.881 and a highest level of 0.934; and the AVE coefficient ranged from 0.698 - 0.824. All these coefficients are at acceptable levels, indicating that the scales measuring the latent constructs possess high reliability and satisfy the requirements for convergent validity.

Table 4. Second-order constructs analysis with repeated indicators approach

Constructs/Dimensions	No. of scale items		First phases			Second phases		
	Original	*Final*	*CA*	*CR*	*AVE*	*CA*	*CR*	*AVE*
Customer motivation						0.907	0.941	0.842
Hedonic motivation (MOTA)	4	4	0.856	0.903	0.698			
Normative motivation (MOTB)	4	4	0.834	0.889	0.668			
Cognitive motivation (MOTC)	3	3	0.875	0.923	0.800			
MAR features						0.868	0.919	0.792
Immersion (IMM)	3	3	0.893	0.934	0.824			
Interaction (INT)	3	3	0.868	0.920	0.792			
Imagination (IMA)	3	3	0.867	0.919	0.790			
Customer experience (CNEW)						0.917	0.935	0.706
Affective (AFF)	3	3	0.874	0.923	0.799			
Cognitive (COG)	3	3	0.822	0.894	0.737			
Physical (BEH)	3	3	0.796	0.881	0.711			
Relational (REL)	3	2	0.764	0.894	0.809			
Sensorial (SEN)	3	3	0.874	0.923	0.799			
Symbolic (SYM)	3	3	0.843	0.905	0.761			

Note. CA: Cronbach Alpha, CR = composite reliability; AVE = average variance extracted

Using the two-stage approach, following the evaluation of the first-order structure of the observed variables, the authors proceeded to assess the second-order variables, with the results presented in Table 4. The CA, CR, and AVE values of the second-order variables were all higher than 0.7 and 0.5, respectively. All three second-order variables achieved construct reliability and convergent validity. Consequently, the reliability of the measurement scales is acceptable for the second-order structures. Additionally, during the assessment of the first-order structure, the outer loading of indicator REL2 was found to be only 0.493, which is

considerably below the standard threshold of 0.70. Therefore, REL2 was removed to improve scale quality. Following this removal, the measurement model was re-evaluated to ensure that all criteria for reliability and convergent validity were fully satisfied.

To evaluate discriminant validity within the research model, one of the most widely recognized methods is the Fornell-Larcker criterion, established by the respective authors in 1981 [42]. The fundamental principle of this approach involves comparing the square root of the Average Variance Extracted ($\sqrt{AVE}$) for each construct against the correlation coefficients between that specific construct and all other latent variables in the model. The AVE serves as a measure of the average explanatory power of a latent variable over its constituent observed indicators. According to this criterion, discriminant validity is confirmed if the $\sqrt{AVE}$ of a construct is greater than its highest correlation with any other latent construct. This outcome demonstrates that a latent variable shares more variance with its own assigned indicators than it does with other distinct concepts within the structural model.

Table 5. Assessing discriminant validity according to Fornell Larcker

	COG	SYM	AFF	IMA	IMM	INT	MOTA	MOTB	MOTC	SEN	BEH	REL
COG	0.859											
SYM	0.539	0.873										
AFF	0.711	0.627	0.894									
IMA	0.104	0.121	0.164	0.889								
IMM	0.076	0.196	0.158	0.583	0.908							
INT	0.110	0.155	0.172	0.834	0.644	0.890						
MOTA	0.557	0.475	0.520	0.106	0.079	0.099	0.836					
MOTB	0.542	0.492	0.523	0.149	0.073	0.135	0.776	0.817				
MOTC	0.473	0.370	0.436	0.041	0.003	0.031	0.781	0.735	0.894			
SEN	0.668	0.680	0.672	0.101	0.154	0.129	0.588	0.540	0.526	0.894		
BEH	0.640	0.610	0.714	0.081	0.115	0.106	0.510	0.492	0.459	0.692	0.843	
REL	0.523	0.648	0.669	0.103	0.118	0.092	0.491	0.555	0.422	0.669	0.635	0.899

The Fornell–Larker discriminant validity test results show that the square root of the extracted variance (AVE) of each latent variable is greater than the correlation coefficient between that variable and the other latent variables in the model. The values on the diagonal range from 0.817 to 0.908, all higher than the corresponding correlation coefficients in the same row and column. This demonstrates that each latent variable is highly discriminant, meaning the concepts in the research model are relatively independent and there is no measurement overlap.

4.3. Structural model assessment and hypothesis testing

To ensure the robustness of the structural estimates, multicollinearity was first assessed. As presented in Table 6, the Variance Inflation Factor (VIF) values for both customer motivation (MOT) and MAR features were 1.010. These values are well below the conservative threshold of 3.3, confirming the absence of multicollinearity within the model.

Regarding the model's explanatory and predictive power, the R^2 value for customer experience (CNEW) was 0.435, indicating that the model explains 43.5% of the variance in customer experience. This represents a scientifically meaningful result in the context of consumer behavior research toward emerging technologies. According to Hair et al. [36], this

R^2 level is considered moderate, accurately reflecting the fact that human behavior and experience constitute a highly complex phenomenon influenced by numerous tangible and intangible factors. Furthermore, the Stone-Geisser Q^2 value of 0.303 falls within the range of $0.15 \leq Q^2 < 0.35$, confirming that the model possesses medium predictive relevance, which is particularly meaningful for the virtual retail sector in Ho Chi Minh City.

Hypothesis testing was conducted using a bootstrapping procedure with 5,000 samples (Table 7). The results indicate that all proposed hypotheses were supported at the 95% confidence level ($p < 0.05$). Customer motivation ($\beta = 0.642$) exerted a substantially stronger positive influence on customer experience compared to MAR features ($\beta = 0.101$).

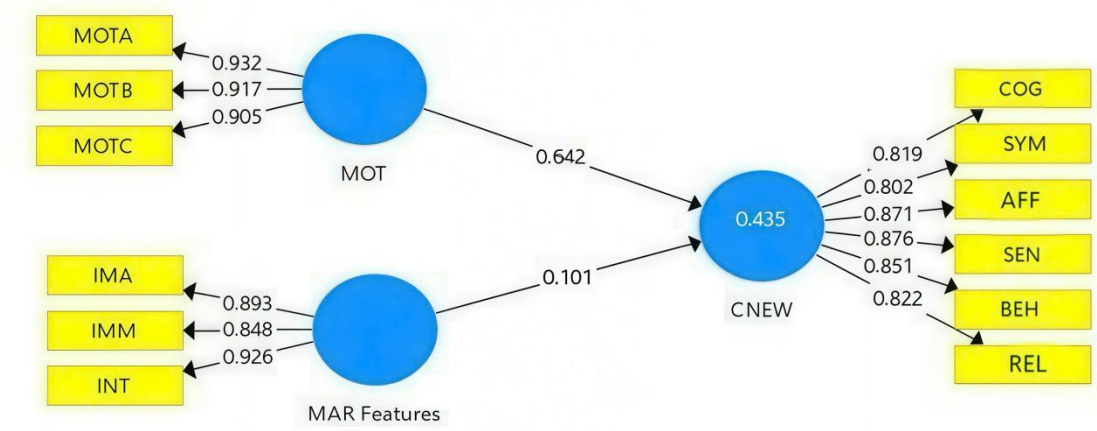

Figure 3. PLS SEM estimation results

To further evaluate the relative impact of each independent variable, the effect size (f^2) was examined (Table 6). Customer motivation (MOT) demonstrated a large effect on customer experience ($f^2 = 0.723$), whereas MAR features showed a small-to-moderate effect ($f^2 = 0.018$). These findings confirm that in the virtual retail environment, the inner world and personal impulses of consumers play a dominant role, far surpassing purely external technical features.

Table 6. Results of testing coefficients R^2, Q^2, f^2

Items	VIF	R^2	Q^2	f^2
MAR features	1.010			0.018
MOT	1.010			0.723
CNEW		0.435	0.303	

The hypothesis testing results in the model (Table 7) are both accepted, with customer motivation (MOT) having a significant impact on customer experience (CNEW) and Mobile Augmented Reality (MAR) features having a significant impact on CNEW.

Table 7. The results of the hypotheses in the model

Paths (Hypotheses)	Original Sample	Sample Mean	Standard Deviation	T Statistics	P values	Results
MOT -> CNEW	0.642	0.644	0.041	15.780	0.000	Significant
MAR features -> CNEW	0.101	0.102	0.051	1.994	0.046	Significant

5. DISCUSSIONS AND IMPLICATIONS

5.1. Discussions

5.1.1. Application of the S-O-R theoretical framework and model fitness

This study adopts the Stimulus-Organism-Response (S-O-R) framework to decode the impact of virtual technology on consumer behavior. However, instead of analyzing the entire trajectory leading to purchasing behavior (Response), the authors prioritize deciphering the Organism component through the customer experience variable. This strategic choice is grounded in the fact that AR/VR technology in Vietnam is currently in its early stage; therefore, decoding the black box of user psychology remains the paramount priority. When the customer experience is optimized and reaches a positive threshold, behavioral responses such as purchase intention or loyalty will emerge as inevitable and natural outcomes.

Statistically, the model achieved a coefficient of determination of R^2= 0,435. In the context of an emerging technology market, a predictive level of 43.5% is considered a realistic indicator with significant scientific value. In Vietnam, user experience is currently fragmented by various external factors outside the scope of this model, such as heterogeneity in personal device configurations (smartphones, VR headsets), unstable internet bandwidth, and a lack of basic 3D interface navigation skills among users. The model's success in isolating core factors (customer motivation and MAR features) amidst a matrix of confounding noise provides a genuine insight into the power of technological stimuli on the internal states of consumers in the current period.

5.1.2. The dominant role of customer motivation (MOT)

Empirical results confirm that customer motivation (MOT) is the most powerful factor influencing experience. This dominant impact is closely linked to the demographic characteristics in Ho Chi Minh City, where digital natives constitute a significant proportion of the sample (47.7% are students). For this group, AR/VR is not merely a utilitarian shopping tool; more importantly, it serves as a medium to satisfy hedonic needs and affirm personal identity.

This finding aligns with the research of Zyminkowska et al. [11] regarding the universality of hedonic needs in the experience economy. MOT functions as a psychological filter: when motivation is sufficiently strong, consumers are willing to invest substantial psychological resources, such as focus and emotion, and may even overlook technical limitations to achieve a state of engagement. Therefore, MOT acts as the primary catalyst that sustains the vitality of the entire virtual experience, while technological features serve as the supporting framework.

5.1.3. Limited impact of MAR features and market specifics

The research results indicate that MAR features have a weak impact on customer experience. This implies that although technical characteristics such as interaction, immersion, and imagination are essential components for building a virtual retail model, they are not yet the breakthrough factors in the experience of consumers in Ho Chi Minh City. In studies conducted in developed markets such as the US, Europe, or South Korea, exemplified by Kim et al. [10] or Heller et al. [32], MAR features typically play a prerequisite role with a very strong impact. In those nations, virtual experience has reached a level of mature technology, where customers have moved past the initial acquaintance phase and become more demanding regarding interface smoothness, sensor latency, and the realism of 3D imagery. In such contexts, technical sophistication is the detonator that creates differentiated value for the experience.

Conversely, the application of virtual technology in the Ho Chi Minh City retail sector remains in its early stage. Most users in Vietnam experience virtual technology via mid-range mobile devices. The screen resolution, internet bandwidth, and graphic processing capabilities of these devices are insufficient to fully convey the immersion or imagination that high-end AR/VR technology aims for. Consequently, even well-designed MAR features suffer significant performance degradation when reaching the end-user. For consumers in a market just becoming acquainted with the technology, they prioritize emotion and excitement over technical perfection. Customers are willing to accept a rudimentary interface as long as it delivers joy and satisfies their curiosity.

Therefore, MAR features currently function as a hygiene factor, meaning they are a necessary condition to form the virtual model, but investing in technology alone without a deep understanding of customer motivation will fail to produce a breakthrough experience. Retailers must avoid the technology race trap and remain focused on the core psychological value of users during the early stages of digital transformation.

5.1.4. Socio-political practical contributions and green growth

The research findings also contribute to the realization of national and regional strategic orientations. Researching and promoting the application of virtual technology in the Ho Chi Minh City market serves as empirical evidence for the implementation of Resolution No. 57-NQ/TW of the Politburo on the direction of socio-economic development in the Southeast region. As the nation's economic locomotive and innovation hub, Ho Chi Minh City prioritizes digital transformation and the digital economy as new growth drivers. This study provides evidence that virtual technology is not just a transient trend but an effective tool for domestic retailers to enhance customer experience, thereby increasing competitive advantage in the digital economy in accordance with the Resolution.

Furthermore, the study opens a new perspective on the link between retail technology and the National Green Growth Strategy for the 2021-2030 period. Virtual shopping technology such as virtual try-on features allows customers to interact with and visualize products realistically before deciding, significantly improving selection accuracy. A direct consequence of this process is a reduction in the return rate, one of the largest sources of waste in e-commerce today. Minimizing reverse logistics not only helps businesses save costs but also contributes directly to environmental goals by reducing carbon emissions from transport vehicles and limiting packaging waste. Thus, virtual technology in retail transcends the boundaries of a mere marketing tool to become a green technology solution, promoting responsible consumption and aligning with the Government's commitment to emission reduction.

These findings affirm that investing in virtual experience is a strategic step that harmonizes corporate economic interests with social responsibility. These results are significant not only for retail managers in Ho Chi Minh City but also serve as a vital reference for policymakers in encouraging sustainable digital business models, contributing to Vietnam's progress toward green growth and a circular economy.

5.2. Implications

Based on the empirical findings, this study proposes strategic implications aimed at assisting retailers in Ho Chi Minh City in developing Phygital Dynamic Capabilities. This encompasses more than a mere technological execution, it represents the organizational capacity to sense, seize, and transform digital values to optimize the customer experience journey within the context of a robust digital transformation. The research results confirm that customer motivation serves as the fundamental fuel governing the experience. Consequently, managers must implement a pivotal shift in mindset, moving from the provision of purely technical tools to the stimulation of experiential desires grounded in intrinsic motives.

Specifically, enterprises should integrate gamification elements and social interaction mechanisms to satisfy hedonic needs and the drive for self-identity among young digital natives, who constitute a significant portion of the surveyed sample. Rather than focusing on the dry technical specifications of AR/VR systems, communication campaigns should be designed to target curiosity and social connectivity, thereby transforming virtual shopping into an inspiring journey of personal discovery and entertainment value.

Furthermore, while technological features currently function as a hygiene factor, their value can be significantly enhanced if businesses leverage deep personalization capabilities to create a mirror effect for consumers. Retailers should optimize Augmented Reality interfaces to allow customers to freely experiment with idealized versions of themselves through virtual avatars. Permitting users to customize virtual fitting rooms or store personalized digital collections not only increases technical interactivity but also fosters internal trust through the congruence between the virtual imagery and the user's vivid reality. This transition from observing virtual objects to experiencing a virtual identity within the digital space acts as a critical touchpoint, helping customers overcome initial psychological barriers and proceed toward actual purchasing behaviors. Simultaneously, this experience must be nurtured within a Social-Phygital ecosystem, where businesses create shared virtual shopping spaces that allow users to invite friends to interact and provide real-time feedback, blurring the boundaries between solitary shopping and social activity to establish sustainable brand engagement.

Finally, to realize national macro-strategic orientations, such as Resolution No. 57-NQ/TW and the National Green Growth Strategy for the 2021-2030 period, retailers must position virtual technology as a highly responsible environmental solution. Businesses need to vigorously communicate the environmental benefits of virtual try-on features by demonstrating how they assist customers in making more accurate purchasing decisions, thereby directly reducing return rates and associated waste. Minimizing the carbon footprint from logistics activities and reducing packaging waste is not merely a technical objective but a method for businesses to build a more humane, modern, and sustainable brand image. Aligning the customer experience with social responsibility and green values will generate a unique competitive advantage, catering to the responsible consumption trends in dynamic urban areas like Ho Chi Minh City while contributing to the promotion of a circular economy in the era of comprehensive digitalization.

6. LIMITATIONS AND FUTURE RESEARCH

Despite achieving significant findings, this study is not without limitations, which concurrently present promising avenues for future research. Firstly, regarding sampling and generalizability: This study employed a convenience sampling method within Ho Chi Minh City, with a predominant focus on young consumers (students accounting for 47.7%). While these results accurately reflect the behavior of digital natives in Vietnam's most dynamic economic hub, the generalizability to older age groups or different geographical regions with distinct shopping cultures remains limited. Future research should expand the survey scope to cross-national or multi-regional levels to validate the model's robustness across diverse cultural contexts.

Secondly, regarding methodology and measurement: The reliance on a structured questionnaire with closed-ended questions may have constrained the ability to capture in-depth feedback or complex psychological nuances of users toward emerging technologies. Subsequent studies could benefit from a mixed-methods approach, integrating qualitative techniques such as in-depth interviews or direct behavioral observation to better understand the technical and psychological barriers consumers encounter in augmented reality environments.

Finally, regarding the theoretical framework and variable scope: The present study intentionally focused on the Organism component of the S-O-R model to decode the mechanisms underlying customer experience, a paramount priority during the early stages of technology adoption. However, the exclusion of the Response component means the link between virtual experience and actual purchasing behavior has not been fully quantified. Consequently, further studies should expand the model to examine how various dimensions of virtual experience translate into purchase intentions, brand loyalty, or green advocacy behaviors within the circular economy.

Acknowledgment: This work was financially supported by Ho Chi Minh City University of Industry and Trade under Contract no 459/HĐ-DCT dated December 15th, 2025.

REFERENCES

[1] D. Grewal, A. L. Roggeveen, S. Benoit, M. Lucila Osorio Andrade, R. Wetzels, and M. Wetzels, "A new era of technology-infused retailing," *Journal of Business Research,* vol. 188, p. 115095, 2025, doi: https://doi.org/10.1016/j.jbusres.2024.115095.

[2] M. Gandhi, A. Gaur, A. K. Kar, and Y. K. Dwivedi, "Crafting user experiences in the metaverse: A design science study," *Technological Forecasting and Social Change,* vol. 209, p. 123759, 2024, doi: https://doi.org/10.1016/j.techfore.2024.123759.

[3] F. S. Rumokoy and B. Frank, "Retail value creation through augmented reality: The role of task-technology fit, consumer knowledge, and personality," *Journal of Retailing and Consumer Services,* vol. 84, p. 104173, 2025, doi: https://doi.org/10.1016/j.jretconser.2024.104173.

[4] W. Batat, "Phygital customer experience in the metaverse: A study of consumer sensory perception of sight, touch, sound, scent, and taste," *Journal of Retailing and Consumer Services,* vol. 78, p. 103786, 2024, doi: https://doi.org/10.1016/j.jretconser.2024.103786.

[5] L. Moi, G. Pusceddu, and F. Cabiddu, "Phygital dynamic capabilities: Microfoundations and their reversed interplay," *Technological Forecasting and Social Change,* vol. 223, p. 124423, 2026, doi: https://doi.org/10.1016/j.techfore.2025.124423.

[6] Q. H. Nguyen, T. T. Hanh, N. L. M. Hanh, N. D. L. Nhi, D. N. Anh, and H. T. Linh, "The impacts of virtual try-on for online shopping on consumer purchase intention: the moderating role of technology experience," *Cogent Business & Management,* vol. 12, no. 1, p. 2500774, Dec. 2025, doi: https://doi.org/10.1080/23311975.2025.2500774.

[7] G. N. Vajpai, T. Webb, and S. Beldona, "Designing a memorable dining experience lexicon based on theory and text mining," *International Journal of Hospitality Management,* vol. 130, p. 104245, 2025, doi: https://doi.org/10.1016/j.ijhm.2025.104245.

[8] J. Zhou, W. D. Dahana, Q. Ye, Q. Zhang, M. Ye, and X. Li, "Hedonic service consumption and its dynamic effects on sales in the brick-and-mortar retail context," *International Journal of Hospitality Management,* vol. 70, p. 103178, 2023, doi: https://doi.org/10.1016/j.jretconser.2022.103178.

[9] W. Bin Kim and H. Jung Choo, "How virtual reality shopping experience enhances consumer creativity: The mediating role of perceptual curiosity," *Journal of Business Research,* vol. 154, p. 113378, Jan. 2023, doi: https://doi.org/10.1016/j.jbusres.2022.113378.

[10] J. H. Kim, M. Kim, M. Park, and J. Yoo, "Immersive interactive technologies and virtual shopping experiences: Differences in consumer perceptions between augmented reality

(AR) and virtual reality (VR)," *Telematics and Informatics,* vol. 77, p. 101936, Feb. 2023, doi: https://doi.org/10.1016/j.tele.2022.101936.

[11] K. Żyminkowska, J. Perek-Białas, and G. Humenny, "The effect of product category on customer motivation for customer engagement behaviour," *International Journal of Consumer Studies,* vol. 47, no. 1, pp. 299–316, 2023, doi: https://doi.org/10.1111/ijcs.12837.

[12] M. Gahler, J. F. Klein, and M. Paul, "Customer Experience: Conceptualization, Measurement, and Application in Omnichannel Environments," *Journal of Service Research*, vol. 26, no. 2, pp. 191–211, May 2023, doi: https://doi.org/10.1177/10946705221126590.

[13] S. Banik and Y. Gao, "Exploring the hedonic factors affecting customer experiences in phygital retailing," *Journal of Retailing and Consumer Services,* vol. 70, p. 103147, 2023, doi: https://doi.org/10.1016/j.jretconser.2022.103147.

[14] G. Zeng, X. Cao, Z. Lin, and S. H. Xiao, "When online reviews meet virtual reality: Effects on consumer hotel booking," *Annals of Tourism Research,* vol. 81, p. 102860, Mar. 2020, doi: https://doi.org/10.1016/j.annals.2020.102860.

[15] V. Calderón-Fajardo, S. Molinillo, R. Anaya-Sánchez, and J. Jiménez-Barreto, "Navigating the future of brand experience: insights from bibliometric analysis," *Spanish Journal of Marketing- ESIC*, vol. 29, no. 4, pp. 491–517, Dec. 2024, doi: https://doi.org/10.1108/SJME-05-2024-0137.

[16] P. Cuesta-Valiño, P. Gutiérrez-Rodríguez, E. Núnez-Barriopedro, and B. García-Henche, "Strategic orientation towards digitization to improve supermarket loyalty in an omnichannel context," *Journal of Business Research,* vol. 156, p. 113475, 2023, doi: https://doi.org/10.1016/j.jbusres.2022.113475.

[17] A. Japutra, A. F. Utami, S. Molinillo, and I. A. Ekaputra, "Influence of customer application experience and value in use on loyalty toward retailers," *Journal of Retailing and Consumer Services,* vol. 59, p. 102390, 2021, doi: https://doi.org/10.1016/j.jretconser.2020.102390.

[18] J. Cambra-Fierro, L. (Xuehui) Gao, I. Melero-Polo, and A. Trifu, "How do firms handle variability in customer experience? A dynamic approach to better understanding customer retention," *Journal of Retailing and Consumer Services,* vol. 61, p. 102578, 2021, doi: https://doi.org/10.1016/j.jretconser.2021.102578.

[19] A. Ranieri, I. Di Bernardo, and C. Mele, "Serving customers through chatbots: positive and negative effects on customer experience," *Journal of Service Theory and Practice*, vol. 34, no. 2, pp. 191–215, Mar. 2024, doi: https://doi.org/10.1108/JSTP-01-2023-0015

[20] M.-H. Huang and R. T. Rust, "A Framework for Collaborative Artificial Intelligence in Marketing," *Journal of Retailing,* vol. 98, no. 2, pp. 209–223, 2022, doi: https://doi.org/10.1016/j.jretai.2021.03.001

[21] M. Barari, M. Ross, S. Thaichon, and J. Surachartkumtonkun, "A meta-analysis of customer engagement behaviour," *International Journal of Consumer Studies,* vol. 45, no. 4, pp. 457–477, Jul. 2021, doi: https://doi.org/10.1111/ijcs.12609.

[22] J. Weidig, M. Weippert, and C. Kuehnl, "Personalized touchpoints and customer experience: A conceptual synthesis," *Journal of Business Research,* vol. 177, p. 114641, 2024, doi: https://doi.org/10.1016/j.jbusres.2024.114641

[23] R. A. Rather and L. D. Hollebeek, "Customers' service-related engagement, experience, and behavioral intent: Moderating role of age," *Journal of Retailing and Consumer*

Services, vol. 60, p. 102453, 2021, doi: https://doi.org/10.1016/j.jretconser.2021.102453.

[24] C. Orús, S. Ibáñez-Sánchez, and C. Flavián, "Enhancing the customer experience with virtual and augmented reality: The impact of content and device type," *International Journal of Hospitality Management,* vol. 98, Sep. 2021, doi: https://doi.org/10.1016/j.ijhm.2021.103019

[25] W. Gao, W. Li, H. Fan, and X. Jia, "How customer experience incongruence affects omnichannel customer retention: The moderating role of channel characteristics," *Journal of Retailing and Consumer Services,* vol. 60, p. 102487, 2021, doi: https://doi.org/10.1016/j.jretconser.2021.102487.

[26] S. Molinillo, R. Aguilar-Illescas, R. Anaya-Sánchez, and F. Liébana-Cabanillas, "Social commerce website design, perceived value and loyalty behavior intentions: The moderating roles of gender, age and frequency of use," *Journal of Retailing and Consumer Services*, vol. 63, p. 102404, 2021, doi: https://doi.org/10.1016/j.jretconser.2020.102404

[27] N. Sharma and J. K. Fatima, "Influence of perceived value on omnichannel usage: Mediating and moderating roles of the omnichannel shopping habit," *Journal of Retailing and Consumer Services,* vol. 77, p. 103627, 2024, doi: https://doi.org/10.1016/j.jretconser.2023.103627

[28] A. Zamfirache, N. A. Neacșu, A. Madar, S. Bălășescu, M. Bălășescu, and I.-M. Purcaru, "Behavioural differences and purchasing experiences through online commerce or offline within mall-based retail structures," *Electronic Commerce Research*, vol. 25, no. 5, pp. 4159–4191, 2025, doi: https://doi.org/10.1007/s10660-024-09879-6

[29] F. Arkadan, E. K. Macdonald, and H. N. Wilson, "Customer experience orientation : Conceptual model, propositions, and research directions," *Journal of the Academy of Marketing Science,* vol. 52, pp. 1560–1584, 2024, doi: https://doi.org/10.1007/s11747-024-01031-y

[30] E. Pantano, A. Rese, and D. Baier, "Enhancing the online decision-making process by using augmented reality: A two country comparison of youth markets," *Journal of Retailing and Consumer Services,* vol. 38, pp. 81–95, Sep. 2017, doi: https://doi.org/10.1016/j.jretconser.2017.05.011

[31] M. Park and J. Yoo, "Effects of perceived interactivity of augmented reality on consumer responses: A mental imagery perspective," *Journal of Retailing and Consumer Services,* vol. 52, p. 101912, Jan. 2020, doi: https://doi.org/10.1016/j.jretconser.2019.101912.

[32] J. Heller, M. Chylinski, K. de Ruyter, D. Mahr, and D. I. Keeling, "Let Me Imagine That for You: Transforming the Retail Frontline Through Augmenting Customer Mental Imagery Ability," *Journal of Retailing*, vol. 95, no. 2, pp. 94–114, Jun. 2019, doi: https://doi.org/10.1016/j.jretai.2019.03.005

[33] M. Chylinski, J. Heller, T. Hilken, D. I. Keeling, D. Mahr, and K. de Ruyter, "Augmented reality marketing: A technology-enabled approach to situated customer experience," *Australasian Marketing Journal,* vol. 28, no. 4, pp. 374–384, Nov. 2020, doi: 10.1016/j.ausmj.2020.04.004.

[34] P. A. Rauschnabel, R. Felix, and C. Hinsch, "Augmented reality marketing: How mobile AR-apps can improve brands through inspiration," *Journal of Retailing and Consumer Services,* vol. 49, pp. 43–53, Jul. 2019, doi: 10.1016/j.jretconser.2019.03.004

[35] A. Jessen, T. Hilken, M. Chylinski, D. Mahr, J. Heller, D. I. Keeling, K. D. Ruyter, "The playground effect: How augmented reality drives creative customer engagement," *Journal of Business Research,* vol. 116, pp. 85–98, Aug. 2020, doi: https://doi.org/10.1016/j.jbusres.2020.05.002.

[36] M. Sarstedt, C. M. Ringle, and J. F. Hair, "Partial Least Squares Structural Equation Modeling BT - Handbook of Market Research," C. Homburg, M. Klarmann, and A. Vomberg, Eds., Cham: *Springer International Publishing*, 2022, pp. 587–632. doi: https://doi.org/10.1007/978-3-319-57413-4_15.

[37] J. F. Hair, J. J. Risher, M. Sarstedt, and C. M. Ringle, "When to use and how to report the results of PLS-SEM," *European Business Review*, vol. 31, no. 1, pp. 2–24, Jan. 2019, doi: https://doi.org/10.1108/EBR-11-2018-0203

[38] J. Henseler, C. M. Ringle, and M. Sarstedt, "Using Partial Least Squares Path Modeling in Advertising Research: Basic Concepts and Recent Issues," pp. 252–276, 2012, doi: 10.4337/9781781001042.00023

[39] W. Chin, "The partial least squares approach for structural equation modeling.," *Modern Methods for Business Research,* G. A. Marcoulides, Ed. Mahwah, NJ, USA: Lawrence Erlbaum Associates, 1998, ch. 10, pp. 295–336.

[40] J. Henseler, and M. Sarstedt, "Goodness-of-fit indices for partial least squares path modeling," *Computational Statistics,* vol. 28, no. 2, pp. 565–580, 2013, doi: https://doi.org/10.1007/s00180-012-0317-1.

[41] R. P. Bagozzi and Y. Yi, "On the evaluation of structural equation models," *Journal of the Academy of Marketing Science*, vol. 16, no. 1, pp. 74–94, 1988, doi: https://doi.org/10.1007/BF02723327.

[42] C. Fornell and D. Larcker, "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research*, vol. 24, pp. 337–346, Feb. 1981, doi: https://doi.org/10.2307/3151312