

## Traversing The Digital Realm: The Quality of Augmented Reality Experience on Consumer Behavior in E-Tailing

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### Abstract

Immersive technologies are changing the buyer seller interaction in online shopping. Though organizations are willing to invest in AR, however, empirical evidence of using AR in online shopping is limited. This study investigates the impact of augmented reality on consumer behavior in online shopping. Specifically, this research examines quality of AR experience on behavioral intention through mental imagery, augmented reality information privacy concern and customer attitude in footwear industry. Five hypotheses were developed and tested with the underlying theory of stimulus-organism-response (S-O-R). Using judgement sampling, self-administered questionnaires were used for data collection after the respondents experienced AR app. 1224 responses were analyzed using structural equation modeling in SmartPLS4. Using gathered data, this study finds that quality of AR experience, mental imagery, augmented reality information privacy concern, customer attitude are the significant antecedents of behavioral intentions. These findings provide convincing evidence that quality of AR experience increases mental imagery and decreases concerns related to AR leading to better customer attitude and behavioral intentions. Further, this study highlights areas of AR research in marketing.

**Key words:** Augmented Reality, Online Shopping, S-O-R theory, mental imagery, AR marketing

### Introduction

The retail industry's models and the behaviors of its customers have undergone significant change, resulting in a dramatic impact on the retail sector (Bruni & Piccarozzi, 2022). It is projected that the global e-commerce and online retailing industry (e-tailing) would rise from USD 4.28 trillion in 2020 to around USD 6.5 trillion in 2024 as a result of all these causes (Jayaswal & Parida, 2023; Lixăndroiu, Cazan, & Maican, 2021; Phaneuf, 2022). Consequently, the use of these technologies will change how businesses and customers interact in many ways (Kumar, Gupta, & Chauhan, 2023; Larivière et al., 2017; Romano, Sands, & Pallant, 2021) in order to improve customer experience and responses with their product, brand, or service globally (M. Park & Yoo, 2020; Sudharshan, 2020). AR technology drastically changes the way consumers interact with goods and services when they purchase, improving their overall experience (Riar, Xi, Korbek, Zarnekow, & Hamari, 2022; Vaghela, 2023). According to a number of studies businesses are already utilizing AR more often in varied scenarios (T. Hilken, K. De Ruyter, M. Chylinski, D. Mahr, & D. I. Keeling, 2017; Jessen et al., 2020; Khalil, Kallmuenzer, & Kraus, 2023; Tan, Chandukala, & Reddy, 2021).

Augmented Reality (AR) enhances the customer experience by superimposing virtual material, such as audio, video, and graphics, on top of the actual world of consumers through the use of object identification and computer vision (Flavián, Ibáñez-Sánchez, & Orús, 2019; Georgiou & Kyza, 2017; Hackl & Wolfe, 2017; Romano, Sands, & Pallant, 2021). Retail practitioners are likewise paying close attention to AR, although just around 35 percent of them really use it (M. Park, Yoo, & Services, 2020).

Nevertheless, online consumers are not adopting AR very quickly (Alimamy & Al-Imamy, 2021; Lai & Cheong, 2022; Schein & Rauschnabel, 2021). The literature suggests that these paradoxes may arise from instances of data misuse, leaks of personal information, cyberattacks, hacking, and the ambiguous role that modern technologies play in extracting consumer data and privacy breaches, which have made consumers more aware of their right to privacy. Furthermore, according to a third of respondents, utilizing AR technology raises worries regarding information privacy (Harborth & Pape, 2021; Lammerding, Hilken, Mahr, Heller, & Technology, 2021). Quality of experiences affects consumer attitudes and behavioral intentions in immersive technology (M. J. Kim, Lee, & Jung, 2020). Prior research stressed the significance of examining frameworks linked to augmented reality in the context of online purchasing in order to leverage on this immersive technology in the online buyer-seller interaction (Andrijana Kos & Bruno, 2021; Sung, 2021; Vaidyanathan & Henningson, 2023). Furthermore, this research promotes augmented reality in marketing and offers useful guidance to practitioners tasked with implementing digital transformation and developing marketing strategies. In addition, AR developers will refine and focus on the aspects of the AR experience that provide users with superior mental imagery and encourage desired behavior in light of the study's findings.

### Quality of AR Experience

Perceived interactivity, authenticity, and presence are all factors that lead to a superior quality of customer experience (Alimamy & Al-Imamy, 2021). The user's sense of being in a particular place or environment is known as the presence (Sheridan, 1992; Witmer & Singer, 1998). Interactivity is defined as "a psychological state that a user perceives during the course of an encounter" (M. Park & Yoo, 2020). Moreover, according to (Grayson & Martinec, 2004) something that is not thought of as a copy or imitation is also referred to as authentic. Experiences have an influence on enterprises and may be a useful tool for differentiation and competitive advantage (Cetin & Dincer, 2014). When it comes to an online shopping experience, mental imagery has a very strong influence on emotions (Loureiro, Correia, & Guerreiro, 2023). In marketing, clear instructions to evoke imagery experiences along with verbal and visual cues might help to promote mental imagery. "The individual's capability (i.e., ability) to manage the information about oneself directly" is the definition of information privacy (Stone, Gueutal, Gardner, &

Mcclure, 1983, p. 460). AR apps often alter and scan the user, their environment, or the others inside these environments. As a result, AR may set off this control-oriented privacy concern about one's personal information as well as that of those around them or bystanders (Lammerding, Hilken, Mahr, & Heller, 2021). In today's digitally connected society, it is improbable that one may enjoy the benefits of modern technology without sacrificing information privacy. Existing literature mentions the "personalization/privacy" conundrum (Aguirre, Mahr, Grewal, De Ruyter, & Wetzels, 2015). Moreover, immersion in an endeavor can benefit individuals by creating memorable experiences (Fu, Lin, Wang, & Sun, 2021). However, inconsistent results have been found about the impact of digital technologies on the customer experience, according to studies that looked at the adoption and usage of these technologies (Batat, 2021). The following hypothesis was formulated from the discussion above.

H1: Quality of AR experience has a positive impact on perceived value.

H2: Quality of AR experience has a negative impact on ARIPC.

### **Mental Imagery**

Imagery is the mental representation of sensory information through mental images in the brain (Demangeot & Broderick, 2010; Macinnis & Price, 1987). Critical attributes of mental imagery include context, content, interaction with perception, and vividness (Marks, 1999). According to Lutz and Lutz (1978), "a mental activity that pictures a relationship, notion or concept" is called mental imagery. Individuals engage in the mental manipulation of information derived from their encompassing environment via mental imagery. Consequently, customers recall prior occurrences because of mental images (i.e., re-experiencing). Issajeva (2015) questions the dominant way of thinking about mental imagery, suggesting that it should be seen as a system of signs that serves different purposes and has different characteristics. Even touching the product's mental imagery was associated with a change in customer responses (i.e., a greater sense of ownership) (Song, Baek, & Choo, 2020). These studies emphasize the capacity of mental imagery to improve our comprehension of the SOR model. This study conceptualizes mental imagery as the mental activity to understand, operationalize, or visualize a concept or relationship of a digital product in the real world through AR. The concept of mental imagery is multi-faceted and varies in quality and elaboration (Miller & Marks, 1997; Walters et al., 2007; Yoo & Kim, 2014). The vividness and clarity of the mental images are called quality, whereas the number of mental images a person develops when processing information is called elaboration. Stimuli that elicit mental imagery can cause customers to picture mental images (affecting their capability of imagining), prompt information from long-lasting memory, elicit previous experiences as the images and influence affective and cognitive outcomes like customer attitude, positive emotion of customer, and customer responses such as behavioral intentions (Ellen & Bone, 1991; Hirschman, 1984; M. Kim, Kim, Park, & Yoo, 2021; Yoo & Kim, 2014).

H3: Mental Imagery has a positive impact on customer attitude.

### **Augmented Reality Information Privacy Concern (ARIPC)**

According to H. Wang, Lee, and Wang (1998), the definition of "privacy" is "the right to be left alone." The word implies autonomy, confidentiality, and solitude. People naturally want to keep themselves or data about themselves private and only selectively provide personal information (Grace, 2013; Nguyen, 2021). A "feeling of anxiety over one's privacy" might be described as a privacy issue from a personal and consumer standpoint. Despite the significant emphasis on privacy concerns in e-commerce literature, empirical research regarding consumer privacy has produced inconsistent results (Phelps, Nowak, & Ferrell, 2000; Taylor, Ferguson, & Ellen, 2015). According to Phelps, Nowak, and Ferrell (2000) and Taylor, Ferguson, and Ellen (2015), as privacy concerns increase, consumer receptivity to relationship marketing programs decreases, whereas a reduced level of consumer privacy is associated with more favorable attitudes toward direct mail. Moreover, in anthropomorphic chatbots, privacy concerns produce a negative attitude (Adyantari, 2022).

H4: ARIPC has a negative impact on customer attitude.

### **Customer Attitude**

Customer attitude is linked to an assessment of a customer regarding a service or product (Holbrook & Corfman, 1985). Attitude shifts arise from the attitudinal-behavior theory family, which encompasses the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), and the Technology Acceptance Model (TAM) (Davis, 1985; López-Bonilla & López-Bonilla, 2017). Attitude refers to the psychological inclination and positive outlook of customers while expressing their evaluations and beliefs (Ajzen & Fishbein, 1980). The quality of an experience is inseparably tied to customer attitudes because such customers are more likely to show positive attitudes and behavioral intentions (Huang & Hsu, 2009; Jin, Lee, & Lee, 2015). Using this approach, M. J. Kim, Lee, and Jung (2020) concluded that the quality of immersive (i.e., virtual reality) experiences had a beneficial impact on customer attitudes and behavioral intentions.

H5: Customer attitude has a positive impact on customer attitude.

### **Behavioral Intentions**

In the context of online shopping, behavioral intentions are characterized as "what an individual means to do" (O'keefe Daniel, 2002, p. 101), and these have been extensively studied in the literature on e-commerce as a significant determinant of actual behavior (Pelet, Ettis, & Cowart, 2017; Yoo, 2023). Zeithaml, Berry, and Parasuraman (1996) distinguished favorable and unfavorable behavioral intentions in retail. Behavioral intentions

that are unfavorable consist of reluctance to pay the extra money, complaining behavior, price sensitivity, negative word-of-mouth, and a decline in the business volume (Zeithaml, Berry, & Parasuraman, 1996). In contrast, favorable behavioral intentions comprise willingness to revisit a store, positive word-of-mouth, and willingness to purchase a product (Yoo & Kim, 2014). Recent studies have investigated many elements within augmented reality apps and online shopping. For instance, Tom Dieck, Cranmer, Prim, and Bamford (2023) showed presence and immersion as the mediators for augmented reality in the context of the shopping satisfaction experience framework. The mediators of immersion and presence influence the shopping satisfaction experience in augmented reality.

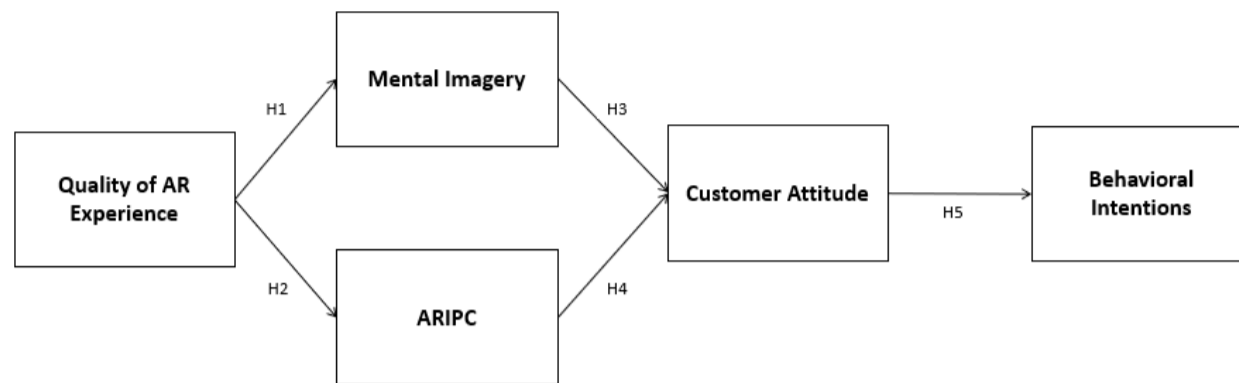


Figure 1. Research Framework

### Methodology

This study used variables from existing literature to examine a framework in the context of online business. Questionnaires were utilized as the method for acquiring data in this study. Judgement sampling, a non-probability sampling technique, was employed (Sekaran & Bougie, 2016). It comprises 20 items to assess the construct of the quality of the AR experience, which includes the dimensions of presence (Witmer & Singer, 1998), authenticity (Kolar & Zabkar, 2010; Ramkissoon & Uysal, 2011; Xie, Wu, & Hsieh, 2012), and perceived interactivity (M. Park & Yoo, 2020). The nine items of the second-order construct of mental imagery with dimensions of elaboration and Quality were adapted from the studies undertaken by Overmars and Poels (2015) and M. Park and Yoo (2020). Ten items made up the ARIPC scale (Lammerding, Hilken, Mahr, et al., 2021). The customer attitude as a second-order construct is measured through a twenty-item scale with five dimensions: observability, trialability, complexity, compatibility, and relative advantage. (Al-Jabri & Sohail, 2012; Alimamy & Al-Imamy, 2021; Kuisma, Laukkanen, & Hiltunen, 2007). It is defined as willingness to revisit a store, positive word-of-mouth, and willingness to purchase a product. Moreover, behavioral intentions in the framework are measured through a scale of three items (Yoo & Kim, 2014).

The 7-point Likert scale measured all variables (1 strongly disagree and seven strongly agree). Before pretesting and data collecting, four academics with expertise in consumer behavior reviewed the questionnaire's instructions and questions to ensure it was acceptable for the study. While consumer behavior research has shown a great deal of interest in online shopping, new technologies (such as augmented reality) that provide a rich and unique customer experience have received comparatively little attention. A sample of persons living in Pakistan's largest cities, including Islamabad, Rawalpindi, Lahore, Karachi, etc., provided the empirical evidence for analysis. After at least fifteen minutes of AR-induced online shopping, online customers who were ready to participate were given self-administered questionnaires. There is no agreement on the single best method for selecting the suitable sample size for Partial Least Square-SEM. There are few popular assumptions in the literature for structural equation modeling: one that one needs more than two hundred responses or observations or minimum fifty times the number of variables in the research framework (Jackson, 2003; Westland, 2010). Whereas G\*Power software determined minimum sample size of 92. It is a statistical power analysis tool commonly used in behavioral sciences (Faul, Erdfelder, Lang, & Buchner, 2007). The F test as a test family with multiple regression using five predictors fixing alpha of 0.05, medium effect size ( $f^2 = 0.15$ ) and power at 0.80 was applied. For SEM, a large sample size is always suitable (Bell, 2022). Confirmatory factor analysis was used to assess the constructs' validity and reliability prior to testing the model and hypotheses.

### Results

Table 1 of the descriptives presents a summary of the respondents' demographic information. It shows that the prevalence of respondents in this survey are those who are under 25 years old. These results suggest that, compared to other age groups, younger consumers who are proficient in utilizing novel, cutting-edge, and distinctive immersive technologies are often drawn to AR-induced internet buying.

### Table 1. Descriptive Analysis

Demographics	Frequency	Percentage
<i>Gender Profile</i>		
Female	560	45.8
Male	664	54.2
<i>Age Profile</i>		
18-25	886	72.4
26-40	274	22.4
41-55	47	3.8
56-70	15	1.2
Above 70	2	0.2
<i>Education Profile</i>		
High School	48	3.9
Intermediate	164	13.4
Bachelor	739	60.4
Master	191	15.6
MS and Above	82	6.7
<i>Work Profile</i>		
Employee (Public Sector)	87	7.1
Employee (Private Sector)	228	18.6
Entrepreneur	116	9.5
Student	723	59.1
Other	70	5.7
<i>Income Profile</i>		
Below 20,000	587	48
20,000 - 40,000	215	17.6
40,001 - 60,000	202	16.5
60,001 - 80,000	118	9.6
Above 80,000	102	8.3
<i>Average online monthly shopping amount</i>		
Below 5000	560	45.8
5000 - 10000	333	27.2
10001 - 15000	125	10.2
15001 - 20000	80	6.5
Above 20000	126	10.3

Measurement Model

The two-stage disjoint approach is employed in this study. The initial analysis of lower order constructs is followed by the higher-order analysis (Agarwal & Karahanna, 2000; Bradley & Henseler, 2007).

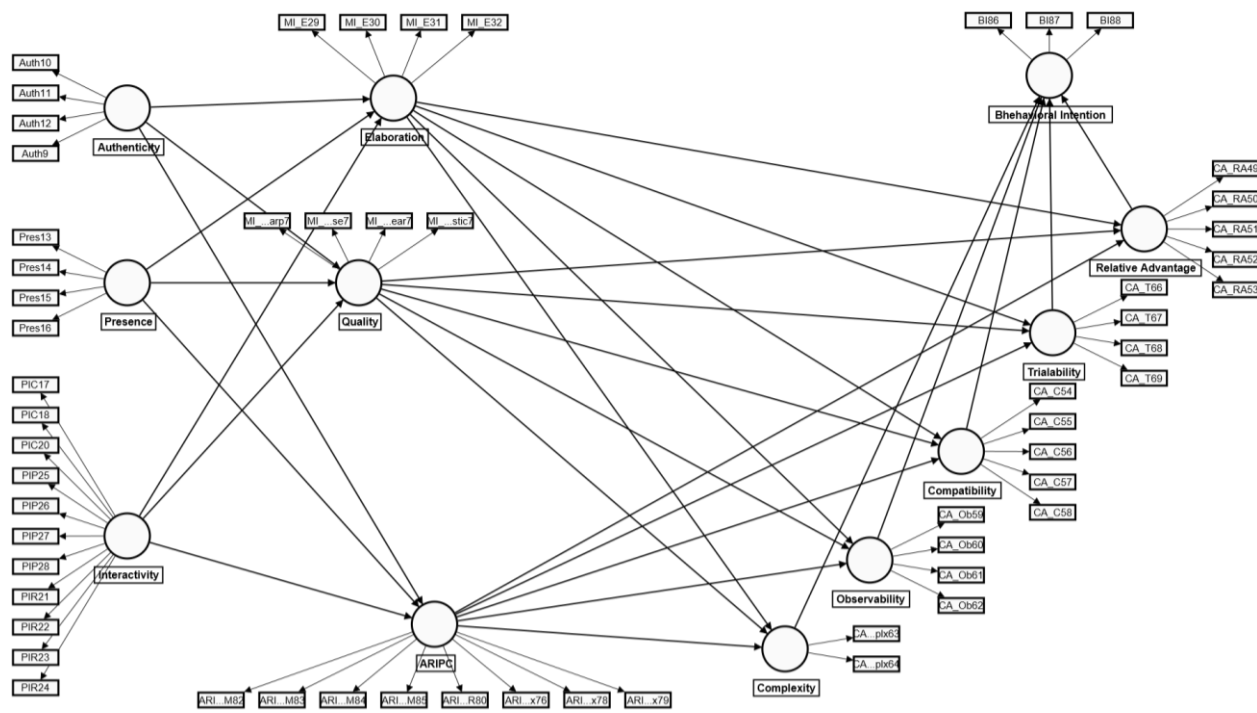


Figure 2. Measurement Model - Lower Order Constructs

First measurement model (also known as outer model) for lower order and then higher order constructs are analyzed in the proposed framework. The reliability and validity of the constructs are assessed in lower and higher order constructs using Cronbach's Alpha, average variance extracted (AVE), and composite reliability (CR). All the outer loadings for lower and higher order constructs are significant and more than 0.66. It is achieved after gradually removing items with low loadings (two items from ARIPC, one from interactivity and complexity each).

Table 2: Construct Reliability and Validity Indicators for Lower Order Constructs

Lower Order Constructs	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
ARIPC	0.861	0.892	0.507
Authenticity	0.863	0.907	0.709
Compatibility	0.850	0.893	0.625
Complexity	0.663	0.856	0.748
Elaboration	0.812	0.876	0.639
Interactivity	0.911	0.925	0.530
Observability	0.802	0.871	0.627
Presence	0.817	0.879	0.646
Quality	0.770	0.853	0.592
Relative Advantage	0.865	0.903	0.649
Trialability	0.818	0.880	0.647
Behavioral Intention	0.768	0.866	0.684

Similarly, Table 2 and 4 indicate that Cronbach's Alpha and CR values are more than 0.7, reflecting that the construct reliability and validity criteria are fulfilled (Hair, Anderson, Babin, & Black, 2010). Results in this investigation show that AVE values are also more than 0.5, indicating convergent (Suhartanto, Brien, Primiana, Wibisono, & Triyuni, 2020).

Discriminant validity is the measure of how distinct one construct is from another. This study employed the Heterotrait–Monotrait (HTMT) - Matrix criteria to assess discriminant validity (Henseler, Ringle, & Sarstedt, 2015).

Table 3. Lower Order Construct – Heterotrait - Monotrait Ratio (HTMT) - Matrix

	1	2	3	4	5	6	7	8	9	10	11	12
1. ARIPC												
2. Authenticity	0.491											

3. Behavioral Intention	0.667	0.592										
4. Compatibility	0.582	0.678	0.724									
5. Complexity	0.637	0.521	0.624	0.684								
6. Elaboration	0.552	0.727	0.682	0.794	0.655							
7. Interactivity	0.566	0.806	0.684	0.793	0.618	0.898						
8. Observability	0.566	0.677	0.699	0.858	0.763	0.774	0.783					
9. Presence	0.548	0.849	0.603	0.681	0.572	0.773	0.849	0.671				
10. Quality	0.383	0.564	0.524	0.621	0.489	0.687	0.664	0.601	0.598			
11. Relative Advantage	0.605	0.668	0.698	0.881	0.691	0.769	0.771	0.784	0.685	0.611		
12. Trialability	0.603	0.648	0.737	0.837	0.723	0.732	0.749	0.799	0.649	0.611	0.779	

Tables 3 from measurement model of lower order constructs and table 5 from measurement model of higher order constructs meet the discriminant validity criteria since every HTMT value is less than 0.9 (Henseler, Ringle, & Sarstedt, 2015) (Agarwal & Karahanna, 2000; Bradley & Henseler, 2007).

Table 4. Construct Reliability and Validity Indicators for Higher Order Constructs

Higher Order Constructs	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
Quality of AR Experience	0.885	0.929	0.813
Mental Imagery	0.705	0.869	0.769
Customer Attitude	0.889	0.919	0.696

Table 5. Higher Order Constructs – Heterotrait - Monotrait Ratio (HTMT) - Matrix

	Customer Attitude	Mental Imagery	Quality of AR Experience
Customer Attitude			
Mental Imagery	0.810		
Quality of AR Experience	0.845	0.834	

Structural Model

The assessment of the structural model was done using 10,000 bootstrapping iterations, and the values and coefficient paths were determined to be significant with one-tail (Basco, Hair Jr, Ringle, & Sarstedt, 2022). The R<sup>2</sup>, NFI and SRMR were used to assess goodness of fit of the model. The R<sup>2</sup> values of mental imagery, ARIPC, customer attitude and behavioral intentions are 0.434, 0.251, 0.629, and 0.573, respectively. The R<sup>2</sup> values show that there is a moderate impact of the independent constructs on behavioral intentions (Chin, 1998, 2010). A normal fit index (NFI) and a standard root mean square residual (SRMR) were also used to assess the approximation fit indices, with an NFI of 0.843 and an SRMR of 0.079, both fall within the permissible range (i.e., less than 0.90 for NFI and SRMR < 0.08) (Hair Jr, Howard, & Nitzl, 2020; Sarstedt, Ringle, Henseler, & Hair, 2014). Overall, the findings of this empirical analysis are significant.

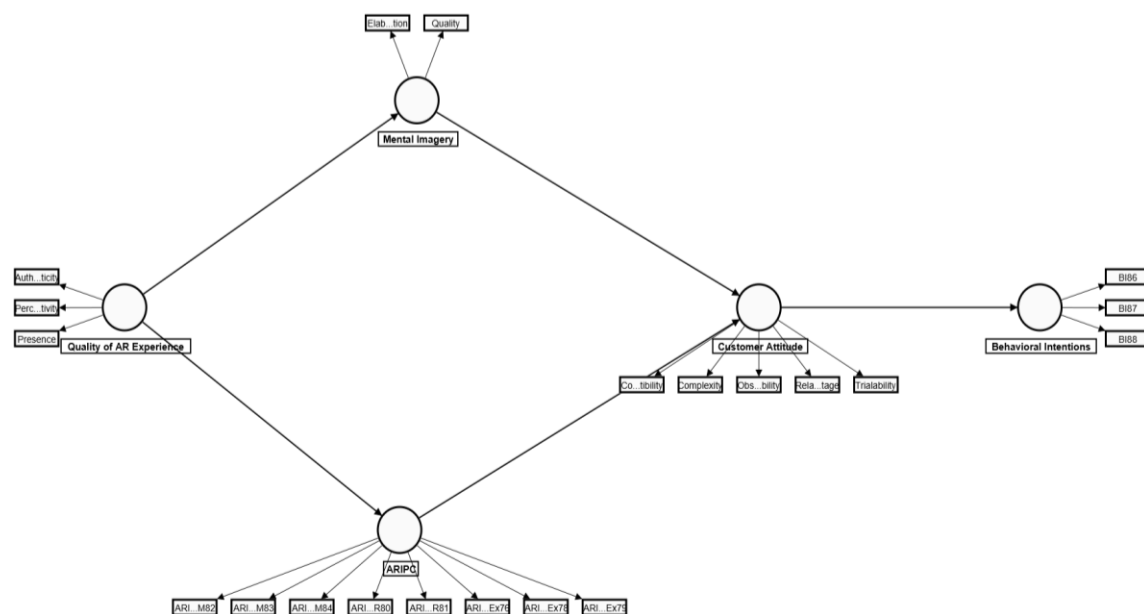


Figure 2. Structural Model

The results support the hypothesis that there is a substantial positive impact of AR experience quality on mental imagery ( $\beta = 0.504, p < .05$ ) and a significant negative impact on ARIPC ( $\beta = 0.463, p < .05$ ). Furthermore, mental imagery significantly improves customer attitude ( $\beta = 0.265, p$

<.05), whereas ARIPC significantly negatively affects it ( $\beta = 0.265, p <.05$ ). In addition, customer attitude has a strong effect on behavioral intentions ( $\beta = 0.309, p <.05$ ). Therefore, all hypotheses in this study are supported.

Hypothesis	Relationship	Std Beta	t-values	p-values	BCI LL	BCI UL	f <sup>2</sup>
H1	Quality of AR Experience → Mental Imagery	0.757	54.134	0.000	0.733	0.780	1.341
H2	Quality of AR Experience → ARIPC	0.501	16.630	0.000	0.452	0.551	0.336
H3	Mental Imagery → Customer Attitude	0.594	22.988	0.000	0.549	0.635	0.774
H4	ARIPC → Customer Attitude	0.328	12.653	0.000	0.287	0.373	0.236
H5	Customer Attitude → Behavioral Intentions	0.659	30.447	0.000	0.623	0.694	0.767

**DISCUSSION AND CONCLUSION**

The results of hypothesis H1 indicate that QoARE and MI have a substantial positive association (p-value = 0.000, t-statistics = 54.134, path coefficient = 0.757). This result is in line with a number of research. For example, Schlosser (2003) spoke about changes, interactions, or experience relating website imagery. Moreover, Krishna (2012) suggested the influence of subconscious stimuli (e.g., QoARE) on intangible characteristics like quality and sophistication of a product in buying (i.e., mental imagery). The results of Hypothesis H3 indicate a statistically significant negative relationship (p-value = 0.000, t-statistics = 16.630, and path coefficient = 0.501) between QoARE and ARIPC. According to the study's findings, customers' privacy concerns can be allayed when high-quality augmented reality shopping experiences are used. This is in line with the study, which claims that because of their unique qualities, mobile applications are exclusive to m-commerce and offer additional privacy possibilities (Molinillo, Navarro-García, Anaya-Sánchez, & Japutra, 2020). With a p-value of 0.000, t-statistics of 22.988, and a path coefficient of 0.594, the results of H3 demonstrate a strong positive link between mental imagery and customer attitude, suggesting that consumers' assessments are influenced by their mental imagery when they purchase online. Empirical research has confirmed the impact of mental imagery on attitudes, which is consistent with this study's findings (Babin & Burns, 1998). Furthermore, the results in H4 indicates a statistically significant negative impact of ARIPC on attitudes. Specifically, the p-value of 0.000, t-statistics of 12.653, and path coefficient 0.328 of indicate that ARIPC negatively impacts the evaluation of a product or service while online shopping. Existent literature shows that privacy concerns affect attitudes (De Wolf et al., 2023; Maseeh et al., 2021; Mo et al., 2023; Taylor, Ferguson, & Ellen, 2015). H5, with the p-value = 0.000, t-statistics = 30.447, and path coefficient = 0.659, indicating acceptance, demonstrates a substantial positive association between consumer attitude and behavioral intentions. Similar correlations have been found between the entrepreneurial ambitions, attitudes, and behavioral intents of Indian citizens toward the meal-sharing economy (Kahraman, Cifci, & Tiwari, 2023).

In conclusion, this research illuminates the significant influence of augmented reality (AR) on reshaping consumer behavior in online shopping, with a specific focus on the footwear industry. Utilizing the stimulus-organism-response (S-O-R) theory as a framework, the study examined the multifaceted impact of AR on consumer decision-making processes. The findings highlight the critical role played by the quality of AR experience (QoARE) in evoking positive mental imagery (MI) among consumers, consequently shaping their overall attitude towards the products. This finding resonates with previous studies emphasizing the impact of sensory cues on consumer perceptions and preferences. Additionally, the research demonstrates a noteworthy negative correlation between QoARE and augmented reality information privacy concern (ARIPC), indicating that enhanced AR experiences can alleviate consumer apprehensions about privacy, thereby fostering trust in online shopping platforms. Furthermore, the positive relationship observed between MI and customer attitude underscores the importance of leveraging mental imagery to influence favorable consumer evaluations during online shopping interactions. Conversely, the adverse effect of ARIPC on attitudes emphasizes the necessity of addressing privacy concerns to maintain consumer trust and satisfaction. Crucially, the study reaffirms the strong association between consumer attitude and behavioral intentions, highlighting the pivotal role attitudes play in driving purchasing decisions in online retail environments. These insights provide valuable guidance for marketers and practitioners aiming to effectively utilize AR technologies to enhance customer engagement, trust, and ultimately drive desired behavioral outcomes in online shopping. As the field of AR marketing continues to evolve, this research suggests promising avenues for future exploration, emphasizing the ongoing need for in-depth inquiry and innovation in this dynamic domain.

**Implications**

The implications drawn from this study offer valuable insights for both academia and industry stakeholders. Firstly, it underscores the increasing relevance of augmented reality (AR) in online shopping, suggesting avenues for further investigation into factors influencing its adoption. Secondly, it emphasizes the critical role of improving the quality of AR experiences (QoARE) in shaping positive consumer perceptions and attitudes, while also highlighting the necessity of addressing privacy concerns associated with AR shopping. Additionally, the study emphasizes the influential nature of mental imagery in consumer decision-making, advocating for its strategic integration by marketers. Moreover, the strong correlation between consumer attitudes and behavioral intentions underscores the importance of nurturing positive perceptions to drive desired consumer actions. Lastly, the practical implications stress the significance of prioritizing QoARE, addressing privacy concerns, and harnessing

mental imagery to enhance consumer engagement and trust. Implementing these recommendations stands to significantly bolster the effectiveness of AR marketing initiatives, ultimately leading to enhanced consumer experiences and outcomes in online retail environments.

#### Limitations and Future Research

This study's insights are valuable, yet it faces several limitations. Firstly, its focus solely on the footwear industry may restrict the applicability of findings to other product categories. Secondly, reliance on self-administered questionnaires could introduce response bias or data inaccuracies. Additionally, the research overlooks contextual factors like cultural differences and technological literacy levels, which could influence outcomes. Lastly, the study's cross-sectional design limits its ability to establish causal relationships or capture long-term behavioral changes accurately. To address these limitations and deepen our understanding of AR in online shopping, future research can explore several avenues. Longitudinal studies could unveil the enduring effects of AR adoption on consumer behavior and attitudes. Comparative research across diverse product categories and cultural contexts could provide broader insights. Qualitative methods such as interviews and observational studies may offer richer perspectives on consumer experiences with AR technology. Experimental designs could enable researchers to manipulate variables and establish causal relationships effectively. Lastly, interdisciplinary collaboration integrating psychology, marketing, and technology fields could offer comprehensive insights into the mechanisms driving AR adoption and its impact on consumer behavior. By pursuing these avenues, future research can enrich our understanding of AR's role in shaping online shopping experiences.

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