THE EFFECTS OF PERCEIVED AUGMENTED REALISM AND TECHNOLOGY FLUIDITY ON PURCHASE INTENTION USING AN EXTENDED STIMULUS-ORGANISM-RESPONSE MODEL: THE CASE OF MOBILE SHOPPING IN CHINA

LUDAN YU

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN INDUSTRIAL BUSINESS ADMINISTRATION
KING MONGKUT'S INSTITUTE OF TECHNOLOGY LADKRABANG BUSINESS SCHOOL
KING MONGKUT'S INSTITUTE OF TECHNOLOGY LADKRABANG
2025

KMITL-2025-KBS-D-128-004

Dissertation Title	The Effects of Perceived Augmented Realism and Technology Fluidity on Purchase Intention Using an Extended Stimulus-Organism-Response Model: The Case of Mobile Shopping in China
Student Name	Ludan Yu
Student ID	63611121
Degree	Doctor of Philosophy
Program	Industrial Business Administration (International Program)
Year	2025
Disseration Advisor	Asst. Prof. Dr. Chatchai Chatpunyakul

ABSTRACT

Grounded in the Stimulus–Organism–Response (S-O-R) theoretical framework, this study systematically investigates the influence mechanism of key Augmented Reality (AR) features on young Chinese consumers' purchase intentions in mobile e-commerce environments. As mobile commerce becomes increasingly integrated with AR technologies, consumers are engaging with more immersive and interactive shopping experiences. However, existing literature offers limited insight into how specific AR characteristics stimulate consumers' psychological responses and subsequently drive their purchasing behavior. To address this research gap, the study focuses on two critical AR attributes—Perceived Augmented Realism and Perceived Technology Fluidity—and examines their effects on consumers' cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment). Furthermore, it explores the mediating role of these psychological responses in the relationship between AR features and purchase intention.

A posttest-only, between-group experimental design was employed, and data were collected from a sample of 802 participants across four universities in China. Multi-group Structural Equation Modeling (SEM) was applied to empirically test the proposed research model. The results reveal that both perceived augmented realism and technology fluidity significantly enhance consumers' cognitive and affective responses, which in turn positively influence their purchase intentions. Moreover, cognitive and affective responses serve as key mediators linking AR features to behavioral outcomes, thereby validating the applicability and explanatory power of the S-O-R model within the context of mobile AR shopping.

Theoretically, this study extends the S-O-R framework by applying it to the domain of AR-driven consumer behavior and offers a deeper understanding of the internal mechanisms underlying user responses in virtual interactive environments. Practically, the findings provide

actionable insights for mobile e-commerce retailers and AR application developers, suggesting that enhancing the realism and fluidity of AR experiences can effectively promote consumer immersion, positive attitudes, and ultimately, purchasing decisions and brand loyalty. Future AR marketing strategies should be tailored to specific product categories and consumer segments to optimize user experience and improve business performance.

ACKNOWLEDGMENTS

First and foremost, I wish to express my sincere gratitude to my advisor, Asst. Prof. Dr. Chatchai Chatpunyakul, for his invaluable guidance and unwavering support throughout the course of my doctoral research. His profound expertise, insightful feedback, and critical perspectives greatly contributed to the refinement of my research framework and the development of my academic capabilities. His patience and consistent encouragement were especially motivating during the more challenging phases of this journey.

I am also indebted to the distinguished members of my dissertation committee—Assoc. Prof. Dr. Singha Chaveesuk, Assoc. Prof. Dr. Nuttawut Rojniruttikul, and Assoc. Prof. Dr. Wornchanok Chaiyasoonthorn—for their time, constructive comments, and professional insights, all of which have significantly enriched the quality of this dissertation.

My deepest appreciation goes to my family, particularly my parents, whose steadfast support, understanding, and encouragement have been vital throughout this academic endeavor. Their emotional strength and unwavering belief in my goals have sustained me throughout this rigorous process.

I would also like to extend my heartfelt thanks to all the participants involved in this research. Their willingness to share their time and experiences played a crucial role in the successful completion of this study.

Finally, I am profoundly grateful to all individuals—colleagues, mentors, and friends—who have, in one way or another, contributed to this academic journey. Their support has been instrumental in enabling me to pursue and complete this work with determination and purpose.

Ludan Yu

TABLE OF CONTENTS

TABLE OF CONTENTS (Continue)

TABLE OF CONTENTS (Continue)

Page

LIST OF TABLES

Table **Page**

LIST OF TABLES (Continue)

Page

LIST OF TABLES (Continue)

Page

LIST OF FIGURES

CHAPTER 1
INTRODUCTION

1.1 Overview

The current chapter aims to provide a comprehensive overview of the research phenomenon under investigation. It commences with an in-depth exploration of the research background, followed by a discussion on the problem statement, research questions, objectives, significance, scope, and subsequently delves into the innovative aspects and definition of terms within this study.

1.2 Research Background

With the development of information technology, a technological revolution has taken place in the field of business and marketing, especially in the field of shopping. In traditional marketing, consumers acquire product knowledge through direct and indirect experiences. Direct experience encompasses the tangible interaction between the consumer and the object (such as the product) and the subject (such as the seller). This direct communication entails a profound, multi-sensory engagement with the product and the seller. Indirect marketing experience encompasses various elements, including physical stores, devices like computers and smartphones, mass media communication channels such as advertising (visual mediums like brochures, billboards, newspapers, and magazines; audio platforms like broadcast; audiovisual platforms like television), and digital media. A paramount objective for any e-retailer is to cultivate an optimal shopping experience for customers through computer-mediated communication, with a primary emphasis on the Internet (Alcañiz et al., 2019). The increased accessibility of the Internet has led to the global expansion of e-commerce (Riar et al., 2022). E-commerce is widely regarded as advantageous compared to physical store shopping, particularly in terms of convenience, as well as economic, time, and physical cost considerations (Riar et al., 2022). As a result, consumers are progressively acclimating to and relying more on online shopping services (Malthouse & Krishnamurthi, 2015).

Despite the rapid growth of e-commerce, traditional web-based online stores continue to face significant limitations. These include restricted product presentation, the inability to physically try products, limited information depth, and a lack of multi-dimensional, immersive experiences (Riar et al., 2022); As a result, many e-retail platforms still fall short of replicating the enjoyable and emotionally engaging shopping experiences consumers often associate with brick-and-mortar stores (Alcañiz et al., 2019). Physical stores offer rich, multi-sensory engagement—allowing customers to touch, see, smell, and even hear the products in context—while also benefiting from personalized interactions with sales staff and the overall store environment. Certain consumers express that these sensory and interpersonal elements are crucial to their shopping satisfaction and are largely missing from current online shopping experiences (Bonetti et al., 2018). When assessing sizable furniture, intricate machinery, and items with significant economic value, consumers frequently visit a physical store for a more thorough comprehension of the product. Moreover, without a try-on experience, evaluating the value of items like clothing, shoes, glasses, and accessories—primarily acquired for self-presentation—can prove challenging for consumers (Hilken et al., 2017; Morillo et al., 2019).

As a result, practitioners are actively seeking solutions to resolve these shopping dilemmas. The increasing prevalence of mobile devices and the emergence of immersive technologies, such as augmented reality (AR), are believed to enhance interactivity (Huang & Liao, 2017), richness and vividness of information (Yim & Park, 2019), and personalized experiences (Smink et al., 2020). Additionally, retail location independence presents novel opportunities (Rauschnabel, 2021). AR leverages various media (visual displays like smartphones, tablets, and glasses; sound, smell, and touch displays) to facilitate and optimize the consumer shopping experience (Alcañiz et al., 2019). This makes it a more effective e-commerce tool than previously employed VR-based product presentations, such as image interactivity technology (Yim et al., 2017).

Therefore, AR is widely applied across online websites, physical stores, and mobile apps (Lavoye et al., 2021). At present, large international retail companies such as IKEA, Walmart, Amazon, and others have developed their own AR services to complement existing retail activities, such as IKEA Place for 3D product display, Walmart AR scanning tool for product comparison, and Amazon AR View for product trial (Riar et al., 2022). In China's prominent e-commerce platforms like Jingdong.com and Taobao, AR technology enhances consumers' shopping experiences through virtual try-ons of items like glasses, jewelry, shoes, and cosmetics (Nawaz, 2022). AR enables potential buyers to experience furniture and decorative products in their intended environment, providing a more accurate representation of product features (Haile & Kang, 2020; Kowalczuk et al., 2021). According to Wikitude (2020), 53% of customers express interest in adopting AR technology for future purchases, with consumers perceiving AR as enjoyable, pleasant, and satisfying. Thus, AR can potentially be highly disruptive in marketing (Rauschnabel, 2021).

Similarly, the situation in China mirrors this trend. With the evolution of e-commerce, mobile applications have become increasingly user-friendly and diversified. They seamlessly integrate into every aspect of daily life, encompassing social media, merchandise sales, marketing, customer service, and order delivery, to create a cohesive online shopping experience (Xia, 2021). According to the China Internet Network Information Center's (CNNIC)

" 51st Statistical Report on Internet Development in China", as of December 2022, the number of Chinese internet users reached 1.06 billion, with an internet penetration rate of 75.6%. Notably, the number of mobile internet users in China increased by 36.36 million from December 2021 to reach 1.065 billion, and 99.8% of internet users use mobile phones to access the internet, as depicted in Figure 1.1. Online shoppers also saw an increase of 3.19 million from December 2022 to 845 million, representing 79.2% of all internet users (CNNIC, 2023), as illustrated in Figure 1.2. The user-friendly mobile apps and payment systems for online shopping have streamlined and propelled the online shopping industry. E-retail is not only popular among tech-savvy young millennials but also plays a significant role among older generations (Xia, 2021).

Moreover, according to the E-COMMERCE IN CHINA (2022), as shown in Figure 1.3, E-commerce transactions in China reached RMB 43.83 trillion in 2022, an increase of 3.5% over the previous year. Among them, the total national online retail sales reached RMB 137.9 trillion, representing a 40% increase compared to last year. The online retail sales of physical goods amounted to RMB 119.6 trillion, showing a growth of 6.2% from the prior year and accounting for 27.2% of the total retail sales of consumer goods (China, 2023). This indicates that online retail is becoming an essential component of the consumer market, and online shopping is gradually becoming the norm for Internet users. Customers can access the retail store through a specific mobile app, browse various product information, compare and research product specifications, chat with suppliers or online customer service, get in-store promotion information, place orders at any time, and deliver them on time (Xia, 2019).

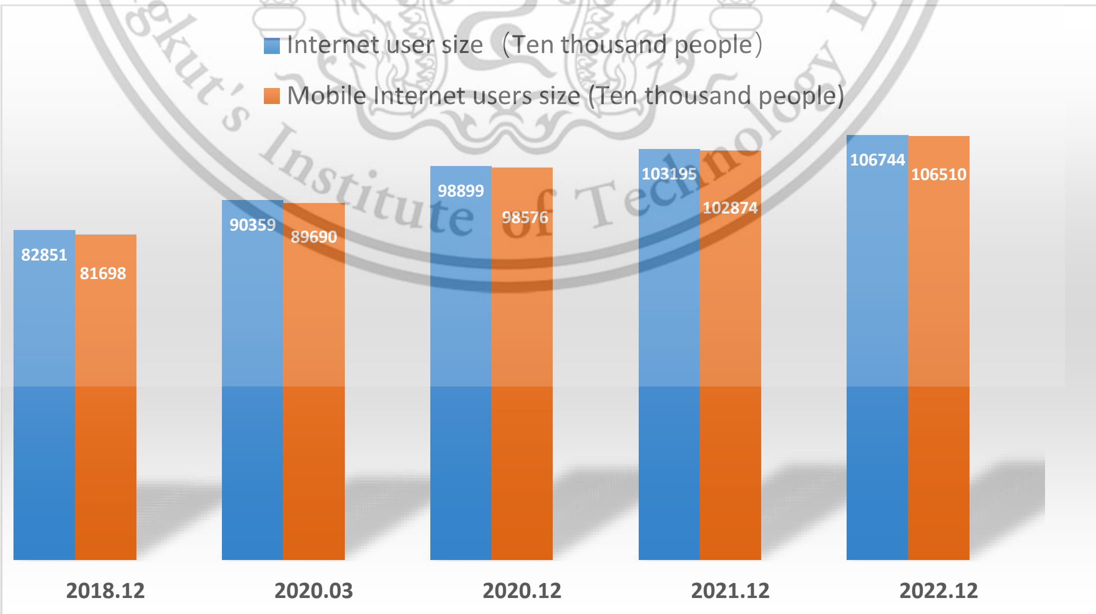


Figure 1.1 Internet users size and mobile Internet users size in China (CNNIC, 2023)

Figure 1.2 Number of online shopping users in China from 2018 to 2022 (CNNIC, 2023)

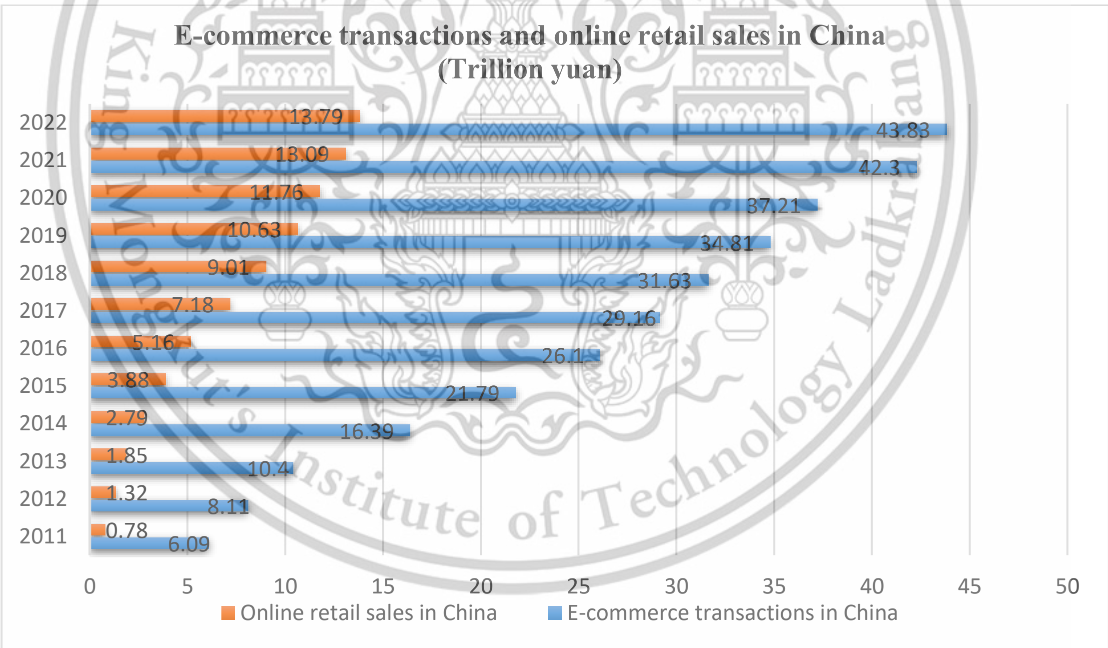


Figure 1.3 E-commerce transactions and online retail sales in China (China, 2023)

The surge in e-commerce has had a profound impact on demand across various sectors of the Chinese economy, prompting the development of advanced technologies such as augmented reality (AR), artificial intelligence (AI), big data, and cloud computing (Longmei & Sally, 2019). As reported by Mobile (2022), China's AR/VR market is experiencing considerable dynamism and exhibits expansive potential for development. The Information Technology (IT)-related spending in China's AR/VR market amounted to approximately $2.13

billion in 2021. It is projected to escalate to $13.08 billion by 2026, positioning China's IT market as the second-largest globally. Notably, the AR spending scale is experiencing rapid growth at a compound annual growth rate (CAGR) of 49.0% (Mobile, 2022).

However, retailers and business practitioners still seem hesitant to adopt AR technology, which is related to other factors, for example, the dynamic relationship between the economic and time costs of developing AR stores, marketing and sales performance, sustained usage, and AR experience and purchase intention is unclear (Huang & Liao, 2015; Qin et al., 2021). Therefore, it is imperative to conduct a comprehensive investigation into the impact of AR technology on consumer experience in online shopping environments and its influence on consumer behavior.

Henceforth, scholars have investigated the impact of AR characteristics on consumer behavior. Existing studies in this domain include, for instance, Kowalczuk et al. (2021), who applied the empirical hierarchy model and demonstrated that behavioral responses (reuse and purchase intention) stem from affective (immersion, enjoyment, product liking) and cognitive (media usefulness, choice confidence) responses to specific AR characteristics (interactivity, system quality, product informativeness, reality congruence). Besides, based on the S-O-R theory, Pessoa et al. (2022) explored the impact of an augmented reality shopping assistant on consumers' emotional and cognitive responses, and the results show that media richness (the level of information cues, variety, and immediate feedback) impacts consumer decisions and heightens their cognitive and emotional responses. Additionally, Yim et al. (2017) focus on two functional mechanisms, namely, vividness and interactivity, and found that AR provides effective communication benefits by generating greater novelty, immersion, enjoyment, and usefulness, resulting in positive attitudes toward medium and purchase intention, compared to the web-based product presentations. These studies mainly focus on AR characteristics such as interactivity, system quality, product informativeness, reality congruence, the level of information cues, variety and immediate feedback, vividness, and interactivity. However, only the study of Chen and Lin (2022) focused on the effects of augmented realism and technology fluidity on consumer behavior. In the investigation conducted by Chen and Lin (2022), the concept of flow, encompassing elements like control, concentration, and interest curiosity, serves as a mediating variable. Cognitive and affective responses and purchase intention are conceptualized as unidimensional constructs and treated as dependent variables. Nevertheless, the research conducted by Chen and Lin (2022) did not delve into how augmented realism and technology fluidity impact consumers' purchase intention through cognitive and affective processes, leaving the influencing mechanism in a state of ambiguity.

AR has become an integral element of mobile marketing, so it is important to analyze how AR reshapes the online shopping experience (Narang & Shankar, 2019). However, as previously noted, regarding the impact of AR technology characteristics on consumer psychology and behavior, only some scholars have examined how perceived augmented realism and technology fluidity affect purchase intention through cognitive and affective processes. Relevant studies have previously demonstrated that AR-interface experience was related to the visual image quality and perceived AR environment realism (Javornik, 2016; Poushneh, 2017); a more realistic AR experience could increase how consumers imagine and visualize possibilities and new ideas (Rauschnabel et al., 2019). Therefore, it is evident that the perceived augmented realism in AR systems significantly influences consumer experience.

Similarly, there is limited empirical research on the impact of technology fluidity in AR systems on consumer psychology and behavior. Fluid interaction technology provides smooth, seamless, and powerful interaction and is highly responsive and interactive (Elmqvist et al., 2011). Users will have a more continuous, intuitive, immersive, and satisfying experience when interacting with virtual items in connection to the actual world when using AR technology that is high in perceived fluidity (Chen & Lin, 2022). Therefore, it is necessary for us to investigate deeply how perceived augmented realism and technology fluidity affect consumers' cognitive and affective and then affect their purchase intention.

Moreover, prevailing scholars predominantly utilize the technology acceptance model (TAM) (Huang & Liao, 2015; McLean & Wilson, 2019; Qin et al., 2021; Rese et al., 2017), as well as consumer acceptance theory, engagement, and motivation theory (Beck & Crié, 2018; Jessen et al., 2020; McLean & Wilson, 2019). Additionally, some researchers employ the Stimulus-Organism-Response (S-O-R) theory (Daassi & Debbabi, 2021; Pessoa et al., 2022) to investigate the impact of AR technology on consumer behavior. Nonetheless, a paucity of researchers utilize the S-O-R theory or consider perceived information quality as a variable within cognitive responses to investigate the impacts of perceived augmented realism and technology fluidity on consumer psychology and behavior. The S-O-R theory, however, can be used to link better the stimulus factors and consumers' internal perception with consumption response (He & Li, 2016).

Furthermore, there is scarce research in China regarding the utilization of AR in marketing or e-commerce. To date, no scholars have investigated the potential impact of augmented realism and technology fluidity on consumers' purchase intentions. However, as previously mentioned, China boasts a colossal E-commerce market where AR has emerged as an indispensable component of mobile marketing, demonstrating the potential to be profoundly disruptive in this domain (Rauschnabel, 2021). Therefore, the examination of how AR is reshaping the online shopping experience for Chinese consumers holds considerable significance.

In summary, although e-commerce offers advantages in terms of convenience and cost-effectiveness, it still falls short of delivering the immersive shopping experience found in physical stores, particularly with regard to product trial (Riar et al., 2022). AR technology, by overlaying virtual products onto the physical environment, significantly enhances interactivity, information richness, and immersion (Yim & Park, 2019), thereby reducing consumers' perceived risk and improving decision-making processes. While existing research has largely focused on the impact of AR's technical features on perceived usefulness and usage intention (McLean & Wilson, 2019; Rese et al., 2017) limited attention has been paid to how characteristics such as perceived augmented realism and technology fluidity influence purchase intention through users' cognitive and affective responses—particularly among Chinese consumers. Furthermore, a paucity of researchers utilized the S-O-R theory or consider perceived information quality as a variable within cognitive responses to investigate the impacts of perceived augmented realism and technology fluidity on consumer psychology and behavior. Therefore, examining the underlying mechanisms of AR's influence within China's e-commerce environment is of both theoretical and practical significance.

To bridge the research gaps mentioned above, this study aims to investigate the influence of mobile AR on Chinese consumers' purchasing intentions, drawing upon the S-O-R theory. Among the factors, perceived augmented realism and perceived technology fluidity serve as external stimuli (S), while cognitive response and affective response represent the organism (O). Ultimately, the behavioral response (R) manifests as purchase intention.

1.3 Problem Identification

As shown in Figure 1.3 above, e-commerce transactions in China reached RMB 43.83 trillion in 2022, an increase of 3.5% over the previous year. Among them, the total national online retail sales reached RMB137.9 trillion, representing a 40% increase compared to the previous year (China, 2023). According to the E-COMMERCE IN CHINA (2022), from the perspective of market players, by the end of 2022, the number of online retail platform stores monitored by business big data reached 24.4807 million, an increase of 11.2%, of which the number of physical goods stores reached 13.1934 million, an increase of 17.7%. The online shopping platforms in China were leading the world's online market in 2021 based on the GMV (Gross Merchandise Value). The most popular Taobao online shopping platform in China led the world e-commerce market with approximately 609 billion US dollars, and Tmall, another famous Chinese e-commerce platform， ranked second with a GMV volume of 593 billion US dollars (Chevalier, 2021). In 2022, the online retail sales of clothing and shoes ranked first, accounting for 22.62% of the online retail sales of physical goods. Online shoe retail presented steady growth over the past decade (China, 2023). However, inherent issues in online shopping for clothing and shoe products， such as the inability to try on and fit experience, can affect the sector's growth potential and are considered a big obstacle in clothing and shoe online shopping in China (Nawaz, 2022).

One of the persistent challenges in online shopping, particularly in the apparel and footwear sectors, is the mismatch between consumers' expectations and the actual product received. This issue—often related to product fit, quality, and specifications—is especially pronounced in garments-related purchases (Buyukaslan et al., 2019). The absence of physical try-on options heightens perceived risk, leading to increased product returns, with fit-related issues cited as the primary cause (Cassidy, 2017). Zhang et al. (2019) conceptualized this as the "suit, fit, and match dilemma," which reflects the complexity of aligning product features with individual consumer preferences in online environments.

In response, many online shoe retailers have sought innovative solutions to bridge this experiential gap. A growing number have turned to augmented reality (AR) technology—particularly AR-based virtual try-on applications—as a strategic approach to enhance consumer decision-making and reduce uncertainty. AR has reshaped traditional consumer shopping behavior by removing time and space constraints and allowing users to engage with products interactively before making a purchase (Hanna et al., 2021).

Although still in the exploratory phase, AR virtual try-on applications have shown considerable promise in the footwear and apparel industries. Prior research suggests that these tools could significantly transform both online and offline retail experiences, offering unique value through real-time product visualization (Pantano et al., 2017; Pereira et al., 2011; Wang et al., 2012). Samir and Islam (2019) even contend that AR virtual try-on capabilities represent the future of retail innovation. Empirical insights further support this trend: according to the *2024 China E-commerce Development Report*, clothing, shoes, and hats accounted for 22.62% of the online retail sales of physical goods, highlighting the centrality of these categories in China's digital marketplace (China, 2025).

Despite these advancements, concerns around consumer privacy persist in AR applications. Scholars note that users may be reluctant to use AR features that require exposure of sensitive body parts—such as the face, hands, or full body—or that involve location tracking through GPS (Cowan et al., 2021; Lele & Shaw, 2021; Rauschnabel et al., 2018). However, in the case of AR try-ons for shoes, such privacy concerns are minimized, as these applications typically focus only on the lower limbs and do not require facial or geographic data. This enhances user acceptability and broadens the applicability of AR in retail.

Given these considerations, the present study aims to explore how AR-based virtual try-on experiences for shoes influence consumers' purchase intentions. By addressing both functional and psychological barriers in online shopping, this research contributes to a deeper understanding of how AR technology can be leveraged to improve consumer experiences and support e-commerce growth in high-demand sectors.

1.4 Research Questions

Following the Stimulus-Organism-Response (S-O-R) theory, this study aims to investigate the influence of an augmented reality-based virtual try-on app designed for online shoe shopping on the purchasing intentions of Chinese consumers. The specific research questions are as follows:

Q1: How do perceived augmented realism and technology fluidity affect the cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) of Chinese consumers?

Q2: How do the cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) of Chinese consumers affect their purchase intention？

Q3: How do Chinese consumers' cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) mediate the relationship between perceived augmented realism, perceived technology fluidity, and purchase intention?

1.5 Research Objectives

The study explores the influence of perceived augmented realism and technology fluidity on consumer cognitive responses (attitudes and perceived information quality), affective responses (immersion and enjoyment), and purchase intention. Additionally, the research seeks to scrutinize the role of cognitive and affective responses as mediators between the independent variables and dependent variables. The specific research objectives are outlined as follows:

To investigate how perceived augmented realism and technology fluidity affect consumer cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) within an AR shopping context.

To investigate the influence of cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) on purchase intention.

To examine the mediating roles of cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) on the relationships between perceived augmented realism, technology fluidity, and purchase intention.

1.6 Significance of the Research

To underscore the significance of the study, this research has bifurcated the section into two segments, elucidating the academic significance and practical relevance of the research work for both the target audience, encompassing academia and practitioners.

1.6.1 Academic Significance

On the one hand, a literature review reveals a scarcity of scholarly investigations into the impact of perceived augmented realism and technology fluidity on consumer cognitive, affective, and behavioral dimensions within the AR shopping environment. However, it is acknowledged that perceived augmented realism and technology fluidity play a crucial role in enhancing the consumer experience in AR systems. This study concentrates on elucidating how the AR affordances of perceived augmented realism and technology fluidity may shape a spectrum of cognitive, affective, and behavioral responses during computer–human interaction in an online marketing environment. This contributes to the existing body of knowledge on augmented reality in marketing, enriching current findings, and holds potential benefits for future research endeavors aiming to delve deeper into the effects of technology affordances associated with an AR-based marketing platform on consumer behavior.

Moreover, within the AR shopping environment, few articles consider perceived information quality as a variable within the cognitive response. Drawing on the S-O-R theory, this study incorporates perceived information quality as one of the variables of cognitive response to investigate the influence of perceived augmented realism and technology fluidity on consumer cognitive response. This approach aims to enhance the S-O-R theoretical framework and offer insights for future research on the impact of AR technology on consumer behavior.

1.6.2 Practical Significance

This study focuses on how perceived augmented realism and technology fluidity may influence consumers' cognitive, affective, and behavioral responses during computer–human interaction when using AR-based "Virtual Try-On" apps. It holds practical significance at both practitioners' and consumers' levels, promoting the continued application and development of AR technology in the field of marketing.

-For the practitioners

First, at the practitioners' level, this study provides actionable insights into how businesses can successfully leverage advanced technologies—particularly AR—to enhance their marketing efforts. By incorporating AR into digital marketing strategies, businesses can improve consumers' online decision-making processes and foster profitable, long-term consumer-brand relationships. Specifically, marketers can develop interactive AR applications that enable consumers to virtually try on products such as shoes, apparel, cosmetics, or furniture, thereby increasing perceived value and reducing purchase-related uncertainty. In addition, integrating AR features into mobile apps or social media platforms can create immersive and engaging brand experiences, deepening consumer involvement and emotional connection. To ensure effectiveness, these AR experiences should be intuitive, visually compelling, and seamlessly embedded within the e-commerce journey. Furthermore, tailoring AR content to individual user preferences—such as offering personalized recommendations—can further enhance consumer satisfaction and drive purchase intentions. This study contributes to practitioners by demonstrating that AR applications significantly influence consumer purchase behavior and offer businesses innovative tools to deliver compelling shopping experiences (Germak et al., 2021). As such, marketing managers are encouraged to incorporate AR strategically into existing campaigns to strengthen consumer engagement and accelerate the evolution of digital commerce.

-For the consumers

Second, at the consumer level, the study confirms that augmented realism (AR) and technology fluidity significantly contribute to enhancing user satisfaction by providing immersive, vivid, interactive, and realistic experiences (Cipresso et al., 2018). These findings can be practically applied by businesses in several ways. First, e-commerce platforms can incorporate high-quality AR virtual try-on features that allow consumers to see how products—such as clothing, accessories, shoes, eyeglasses—fit or appear in real-world settings. This helps consumers better evaluate products that are not physically accessible, especially during online shopping, ultimately facilitating more informed purchase decisions (Riar et al., 2022). Furthermore, to maximize the benefits of AR, companies should focus on optimizing the fluidity of the technology—ensuring that AR apps run smoothly, load quickly, and respond intuitively to user inputs. This minimizes user frustration and enhances the sense of enjoyment during the shopping process, which the study finds is closely linked to purchase intention.

Although AR cannot fully replicate the tactile experience, businesses can position virtual try-on as a complementary tool that supports pre-purchase evaluation, helping users narrow down options more efficiently. This approach not only saves consumers time but also reduces returns and improves overall satisfaction with the online shopping experience. Therefore, the implementation of user-friendly, emotionally engaging AR experiences—grounded in the study's findings—offers a feasible and impactful strategy to meet consumer needs in digital retail environments.

-For the AR technology

Lastly, at the level of promoting the further application and development of AR technology in marketing, this study, if it substantiates that AR-induced augmented realism and technology fluidity positively impact consumer cognitive and affective responses—thereby influencing their purchase decisions—will likely stimulate increased research and development (R&D) efforts from both merchants and governments in the realm of AR technology. The findings would provide compelling evidence for the value of AR in enhancing the consumer experience, which could drive both commercial and governmental investments in AR innovation.

As a result, businesses will likely increase investment in the development of more sophisticated AR applications tailored to various product categories (e.g., fashion, cosmetics, furniture) to better meet consumer demand for immersive and interactive shopping experiences. Additionally, companies may seek to collaborate with tech firms or AR startups to enhance the realism, responsiveness, and personalization of their AR applications. Governments might also play a key role by introducing funding initiatives, tax incentives, or infrastructure projects aimed at accelerating the adoption of AR technologies in marketing and e-commerce.

Furthermore, research and development efforts will likely focus on improving the scalability and accessibility of AR applications, ensuring that even small and medium enterprises (SMEs) can implement such technologies. This could involve making AR applications more mobile-friendly and compatible across a range of devices. Finally, the research's validation of AR's effectiveness in influencing purchase decisions may also encourage the standardization of AR technologies and their seamless integration into existing e-commerce platforms, thus further broadening their application across industries.

1.7 Scope of Research

The research scope of this study encompasses three primary dimensions: content, population, and temporal scope.

1.7.1 Scope of Content

Based on the S-O-R theory, this study aims to examine the impact of perceived augmented realism and perceived technology fluidity on consumer cognitive response (attitudes and perceived information quality), affective response (immersion and enjoyment), and purchase intention. First, the literature review. It involves the review of the relevant literature, theories, concepts, articles, online statistics, and academic papers, which helped in building this research study contention. Secondly, the conceptual framework is constructed according to the S-O-R theory. The conceptual framework contains seven latent variables: perceived augmented realism, perceived technology fluidity, attitudes, perceived information quality, immersion, enjoyment, and purchase intention, and the hypotheses of the correlation between these variables are proposed based on the theory and related literature. Third, the data will be collected through an online questionnaire after the experiment and analyzed via SEM, and the hypotheses will be verified. Finally, the results will be summarized and discussed.

1.7.2 Scope of Population

In this study, the population consists of young Chinese consumers who are familiar with mobile technology and online shopping. They will be selected as the primary sample because they represent a tech-savvy consumer group likely to use AR-based virtual try-on applications in mobile e-commerce environments.

1.8 Innovation Points of The Research

AR in marketing has attracted more and more scholars to study its effect on consumer experience, responses, and behavior (Rauschnabel, Babin, et al., 2022). Nevertheless, as outlined in the background of the study, the preceding literature review has revealed a dearth of research on how perceived augmented realism and technology fluidity impact consumer psychology and behavior in China and other countries. To bridge the research gaps mentioned above, this study aims to investigate the impact of augmented reality-based virtual try-on apps on Chinese consumers, drawing upon the S-O-R theory. Among the factors, perceived augmented realism and perceived technology fluidity serve as external stimuli (S), while cognitive response and affective response represent the organism (O). Ultimately, the behavioral response (R) manifests as purchase intention. Therefore, the innovation points of this study are as follows:

The present study is among the first to examine how AR affordances, namely perceived augmented realism and technology fluidity, affect consumers' set of cognitive, affective, and behavioral responses during computer-human interaction in the context of online marketing in China.

In the AR shopping environment, few articles considered perceived information quality as a variable of cognitive responses. Drawing on S-O-R theory, this study employs perceived information quality as one of the variables of cognitive response to investigate the effects of perceived augmented realism and technology fluidity on consumer cognitive response.

The study framework itself is a unique combination of perceived augmented realism and technology fluidity in enhancing consumer purchase intention in the Chinese context.

1.9 Operational Definition of Terms

1.9.1 Cognitive Responses

Cognitive responses represent consumers' mental processes involving the gaining, processing, and retrieval of information, and cognition includes consumers' understanding, attitudes, and beliefs (Eroglu et al., 2001; Xiao et al., 2019). In this study, cognitive responses are operationally defined as the psychological outcomes resulting from consumers' information processing and rational evaluation of external stimuli—such as perceived augmented realism and perceived technology fluidity—in an AR mobile shopping environment. Specifically, cognitive responses are reflected in two key dimensions: consumers' attitude toward the use of AR technology, and their perceived information quality regarding the product information presented within the AR interface.

1.9.2 Affective Responses

Affective response refers to the affective states represented, such as pleasure (feelings of happiness or joy), arousal (feeling stimulated), and dominance (feelings of control or influence over the mediator) (Kisang & SooCheong, 2007).

In this study, affective responses are operationally defined as the emotional states elicited by consumers in response to AR stimuli during mobile shopping experiences. These responses are characterized by feelings such as pleasure, arousal, and a sense of control. Specifically, affective responses are measured through two key dimensions: immersion, referring to the degree to which consumers feel absorbed and engaged in the AR environment, and enjoyment, referring to the extent of positive emotional experience derived from interacting with the AR interface.

1.9.3 Perceived Augmented Realism

In this study, perceived augmented realism is operationally defined as consumers' subjective judgment of the extent to which digital content presented in an AR environment appears real, natural, and seamlessly integrated with the physical world. Following Chen and Lin (2022), it is conceptualized as a unidimensional construct and measured through five core dimensions: perceived realness, similarity to reality, perceived naturalness, consistency with reality, and the quality of the displayed images. These indicators reflect users' holistic perception of realism in AR shopping experiences, and the measurement items are adapted from validated scales (Baños et al., 2000) to ensure construct reliability and contextual relevance.

1.9.4 Perceived Technology Fluidity

According to Lin (2008) and Chen and Lin (2022), perceived technology fluidity in this study is defined as users' perception that AR technology can smoothly "convey" a maximal number of communication cues – verbal, text, and visual content, as well as other information content at the same time.

In this study, perceived technology fluidity is operationally defined as the extent to which consumers perceive that the AR system enables a smooth, convenient, and rich flow of information—verbal, textual, visual, or other content—thus facilitating seamless interaction and communication within the shopping environment. Consistent with Lin (2008) and Chen and Lin (2022), it is conceptualized as a unidimensional construct and measured using eight items adapted from Lin (2008). These items capture users' perceptions of the system's capacity to support fluid access, retrieval, and review of content, as well as the fun, convenience, and media richness experienced during interaction. This operationalization reflects the core dimensions of perceived fluidity, such as simplicity, ease of use, and communication richness, all of which contribute to a positive AR shopping experience.

1.9.5 Attitudes

A general attitude toward a behavior is defined as "an individual's positive or negative feelings about performing a particular behavior" (Fishbein & Ajzen, 1977). In the context of studying consumers' attitudes toward products or technologies in the virtual world, scholars typically conceptualize attitudes as a unidimensional construct and measure them using multiple items (e.g., Daassi & Debbabi, 2021; Pantano et al., 2017; Pessoa et al., 2022; Rese et al., 2017; Yim et al., 2017).

In this study, attitude is operationally defined as the consumer's overall evaluative judgment—either favorable or unfavorable—toward using AR technology in mobile shopping environments. It reflects the individual's positive or negative affective orientation toward engaging with AR-based applications. Drawing on the conceptualization by Ahn et al. (2004) and Pantano et al. (2017), attitude is treated as a unidimensional construct and measured using five items that assess the extent to which consumers perceive the AR experience as positive, interesting, reasonable ("makes sense"), a good idea, and recommendable for others to use. This operationalization captures both affective and cognitive evaluative dimensions of consumer attitude in the context of AR-facilitated shopping.

1.9.6 Perceived Information Quality

Perceived information quality refers to the useful, trustworthy, personalized, and reliable information perceived by users (Poushneh, 2018). In prior research, perceived information quality has been conceptualized as a unidimensional construct in the study of the impact of virtual experiences on consumer behavior (e.g., Pantano et al., 2017; Pessoa et al., 2022; Poushneh, 2018).

In this study, perceived information quality is operationally defined as the user's perception of the usefulness, trustworthiness, personalization, and reliability of the information provided within the AR shopping environment. This construct is conceptualized as unidimensional, consisting of six key dimensions: (1) the expectation of the information, (2) the trustworthiness and reliability of the information, (3) the personalization of the information, (4) the detail of the information provided, (5) the completeness of the information, and (6) the ability of the information to aid in decision-making within the AR environment. This operationalization aligns with the frameworks of Ahn et al. (2004) and Pantano et al. (2017) and focuses on how AR enhances the consumer's information processing during the virtual shopping experience, thus contributing to the overall cognitive response.

1.9.7 Immersion

Immersion refers to the degree to which the virtual world creates a feeling of being temporarily engaged by a virtual product display (Yim et al., 2017). In the context of augmented reality shopping, scholars commonly conceptualize immersion as a unidimensional construct and measure it utilizing multiple items (e.g., Daassi & Debbabi, 2021; Kowalczuk et al., 2021; Pantano et al., 2017; Plotkina & Saurel, 2019).

In this study, immersion is operationally defined as the degree to which users experience a temporary sense of engagement with a virtual product display within an AR shopping environment. This construct is conceptualized as unidimensional, consisting of three key dimensions: (1) the extent to which users feel engrossed by the virtual product display, (2) the degree to which users feel absorbed in the AR experience, and (3) the level of focus users exhibit while interacting with the virtual products. These aspects reflect the users' subjective experience of being engaged in the AR shopping environment, with immersion enhancing the perception of virtual products as "para-authentic" experiences (Hans, 2004). This operationalization is based on the approaches of Yim et al. (2017) and is measured using the three aforementioned items.

1.9.8 Enjoyment

Enjoyment signifies the extent to which consumers derive entertainment from the pursuit of hedonic information technology systems (Hans, 2004). In prior research, enjoyment has typically been conceptualized as a unidimensional construct and measured through multiple items (e.g., Kowalczuk et al., 2021; Myung et al., 2020; Plotkina & Saurel, 2019; Yim et al., 2017).

In this study, enjoyment is operationally defined as the extent to which consumers derive entertainment and positive emotional experiences from interacting with an AR shopping system, independent of any utilitarian or performance outcomes. Conceptualized as a unidimensional construct, enjoyment reflects the hedonic value of the AR experience and is measured using six items capturing users' feelings of being enjoyable, pleasurable, funny, happy, involved, and excited during their engagement with the AR environment. This definition and measurement approach are grounded in prior studies in hedonic information systems (Hans, 2004; Venkatesh, 2000), VR tourism (Myung et al., 2020), and AR shopping contexts (Plotkina & Saurel, 2019), and is adopted here as a subdimension of affective response.

1.9.9 Purchase Intention

Purchase Intention refers to the possibility of consumers buying a certain product, which reflects a subjective tendency of consumers to buy products; it can predict consumers purchasing behavior (Meng, 2012). In this study, purchase intention is operationally defined as the consumer's subjective likelihood and willingness to buy a product after interacting with an AR shopping environment. It reflects the consumer's cognitive evaluation and behavioral tendency toward making a purchase decision. Conceptualized as a unidimensional construct, purchase intention is measured using five items adapted from Angella and Kim (2016), which assess the extent to which consumers intend to buy, are willing to buy, consider buying, plan to buy, and perceive the probability of buying the displayed product. This operationalization aligns with prior research in both traditional e-commerce and immersive shopping contexts (e.g., Kowalczuk et al., 2021; Pessoa et al., 2022; Sung et al., 2021; Yang, 2021), and serves as a reliable indicator of consumers' behavioral responses in AR-facilitated purchase scenarios.

CHAPTER 2
LITERATURE REVIEW

2.1 Overview

The current chapter is dedicated to providing a comprehensive exposition of the literature review and the development of hypotheses. Specifically, the literature review of the study variables and theory plays a pivotal role in shaping the constructs employed in this research endeavor. This review serves to impart a profound understanding of the constructs incorporated within the research framework under scrutiny in this present study, thereby facilitating an enhanced comprehension of both the constructs and theoretical framework of this current investigation, ultimately contributing to an elevated level of knowledge and insight. The chapter encompasses a meticulous review of relevant literature, theories, concepts, articles, online statistics, and academic papers, all of which have significantly contributed to the formulation of the research study's theoretical foundation. This is a comprehensive study that played a pivotal role in the evaluation and selection of study variables, identification of the research problem, and specification of the research gap. Through this study, the research objectives and questions are formulated and subsequently addressed, aiding in the resolution of the identified research problems and bridging existing gaps in the literature. The outcomes of this process culminated in the development of a conceptual framework encompassing a total of 2 independent variables, four mediating variables, and one dependent variable. The entire framework comprises 39 observed items. This chapter is structured into 11 parts, and the details are elaborated as follows:

The first section provides an overview of the development of global e-commerce and China's e-commerce, respectively. The second section delves into virtual reality, augmented reality, mixed reality, and extended reality, highlighting their distinctions. The third section offers a detailed exploration of augmented reality, encompassing its significance and research status and identifying gaps in current augmented reality (AR) research. In the fourth section, a comprehensive summary is provided on the origin and evolution of the Stimulus-Organism-Response (S-O-R) theory, along with its research status in traditional marketing, online shopping, and XR shopping. Sections five to nine define each variable conceptually while determining their respective measurement items. Hypotheses are developed in the tenth section by explaining relationships and influences among variables based on existing literature. Finally, the eleventh section constructs a conceptual framework for this study based on S-O-R theory and interrelationships among variables.

2.2 The Development of E-Commerce

2.2.1 The Development of Global E-Commerce

Since the commercial utilization of the Internet and the World Wide Web began (Kannan, 2017), the business landscape has undergone rapid transformations. Previously unheard-of giants like Google, Facebook, Amazon, Alibaba, eBay, and Uber have emerged as major players in the modern economy (Massoudi et al., 2023). The advent of digital information and communication technologies has notably enhanced marketing research, leading to the definition of digital marketing as "an adaptive, technology-enabled process by which firms collaborate with customers and partners to jointly create, communicate, deliver, and sustain value for all stakeholders" (Kannan, 2017). The profound impact of digital technologies, such as the Internet and social networks, on marketing research has been extensively explored in various studies (e.g., Babić Rosario et al., 2016; Kannan, 2017; You et al., 2015). In the realm of digital marketing, electronic commerce, or e-retail, stands out as one of the most dynamic and impactful applications (Kannan, 2017). The global proliferation of e-retail businesses has attracted heightened interest from retailers in recent years (Alcañiz et al., 2019). While the growth of e-commerce has been notably rapid in developing markets such as Asia and Eastern Europe, it experiences a comparatively slower pace in developed markets like North America and Western Europe (Nielsen, 2017).

The evolution of information technology has led to a technological revolution in the realms of business and marketing, particularly within the shopping domain. In traditional marketing, consumers acquire product knowledge through both direct and indirect experiences. Direct experience entails physical interaction between the consumer, the product, and the seller, fostering a rich multi-sensory engagement. On the other hand, indirect marketing experience encompasses various elements such as physical stores, devices like computers and smartphones, and mass media communication channels, including visual (brochures, billboards, newspapers, and magazines), audio (broadcast), and audiovisual (television) mediums, as well as digital media. For e-retailers, a paramount objective is to craft an optimal shopping experience for consumers through computer-mediated communication, primarily facilitated by the Internet (Alcañiz et al., 2019). The increased accessibility of the Internet has fueled the global expansion of e-commerce (Riar et al., 2022). E-commerce is regarded as advantageous over traditional in-store shopping, particularly in terms of convenience and cost-effectiveness, encompassing economic, time, and physical considerations (Riar et al., 2022). Consequently, consumers are progressively acclimating to and relying on online shopping services (Malthouse & Krishnamurthi, 2015).

Nonetheless, traditional web-based online stores face limitations concerning product presentation, trial opportunities, information richness, and the provision of a multidimensional experience (Riar et al., 2022). E-retail sites currently struggle to replicate the pleasurable and emotionally significant shopping encounters found in physical stores (Alcañiz et al., 2019). Some consumers expressed that the online retailing experience lacks the richness they find in physical stores, where multi-sensory interactions with products, stores, and salespeople contribute to a more immersive experience (Bonetti et al., 2018). Consequently, when evaluating large furniture, complex machinery, and especially high-value products, consumers often opt to visit physical stores for a more comprehensive understanding of the product. Furthermore, for products such as clothing, shoes, glasses, and accessories, which are primarily acquired for self-presentation, consumers may encounter difficulty in gauging their value without the chance for a try-on experience (Hilken et al., 2017; Morillo et al., 2019).

Consequently, industry practitioners are actively seeking solutions to address these challenges in online shopping. The advent of virtual technologies, including Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR), presents an opportunity for consumers to create innovative, immersive, pleasurable, information-rich, and valuable shopping experiences. Notably, AR facilitates the virtual exploration of furniture and decorative items in their intended environment, offering prospective buyers a more vivid understanding of how the product, including its size, color, and shape, will complement their home, office, or other settings (Haile & Kang, 2020; Kowalczuk et al., 2021). Moreover, the incorporation of AR technology enables consumers to virtually try on products through the utilization of virtual/magic mirrors (Javornik, 2016). This functionality allows consumers to visualize themselves as if standing before a mirror and experiment with virtual applications of makeup or try on various fashion items such as glasses, clothing, watches, and more (Hilken et al., 2017; Poushneh, 2018; Yim & Park, 2019). These advancements underscore the transformative potential of virtual technologies in reshaping the online shopping landscape and enhancing consumer experiences.

2.2.2 The Development of E-Commerce in China

The rapid evolution of the Internet has catalyzed the widespread adoption of e-commerce, and concomitant with the pace of global economic integration, China's e-commerce industry has experienced rapid growth (Liu & Walsh, 2019). This surge in e-commerce is closely tied to the increasing user-friendliness and diversification of mobile applications. These applications have permeated every facet of daily societal life, leveraging seamless integration with social media, merchandise sales, marketing initiatives, customer service, and order delivery to create a unified and comprehensive online shopping experience (Xia, 2021). According to the E-COMMERCE IN CHINA (2022), E-commerce transactions in China reached RMB 43.83 trillion in 2022, reflecting a 3.5% increase from the previous year. Notably, the total national online retail sales amounted to RMB 137.9 trillion, signifying a remarkable

40% surge compared to the preceding year. Specifically, online retail sales of physical goods accounted for RMB 119.6 trillion, showcasing a growth of 6.2% from the previous year and constituting 27.2% of the total retail sales of consumer goods in China (China, 2023), as depicted in Figure 1.3. The scale of E-commerce enterprises continues to expand, indicating a stable growth trend, with a rising number of companies associated with E-commerce emerging.

Moreover, as of December 2022, according to the 51st "Statistical Report on the Development of China's Internet," the number of Chinese Internet users reached 1.067 billion, with an Internet penetration rate of as high as 75.6%, among them, the number of mobile Internet users in China is 1.065 billion, 36.36 million more than in December 2021, and 99.8% of Internet users use mobile phones to access the Internet (CNNIC, 2023), as shown in Figure 1.1. The majority of Chinese people have already been exposed to and integrated into the Internet. The rapid expansion of the Internet user base has provided a fertile ground for the development of e-commerce in China. The number of online shopping users reached 845 million, accounting for 79.1% of the overall Internet user base (CNNIC, 2023). Online shopping has become a very common phenomenon, pushing the overall development of society into a new stage in China.

In China, the online landscape offers a comprehensive array of products and services, ranging from luxury brands to online courses and even unique services like pet grooming. Online shopping has fundamentally transformed the daily lives of the Chinese populace, providing the convenience of shopping anytime and anywhere, often with minimal delivery costs. Customers can utilize dedicated mobile apps to access retail stores, peruse diverse product information, compare and research product specifications, engage in chat conversations with suppliers or online customer service, obtain in-store promotion details, place orders at their convenience, and ensure timely delivery (Xia, 2019). The advanced logistics network uses advanced technologies such as cloud computing, big data, intelligent robots, and drones to ensure fast delivery in all corners of China (Xia, 2019). The surge in E-commerce has impacted demand across all sectors of the Chinese economy, fostering a growing inclination towards leveraging cutting-edge technologies such as augmented reality (AR), artificial intelligence (AI), big data analytics, and cloud computing (Longmei & Sally, 2019). AR is gaining a strong base in several sectors in China, especially offline and online retail. A multitude of prominent shopping platforms like Taobao, Jingdong (JD.com), and Dewu have successfully integrated AR-based facilities to address challenges encountered during online shopping experiences effectively while simultaneously enhancing customer satisfaction. (Li & Xu, 2019). In line with the insights from Mobile (2022), the AR/VR market in China is experiencing substantial growth and holds promising prospects for development. Notably, China's AR/VR market witnessed IT-related spending of approximately $2.13 billion in 2021. This expenditure is projected to escalate significantly, reaching $13.08 billion by 2026. This surge establishes

China's IT market as the second-largest single-country market globally. It is noteworthy that within this expenditure, the scale of spending on AR is experiencing rapid growth at a Compound Annual Growth Rate (CAGR) of 49.0% (Mobile, 2022).

2.3 Extended Reality (XR) Technology

Extended reality (XR) is an all-encompassing concept of technology that integrates the real and virtual worlds to enhance user experiences in various fields such as education, gaming, medicine, industry, and business. XR is frequently employed as an umbrella term for a variety of distinct concepts – most prominently augmented reality (AR) and virtual reality (VR) (Çöltekin et al., 2020). The term mixed reality is often loosely and vaguely incorporated, typically as “a combination of AR and VR” without specifying further what this means (Rauschnabel, Felix, et al., 2022). Therefore, XR is the collective term for all physical and digital settings where human and machine connection is facilitated by interactions produced by hardware and software, and VR, mixed reality (MR), and AR are the three types of XR technologies (Doolani et al., 2020).

As previously stated, the term XR, also referred to as extended or X reality, encompasses a range of current and future spatial computing technologies, including AR, MR, VR, and the areas that lie in between them. (Doolani et al., 2020). XR is defined by Pavlik (2018) as a form of “mixed reality environment that comes from the fusion ubiquitous sensor/actuator networks and shared online virtual worlds.” XR is a super-set that includes the entire spectrum known as the concept of the reality-virtuality continuum introduced by Milgram et al., as shown in Figure 2.1. It is a continuous scale from “the complete real” to “the complete virtual,” consisting of all possible variations and compositions of real and virtual objects, as described by Milgram et al. (1995).

Figure 2.1 depicts the reality-virtuality continuum, which was adapted from Doolani et al. (2020) and provides an overview of the XR ecosystem and how VR, AR, and MR relate to the physical and digital worlds.

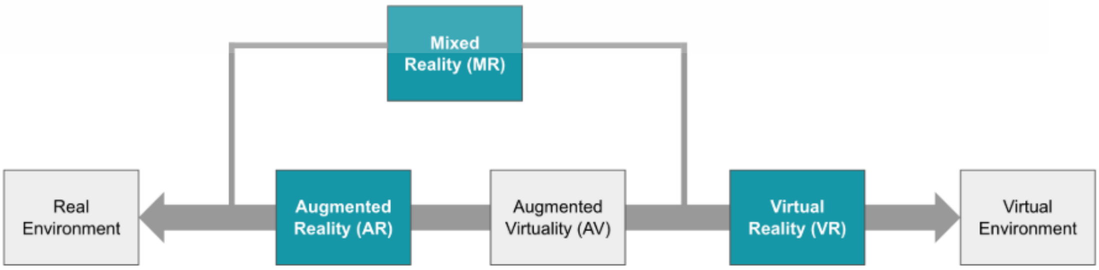


Figure 2.1 Reality–Virtuality continuum adopted from Doolani et al. (2020).

2.3.1 What Virtual Reality, Augmented Reality, and Mixed Reality Are

Individuals frequently encounter confusion when distinguishing between AR, VR, MR, and other immersion technologies. Therefore, it is crucial to offer a comprehensive elucidation of these distinctions. VR, AR, and MR offer huge possibilities for the future of education, marketing, e-commerce, and many other fields. All of these technologies are well known for their improved experience of bringing together the virtual and real worlds with the help of enhanced 3D graphics (Scholz & Duffy, 2018). Although easy to confuse, there are clear differences.

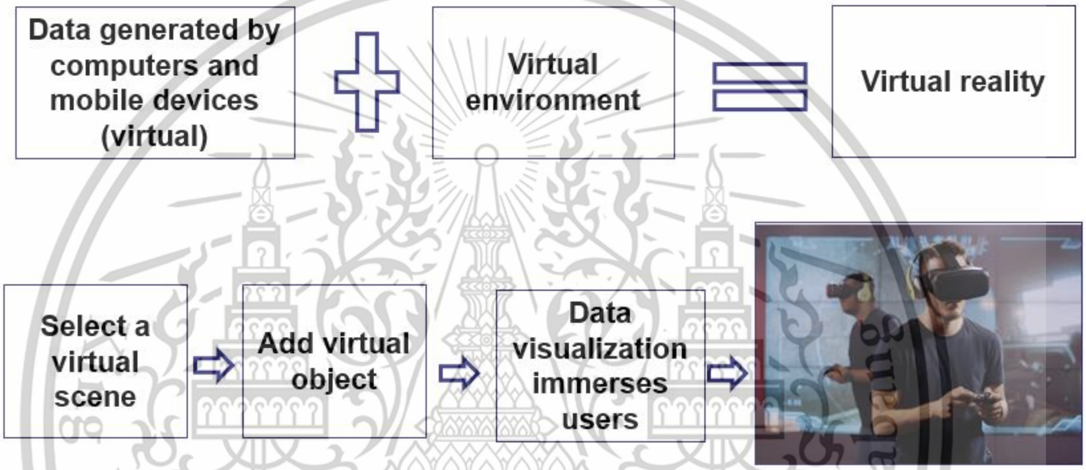


Figure 2.2. Working of virtual reality (adopted from Doolani et al. (2020))

2.3.1.1 Virtual Reality (VR)

The term “virtual reality” is derived from the words “virtual” and “reality”. The term "virtual" is defined as being closely related to reality, which encompasses the human experience. The term “virtual reality,” therefore, refers to a particular type of emulation of reality that is “near-reality” (Dargan et al., 2023). Virtual reality is a computer-simulated, interactive, and immersive virtual environment that isolates the user from the surrounding physical environment, using various immersion methods (Shen et al., 2021), which completely replaces the user's perception of the real world with a similar or completely different virtual world (Doolani et al., 2020). Virtual reality (VR) is considered one of the technological megatrends progressing the digitization of all areas of human life (Myung et al., 2020). To date, VR technology is being used in several areas, such as entertainment (Stapleton et al., 2002), advertising (Wu et al., 2022), tourism (Guttentag, 2010), shopping and retail (Cowan & Ketron, 2019). With the aid of virtual reality technology such as head-mounted displays, haptic devices, body-tracking sensors, motion-tracked controllers, 360-treadmills (that allow unlimited movement in space while stationary), and other innovative wearables, these visions of future shopping and smart (omnichannel) retailing is coming ever closer to reality (Margetis et al., 2019). Figure 2.2 shows how virtual reality works in games.

2.3.1.2 Augmented reality (AR)

Augmented reality (AR) is defined as “a technology that superimposes virtual objects onto a live view of physical environments, helping users visualize how these objects would fit into their physical world” (Tan et al., 2022). AR is a newer technological system or a new human-to-machine interaction tool, which is defined as the immersion of technology with digital objects in the real world. This includes integrating real and virtual worlds, engaging in real-time interaction, and accurately registering virtual and physical objects (Azuma et al., 2001). Using augmented reality can meet the requirements of three crucial things: combining real and virtual objects, aligning real and virtual objects, and providing dynamic interaction between the two (Dargan et al., 2023). The real-time interaction between virtual objects and the real environment with 3D images is a unique feature of AR (Dargan et al., 2023); it is composed of four key terms: real environment, augmented reality enhanced virtual fitting and virtual environment. Like virtual reality, telepresence, real feeling, and realistic level are the main characteristics of AR and VR experience quality and quality indicators (Dargan et al., 2023).

Figure 2.3 illustrates a real-world application of AR technology, wherein digital elements are seamlessly integrated into a live physical environment. What fundamentally distinguishes AR from conventional VR technologies is its ability to generate a "mixed reality" experience—one in which the physical environment remains visible and interactive, while virtual objects are superimposed in real time (Hyejeung & Norbert, 2012). This fusion allows users to maintain awareness of their real-world surroundings while simultaneously interacting with digital content. These devices facilitate the simultaneous display of both physical elements (such as a user’s body or facial features) and virtual components (such as a product) within the same visual frame (Bell et al., 2001). This capability significantly enriches the online shopping experience by enabling virtual product try-ons that are customized to individual users. Rather than relying on static images or textual descriptions, customers can engage with dynamic and personalized visualizations that align with their physical attributes (Ma & Choi, 2007). Consequently, AR offers a level of experiential immersion and decision-making support that surpasses earlier VR-based product presentation methods, such as image interactivity technology, which typically involve rotating 3D images or zoom features (Yim et al., 2017).

Therefore, AR emerges as a superior e-commerce tool, capable of bridging the gap between digital product presentation and the tangible, sensory-rich experiences of in-store shopping. Its potential to reduce uncertainty, increase consumer engagement, and improve purchase confidence underscores its growing importance in the evolution of digital retail environments.

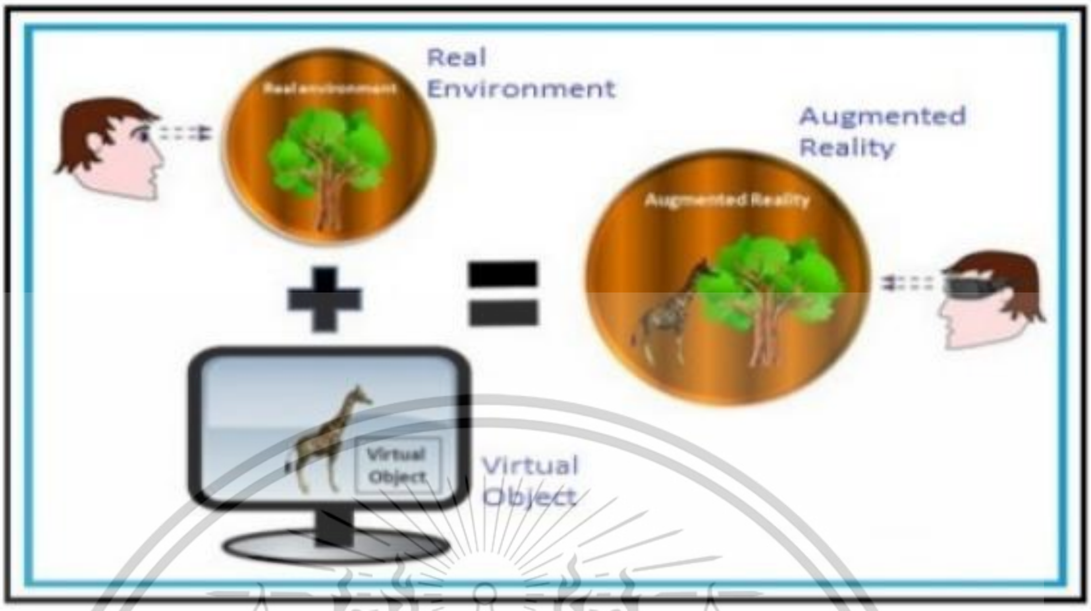


Figure 2.3 Real scene vision using AR technology (Dargan et al., 2023)

2.3.1.3 Mixed reality (MR)

Mixed reality (MR) merges the digital elements with the real world (Farshid et al., 2018), where users interact with both physical and virtual environments. MR refers to the merging of real-world virtual constructs with computer-generated constructs that are either real or possible. Not only does mixed reality (also known as hybrid reality) combine aspects of the actual reality——the physical world around us——with the power of virtual reality, it also combines what's real with what's possible. In other words, mixed realities allow us to experience new objects or scenarios——those that do not actually exist (Farshid et al., 2018). Figure 2.4 shows the working of mixed reality.

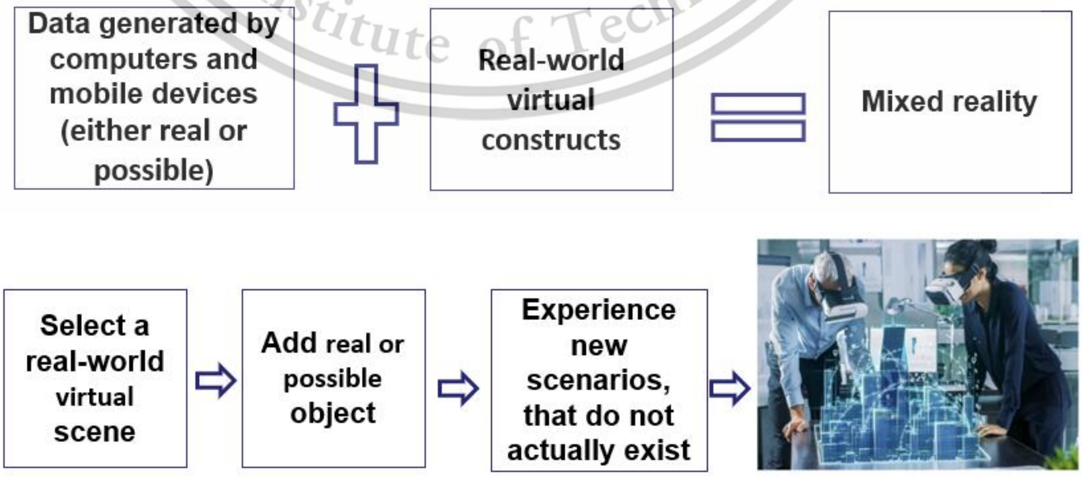


Figure 2.4 Working of mixed reality (adopted from Farshid et al. (2018))

For example, medical mannequins are brought to life for training scenarios and teach empathy to healthcare professionals (Hu et al., 2019). Applications based on MR are increasingly prevalent in corporate settings (Schuir & Teuteberg, 2021). For our real estate example, potential buyers might want to adapt the actual properties of the houses to imagine what the property could look like. They might be interested in what the walls would look like in a different color or play with its interior design by placing a few pieces of furniture from Sweden throughout the property (Farshid et al., 2018). The core of MR is between virtual and reality; for example, when you are in a room with a friend, with MR Glasses, the whole room becomes virtual, but you can also see the real yourself, the real friend and the things you hold in your hand can be virtual or real. This hybrid reality, which switches freely between virtual and real, is called MR.

2.3.2 Comparison of Augmented Reality, Virtual Reality and Mixed Reality

Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR) are immersive technologies that differ in how they integrate digital and physical environments. AR overlays virtual content onto the real world, VR fully immerses users in a simulated environment, and MR merges real and virtual elements for real-time interaction. In short, AR enhances reality, VR replaces it, and MR blends both for interactive experiences. Table 2.1. provides a comparative summary.

Table 2.1 Comparison of VR, AR, and MR (adopted from Doolani et al. (2020) and Dargan et al. (2023))

Features	Virtual Reality	Augmented Reality	Mixed Reality
Definition	A complete three-dimensional (3D) virtual representation of the real world or objects in it.	Real-time display of computer-generated content over a real-world scene.	The seamless integration of images from the actual world with the virtual world.
Display device	Head-mounted display (HMD) or handheld controller.	Laptops, smartphones, tablets, and mobile devices.	Headsets are optional.
Image source	Computer graphics or real images produced by a computer.	Combination of computer-generated images and real-life objects.	Combination of computer-generated images and real-life objects.

Table 2.1 (Continue)

Features	Virtual Reality	Augmented Reality	Mixed Reality
Environment	Fully digital.	Both virtual and real-life objects are seamlessly Blended.	Both virtual and real-life objects are seamlessly blended.
Presence	The feeling of being transported somewhere else with no sense of the real world.	The feeling of still being in the real world, but with new elements and objects superimposed	The feeling of still being in the real world, but with new elements and objects superimposed
Awareness	Perfectly rendered virtual objects that cannot be distinguished from real objects.	Virtual objects can be identified based on their nature and behavior, such as floating text that follows a user.	Perfectly rendered virtual objects that cannot be distinguished from real objects.
Interaction	Joysticks and controller.	Either controllers or gestures.	Finger touch and tap interaction.
Perspective	Virtual objects will change their position and size according to the user's perspective in the virtual world.	Virtual objects behave based on the user's perspective in the real world.	Virtual objects behave based on the user's perspective in the real world.
Usage	It is extensively used in games, education, training, and tourism.	Retail sales, engineering, entertainment, tourism, education and training.	Moderately used in games and training.

As evident in Table 2.1, the distinctions between VR, AR, and MR are outlined as follows:

1. The distinction between augmented reality (AR) and virtual reality (VR) lies in the fact that AR integrates digital information into the real-world environment, whereas VR immerses users entirely into a simulated digital environment.

2. AR encourages better observation by introducing virtual elements such as graphic overlays that add new opportunities for interaction with the real world, whereas VR fully shapes a new kind of reality based on purely computer-generated images.

3. Virtual reality allows users to live in a virtual environment, while augmented

reality and mixed reality allow them to interact with virtual objects in the real world.

4. VR is an absolutely controlled and immersed experience or station. Vision and even the sense of hearing are under the control of the VR system, whereas AR and MR intermix the virtual scenes with the real experience of vision and permit the user to have the real world integrated with virtual objects.

5. The requirements of the devices, computer-generated graphics, videos, and animation in AR are less as compared to the hardware requirements in VR systems, and hence, there is a high risk of maintaining the degree of reality in VR as compared to AR.

6. Compared with VR and MR, AR's display devices are more diverse. AR can be used with laptops, smartphones, tablets, and mobile devices to change how real-world and digital images interact and intersect. While VR uses head-mounted displays (HMDs) or handheld controllers, the display device of MR usually can only use Headsets.

7. In more general terms, typical AR use cases usually emerge in situations where combined experiences of real and virtual content are beneficial (e.g., to compare sizes of furniture or clothing) and possible (e.g., when the space for a specific piece of furniture already exists). VR, in contrast, is preferred in situations where the physical context does not exist (e.g., a fictitious game), is not accessible to a user (e.g., the moon), or where the actual physical context is not desirable (e.g., in training situations that would be dangerous in the real world) (Rauschnabel, Felix, et al., 2022).

Therefore, based on the distinctions outlined in Table 2.1, this study focuses on AR technology due to its multiple advantages in the context of online retail and virtual try-on applications. Unlike VR, which fully immerses users in a simulated environment, AR overlays digital elements onto the real world, enabling consumers to visualize products (such as footwear) within their actual physical context and thereby enhancing pre-purchase evaluation. Moreover, AR can be accessed through commonly used devices such as smartphones and tablets, making it more accessible and cost-effective compared to VR and MR, which often rely on expensive hardware. AR also demands lower technical requirements in terms of graphics and animation, facilitating its large-scale implementation in e-commerce settings. Its interactive and informative features, combined with the ability to operate within real-world environments, are particularly suited for tasks such as comparing product sizes or colors. Importantly, AR-based shoe try-on typically does not require the exposure of the face or body, thereby minimizing privacy concerns. As such, in e-commerce scenarios where real and virtual elements must coexist, AR emerges as the most suitable technology—balancing immersion and consumer practicality—especially for addressing key challenges in online footwear shopping, such as the inability to try on products and uncertainty regarding fit.

2.4 Augmented Reality

Augmented Reality (AR) is a technology that combines the real world with virtual data or objects (such as 3D images, text, audio, or video) through devices such as smartphones, tablets, or AR glasses, working in real time to add information or experiences to users (Yuen et al., 2011). With the increasing popularity of mobile devices and the widespread availability of high-speed wireless networks, a plethora of web-based and mobile AR applications have emerged, aiming to deliver innovative, immersive, informative, and valuable experiences. By integrating real-world and virtual information (Poushneh, 2017), AR is widely applied across online websites, physical stores, and mobile apps (Lavoye et al., 2021). AR technology will change marketing in the coming years (Tan et al., 2022). At present, large international retail companies such as GAP, Levi's, Uniqlo, FILA, IKEA, Sephora, Wayfair, and many others have launched AR-based mobile shopping apps that allow customers to "Try-On" brands on their own bodies or Spaces (Riar et al., 2022). In China's well-known shopping platforms Jingdong.com, Dewu, and Taobao, some products use AR technology to give consumers a better shopping experience, such as trying on glasses and jewelry (Nawaz, 2022), shoes and cosmetics through AR technology, because AR users experience even more immersive, more vivid, more interactive and more realistic (Cipresso et al., 2018). For example, through the utilization of augmented reality (AR) technology, consumers are able to visually perceive and evaluate the impact of cosmetics on their facial appearance. As with other products, one obvious benefit is that AR can help consumers better understand products that are not currently available (i.e., during online shopping), which can support purchasing decisions (Riar et al., 2022).

AR allows the use of different media (visual displays, such as smartphones, tablets, glasses; sound, smell, and touch displays) to facilitate and optimize the consumer shopping experience (Alcañiz et al., 2019), which is a more effective E-commerce tool than previously used VR-based product presentations like image interactivity technology (Yim et al., 2017). AR has the potential to be highly disruptive in marketing (Rauschnabel, 2021), so it is important to analyze how AR is reshaping the online shopping experience (Narang & Shankar, 2019). Therefore, this study focuses on the impact of AR shopping experiences in e-commerce on consumer cognitive, affective, and behavior.

2.4.1 The Application of Augmented Reality

Augmented reality (AR) enables the integration of virtual digital objects or images into the real world, creating a novel interactive environment. For instance, AR can be used to transform or enhance real-world images or scenes by overlaying virtual objects or images onto them, thereby generating a new immersive experience. This refers to a hybrid environment that combines the physical and digital worlds, allowing for the augmentation or overlay of real-time views with textual information, geographical data, graphics, audiovisual content, and other digital elements. Its purpose is to enhance users' perception of visual, auditory, tactile, and olfactory stimuli (Carmigniani et al., 2011; Fan et al., 2020). According to Azuma et al. (2001), AR is possible for the augmented reality system to:

(1) Integrate both actual and virtual things into a real situation.

(2) Be carried out in real-time cooperation.

(3) Set up the interaction of virtual and real-world things.

(4) Consider formative and summative user-based evaluations.

Augmented reality is perception and reality directly through computer-mediated knowledge fusion. The word "augment" means raise or grow or make it bigger, so here we deal with immersing something digital in the real environment. As shown in Figure 2.5, AR encourages better observation by introducing virtual elements, such as graphic overlays that add new opportunities for interaction with the real world.

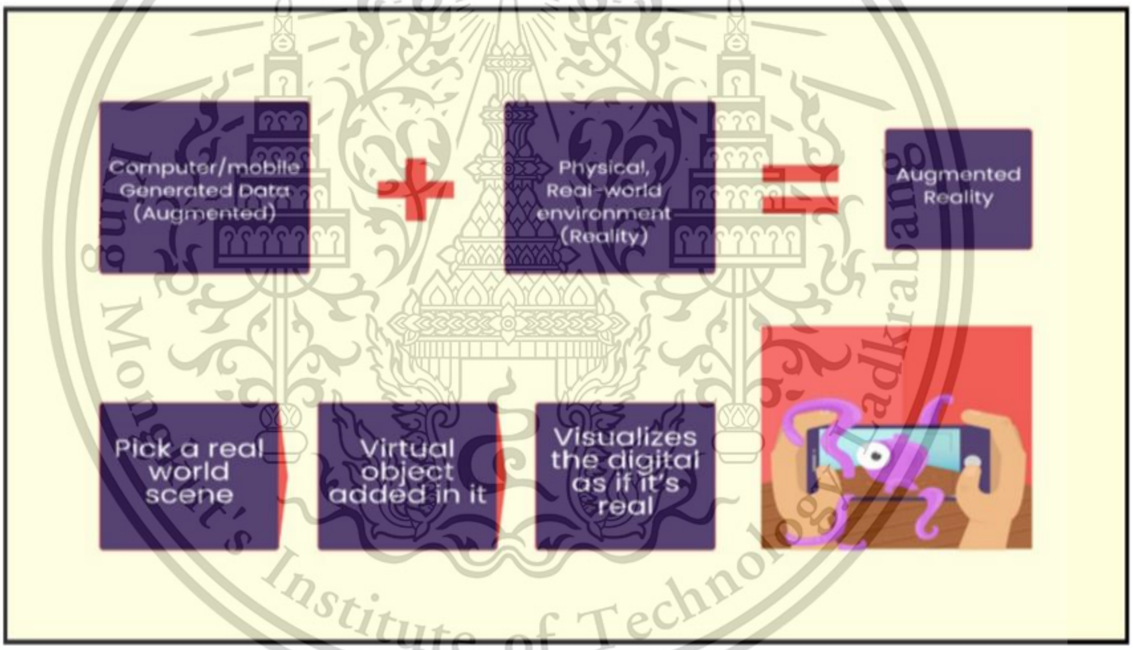


Figure 2.5. Working of AR (Dargan et al., 2023)

A typical augmented reality (AR) system comprises three components: a virtual object representing the geographic space benchmark, the projection of virtual elements onto surfaces, and an image processing unit (Carmigniani, 2011). The initial application of AR systems in commercial practice was limited due to the requirement for specialized equipment such as smart glasses (e.g., HoloLens Magic and Google Glass) (Poushneh, 2018), somatosensory devices (Huang, 2021; Huang & Liao, 2017), or fixed devices like PCs with connected webcams and intelligent mirrors (Rese et al., 2017). Recently, with the widespread adoption of personal mobile devices such as smartphones and tablets, coupled with the availability of high-speed wireless networks, augmented reality (AR) has found applications in various domains, including engineering (Li et al., 2018), marketing (Tan et al., 2022), heritage and archaeology (Amakawa & Westin, 2018), tourism (Cranmer et al., 2020), medicine (Moro et al., 2021), architecture and urban design (Fukuda et al., 2017; Schiavi et al., 2022), education and training (Cabero-Almenara et al., 2019; Mekacher, 2019), and game development (Alha et al., 2019).

2.4.2 Importance of Augmented Reality

Augmented reality has emerged as a prominent subject in the realm of mobile marketing (Narang & Shankar, 2019) and retail research (Guha et al., 2021), primarily attributed to its early adoption within the retail industry (Wiederhold, 2017). While initial implementations of augmented reality were predominantly deployed in physical store settings, such as virtual locker rooms, for superimposing virtual clothing onto real-world environments (An et al., 2021), more recent advancements have shifted towards leveraging customers' handheld devices for augmented reality experiences (Van Esch et al., 2019). GAP, Levi's, Uniqlo, FILA, IKEA, Sephora, Wayfair, and other brands have introduced augmented reality (AR) based mobile shopping applications that enable customers to virtually try on their products on their bodies or in different spaces (Nawaz, 2022), as shown in Figure 2.6. For example, with AR technology, furniture (such as chairs, sofas, tables, closets, etc.) and decorative products (such as wall hangings, plants, wall colors, etc.) can be experienced in the intended environment, thus enabling potential buyers to better understand how the product and its features (such as size, color, shape) will look in their home, office, or other environment (Jessen et al., 2020; Kowalczuk et al., 2021). Additionally, augmented reality technology enables consumers to virtually apply makeup or try on fashion products (such as glasses, clothing, and watches) while seeing themselves in a mirror-like reflection (Hilken et al., 2017; Poushneh, 2018; Yim & Park, 2019). Compared to other technologies, one obvious benefit is that AR can help consumers better understand products that are not currently available (i.e., during online shopping), thereby facilitating informed purchasing decisions (Riar et al., 2022).

The development and maturation of wearable technology in the marketing field position AR devices as the future of retail. Collaborations among technology developers, including software and hardware manufacturers, aim to provide businesses with augmented reality solutions for both online and offline stores (Luo et al., 2020). Consequently, customers can enjoy the convenience of utilizing AR on handheld devices (Rauschnabel et al., 2019), expanding its application beyond a single industry into various industrial and social sectors. Its vast potential has already significantly enhanced various aspects of human life across multiple domains, encompassing marketing (Tan et al., 2022).

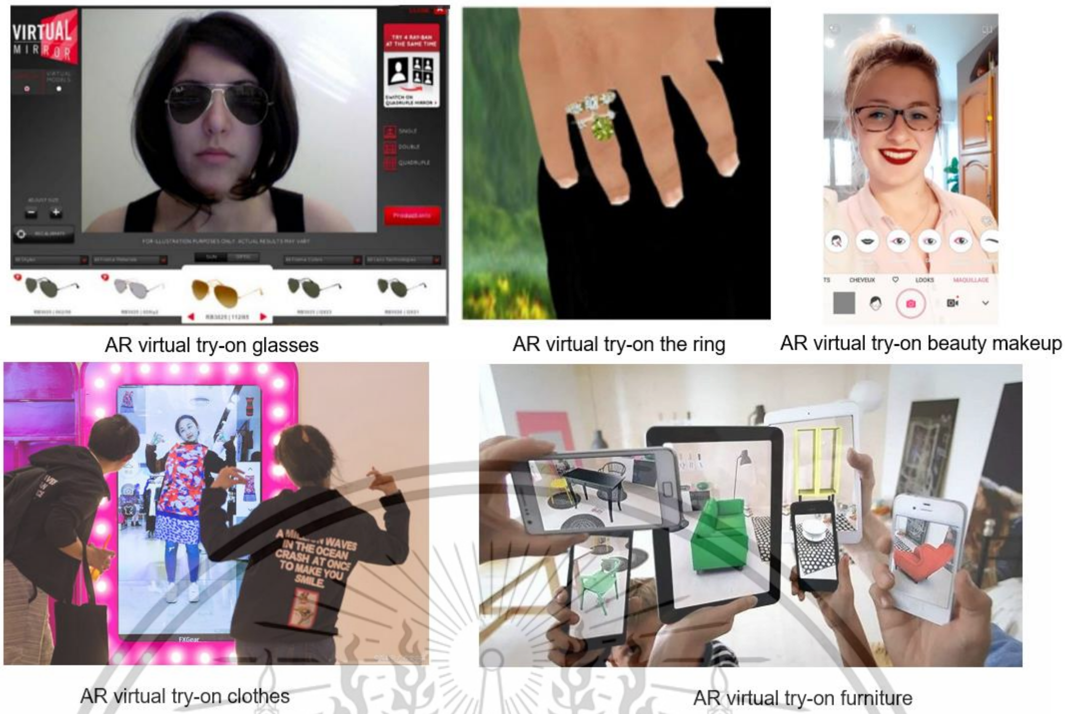


Figure 2.6 AR virtual try-on

One issue to consider when creating AR-based devices and applications is how the product fits with the end user, and "Virtual Try-On" (VTO) facilities leverage AR applications and devices to enable customers to make accurate decisions (An et al., 2021). AR has achieved a milestone by introducing this VTO facility in retail, providing convenience to customers in brick-and-mortar and online retail stores who prefer to virtually try on products before making a purchase decision (Li & Xu, 2019). It is one of the key trends in the online retail environment (Noghabaei et al., 2020) and is of critical importance. Therefore, more and more brands are keen to implement such VTO facilities through AR applications (Zhang et al., 2019).

Furthermore, the future of the retail industry lies in AR technology and its application in Virtual Try-On (VTO) facilities (Samir & Islam, 2019). Although still in the experimental stage within the apparel and shoe industry, it holds immense potential for yielding positive outcomes. Thus, we can infer that both the online and offline popularity of AR is growing in the apparel and footwear sectors (Acharya et al., 2018). Online retail is receiving great attention from Chinese consumers, and it is highly anticipated that AR "Virtual Try-On" facilities can be applied to the apparel and shoe industry to solve the challenges of online shopping (Nawaz, 2022).

2.4.3 Research Status of AR Beyond China

Upon synthesizing the existing literature, our analysis reveals that current scholarly works on augmented reality predominantly explore the consequences of augmented reality usage and diverse augmented reality characteristics. These investigations extend across a spectrum of outcome variables related to technology, products, and brands. Furthermore, these studies delve into uncovering the underlying mechanisms that drive these effects. Some articles concentrate on specific categories of outcome variables, such as those tied to technology, products, or brands. Meanwhile, other articles adopt a more comprehensive approach, examining multiple classes of outcome variables simultaneously.

Augmented reality (AR) is characterized by features such as interactivity, augmentation, informativeness, vividness, novelty, and aesthetics. These elements enhance its immersive and engaging experience, especially in areas like mobile commerce, education, and entertainment. Among these features, interactivity emerges as the most extensively examined element within the scholarly discourse on AR. This prominence is largely attributed to interactivity's pivotal role in shaping user engagement, enhancing perceived control, and facilitating meaningful interactions between users and virtual content embedded in real-world environments. Prior studies have consistently emphasized that heightened interactivity not only increases user satisfaction but also reinforces cognitive and affective responses, ultimately influencing behavioral outcomes such as purchase intention, continued usage, and brand loyalty. Consequently, understanding the mechanisms and effects of interactivity in AR environments remains a critical focus for both academic inquiry and practical application (Du et al., 2022). Interactivity refers to the capability of technical systems to facilitate users in easily interacting, controlling, manipulating, and engaging with content (Pantano et al., 2017). Augmentation, also referred to as augmented quality, stands out as the most distinctive feature of augmented reality. It offers an immersive consumer experience by defining the extent to which a digital object seamlessly integrates into an individual's real-world environment (Daassi & Debbabi, 2021). Additionally, it emphasizes the user's ability to naturally interact with and manipulate the digital object within that environment (Rauschnabel et al., 2019). Informativeness describes the extent to which the information provided is beneficial to consumers in making better decisions (Kowalczuk et al., 2021). Vividness in augmented reality denotes the integration of sensory experiences from real objects (such as visual and tactile elements) with non-sensory imagined objects (objects created within an individual's mind) (McLean & Wilson, 2019).Novelty refers to the degree of uniqueness, specificity, and unexpectedness of the information presented to consumers through augmented reality experiences. It captures users' perceptions of how original or unconventional the AR content appears, which can significantly enhance curiosity, attention, and exploratory behavior (Nikhashemi et al., 2021). Aesthetic encompasses elements such as color harmony, layout, realism, and design consistency, which collectively influence users' sensory pleasure and emotional responses (Yim & Park, 2019). Aesthetically pleasing AR interfaces can elevate perceived enjoyment and immersion, contributing to more memorable and satisfying user experiences. Both constructs are essential components of the

AR experience and are summarized in Table 2.2.

Table 2.2 Augmented reality characteristics and related literature

AR Characteristic	Definition	Studies
Interactivity	It refers to the ability of technical systems to enable users to easily interact, control, manipulate, and engage with content.	McLean and Wilson (2019), Yim and Park (2019), Park and Yoo (2020), Barhorst et al. (2021), Hsu et al. (2021), Kowalczuk et al. (2021)
Augmentation	It describes the extent to which digital objects are integrated into the real-world environment and the ability to enable consumers to move the digital objects naturally.	Rauschnabel et al. (2019), Song et al. (2020), Fan et al. (2020), Hinsch et al. (2020), Nikhashemi et al. (2021), Daassi and Debbabi (2021)
Informativeness	It describes the extent to which the information provided is beneficial to consumers in making better decisions.	Rese et al. (2017), Qin et al. (2021), Yuan et al. (2021), Kowalczuk et al. (2021)
Vividness	It means that augmented reality combines the sensory experience of real objects (such as visible and touched) with non-sensory imagined objects (i.e., objects created in an individual's mind) to create a clear product image or experience for the consumer.	Yim and Park (2019), McLean and Wilson (2019), Barhorst et al. (2021), Nikhashemi et al. (2021), Whang et al. (2021)
Novelty	It describes the novelty, uniqueness, specificity, and unusualness of augmented reality information presented to consumers.	Yim and Park (2019), McLean and Wilson (2019), Nikhashemi et al. (2021), Whang et al. (2021), Barhorst et al. (2021)
Aesthetics	It describes the visual appeal of augmented reality objects or augmented reality environments.	Yim and Park (2019), McLean and Wilson (2019), Barhorst et al. (2021), Nikhashemi et al. (2021), Huang and Liao (2017)

2.4.3.1 Technology-Related Outcome Variables

Technology-related outcome variables in the literature on AR research include consumer attitudes toward AR technology /AR applications, satisfaction, adoption/use intention, continued use/reuse intention, and recommendation intention. Consumer attitudes toward AR technology /AR applications refer to how they feel when using the technology (e.g., Daassi & Debbabi, 2021; Pantano et al., 2017; Plotkina & Saurel, 2019; Qin et al., 2021; Rese et al., 2017). Consumer satisfaction with AR technology /AR applications describes the accumulation when they interact with them repeatedly over a period of time (Chiu et al., 2021; Poushneh, 2017). Consumers' willingness to adopt/use AR technology /AR applications refers to their willingness to adopt/use the technology (Plotkina & Saurel, 2019; Rese et al., 2017). Consumers' continued intention to use/reuse AR technology /AR applications describes their willingness to use it again in the future (Daassi & Debbabi, 2021; Kowalczuk et al., 2021; Nikhashemi et al., 2021). Consumers' willingness to recommend AR technology /AR apps refers to their willingness to share information about it privately with friends or publicly on social media (Pantano et al., 2017; Smink et al., 2020).

The literature on consumer attitudes research in Augmented Reality (AR) has predominantly centered around investigating the influence of AR app usage or specific AR features on consumer attitudes, unveiling the mechanisms through which these effects materialize. For example, the use of AR technology or AR characteristics (interactivity, augmentation, informativeness, vividness, novelty, and aesthetics) can enhance consumer satisfaction (Chiu et al., 2021; Poushneh, 2017) and then stimulate their willingness to use/continue to use and recommend AR technology or AR apps (Nikhashemi et al., 2021; Rese et al., 2017; Smink et al., 2020). In examining the influence of AR technology or AR-based applications on consumer behavior, both utilitarian and hedonic factors play a mediating role in shaping user responses and decision-making processes. Utilitarian dimensions—such as perceived usefulness, ease of use, convenience, and informativeness—reflect the functional and goal-oriented value that consumers derive from AR experiences. At the same time, hedonic elements, including enjoyment, hedonic experience, and a sense of immersion, capture the emotional and experiential appeal of AR, which can significantly enhance user engagement. Together, these dual pathways help explain how AR technologies affect consumer attitudes, satisfaction, and behavioral intentions. (e.g., Daassi & Debbabi, 2021; Pantano et al., 2017; Plotkina & Saurel, 2019; Qin et al., 2021; Rese et al., 2017; Smink et al., 2020). Specific details are available in Table 2.3.

Table 2.3 Technology-related outcome variables

Studies	AR characteristics	Affective responses	Cognitive responses	Behavioral responses
Pantano et al. (2017)	Interactivity, Aesthetic quality, Response time, Quality of information,	Enjoyment	Perceived ease of use, Perceived usefulness	Attitudes toward app
Rese et al. (2017)	Perceived informativeness, Perceived enjoyment		Perceived ease of use, Perceived usefulness	Attitudes toward using, Intention to use
Plotkina and Saurel (2019)	Humans visualized in commerce	Enjoyment	Convenience, Ease of use, Usefulness	Attitudes toward technology, Purchase intention
Qin et al. (2021)	Perceived Interactivity, perceived virtuality	Hedonic, Utilitarian	Perceived informativeness, Perceived ease of use	Attitudes toward using, Purchase intention
Daassi and Debbabi (2021)	Perceived augmentation	Immersion,	Perceived realism, product presence	Attitudes towards AR, Intention to reuse
Poushneh (2017)	Augmented reality	Hedonic, Quality by emotional stimulation	Pragmatic Quality, Hedonic quality by identification	User's willingness to buy, user satisfaction
Kowalczuk et al. (2021)	Interactivity, System quality	Immersion, Enjoyment	Media usefulness, Choice confidence	Reuse intention, Purchase intention
Nikhashemi et al. (2021)	Interactivity, Quality of the augmented reality, Vividness, Novelty	Psychological inspiration, Engagement	Utilitarian benefit, Hedonic benefit	Intention to reuse, Willingness to pay a price premium

Table 2.3 (Continue)

Studies	AR characteristics	Affective responses	Cognitive responses	Behavioral responses
Smink et al. (2020)	AR app (VS NON-AR APP)		Perceived personalization, Perceived intrusiveness, Spatial presence	Brand response, Recommendation intention

2.4.3.2 Product-Related Outcome Variables

In the body of literature on Augmented Reality (AR) research, product-related outcome variables are frequently examined to assess the influence of AR experiences on consumer behavior. These outcomes commonly include product attitudes, purchase intention, willingness to pay a price premium, and word-of-mouth (WOM) intention. Product attitudes refer to consumers' overall evaluative judgments, encompassing their emotional responses, beliefs, and sentiments toward the product presented through AR interfaces (Fan et al., 2020; Van Esch et al., 2019). Purchase intention denotes consumers' behavioral inclination or likelihood to purchase products encountered within AR retail environments (Javornik, 2016; Plotkina & Saurel, 2019; Smink et al., 2020). Consumers' willingness to pay a price premium signifies their readiness to pay a higher price for a product (Nikhashemi et al., 2021). Consumers' WOM intentions indicate their readiness to share positive aspects of the product with friends, relatives, and others (Hilken et al., 2017).

As indicated in Table 2.4, the current body of literature demonstrates a comprehensive understanding of how AR characteristics significantly influence consumers' attitudes toward products and their purchase intentions. To be specific， AR characteristics such as interactivity (e.g., Kowalczuk et al., 2021; Qin et al., 2021; Whang et al., 2021)， augmentation (Javornik, 2016)， informativeness (Kowalczuk et al., 2021; Yang, 2021)， novelty (Hilken et al., 2017; Nikhashemi et al., 2021), quality (Kowalczuk et al., 2021) and anthropomorphism (Van Esch et al., 2019) affect product-related outcomes. The majority of studies concentrate on consumers' intentions to purchase products (Haile & Kang, 2020; Plotkina & Saurel, 2019), with some research also shedding light on the influence of AR characteristics on consumer product/brand attitudes and word-of-mouth (WOM) intentions (Hilken et al., 2017; Van Esch et al., 2019). These studies employ consumers' perceptions of hedonic and utilitarian benefits (Hilken et al., 2017; Qin et al., 2021), as well as affective and cognitive responses (Fan et al., 2020; Javornik, 2016), presence (Hilken et al., 2017), immersion/enjoyment (Kowalczuk et al., 2021; Plotkina & Saurel, 2019), convenience/ease of use (Plotkina & Saurel, 2019; Qin et al., 2021) and flow (Javornik, 2016) to elucidate the observed effects.

Table 2.4 Product-related outcome variables

Studies	AR characteristics	Affective responses	Cognitive responses	Behavioral responses
Van Esch et al. (2019)	Anthropomorphism	Innovative	Confidence, Facilitates, Convenience, Consumers, Discomfort	Attitude toward the brand
Fan et al. (2020)	Environmental embedding, Simulated physical control		Cognitive fluency, Cognitive load	Product attitudes
Javornik (2016)	Perceived augmentation	Flow (immersion)	Cognitive responses	Brand attitude, Purchase intentions
Plotkina and Saurel (2019)	Human visualized in the m-commerce	Enjoyment	Convenience, Ease of use, Usefulness	Attitude toward technology, Purchase intention
Kowalczuk et al. (2021)	Interactivity, Informativeness, System quality	Immersion, Enjoyment	Media usefulness, Choice confidence	Purchase intention, Reuse intention,
Hilken et al. (2017)	Simulated physical control, Environmental embedding (novelty)	Utilitarian value, Hedonic value	Spatial presence,	Purchase intention, WOM
Yang (2021)	Informativeness, Ease of use, Telepresence		Perceived value	Purchase intention
Qin et al. (2021)	Perceived interactivity, Perceived virtuality	Hedonic, Utilitarian	Perceived informativeness, Perceived ease of use	Purchase intention, Attitude toward using

Table 2.4 (Continue)

Studies	**AR characteristics**	**Affective responses**	**Cognitive responses**	**Behavioral responses**
Nikhashemi et al. (2021)	Interactivity, Quality of the augmented reality, Vividness, Novelty,	Psychological inspiration, Engagement	Utilitarian benefit, Hedonic benefit	Intention to reuse, Willingness to pay a price premium
Whang et al. (2021)	Interactivity, Vividness	Behavioral control	Cognitive control	Purchase intention
Haile and Kang (2020)	Informativeness, Real-Time Interactivity, Irritation, Entertainment	Affection	Cognition	Purchase Intent

2.4.4 Research Status of AR in China

In China, a search using the keyword "Augmented Reality" in CNKI (China National Knowledge Infrastructure) yields a total of 5,115 related articles. Specifically， under the title "Augmented Reality," 3,387 articles can be identified. To ensure the quality of the analysis, the data retrieved using the keyword "Augmented Reality" is utilized as the sample for analysis in this section.

As can be seen from Figure 2.7, the number of newly added "augmented reality" literature each year, AR research in China has roughly gone through four stages. According to Yu (2018), the four stages are as follows. The first stage is the introduction period (1996-1999). The second stage is the introduction and absorption period (2000-2008), during which papers are published on a large scale, and the early institutions are mainly concentrated in the institutes of Beijing Institute of Technology, Zhejiang University, University of Electronic Science and Technology, Xi 'an Jiaotong University and other universities. The third stage is the development period (2009-2013). With the promotion of new media and mobile networks, AR technology burst into a new vitality. In 2009, augmented reality-related new papers exceeded 100, and in 2012 exceeded 200. The fourth stage is the high-speed development period (2014 - present), in which augmented reality research begins to break through the technical field and move towards more commercialization and popularization.

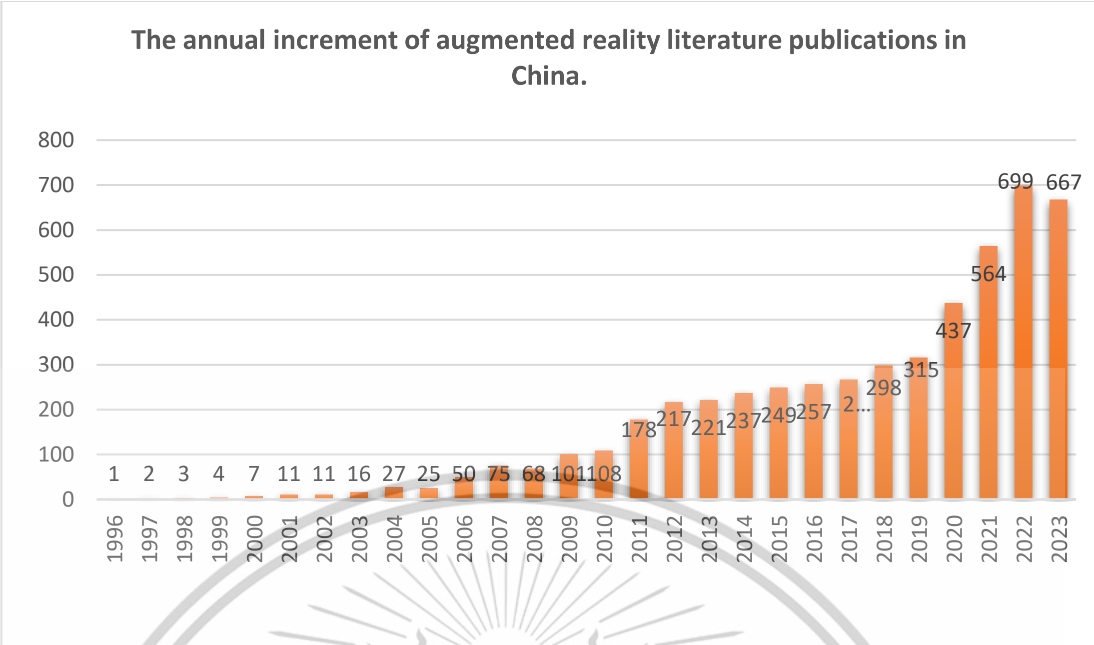


Figure 2.7. The annual increment of augmented reality literature publications in China.

In terms of research fields, according to the discipline classification of CNKI, the fields with a large number of publications are computer software and computer applications, information economy, industrial economy, educational theory and educational management, telecommunications technology, automation technology, news and media, and trade economy. The field with the largest number of published papers was computer software and application, with a total of 2831 published papers, accounting for 55.34%. Followed by the economy, including information economy (460 articles), industrial economy (407 articles), trade economy (201 articles), and enterprise economy (170 articles), a total of 1238 articles, accounting for 24.2%. The remaining 30% of articles focus on education management, educational technology, news and media, finance, and marketing, as shown in Figure 2.8.

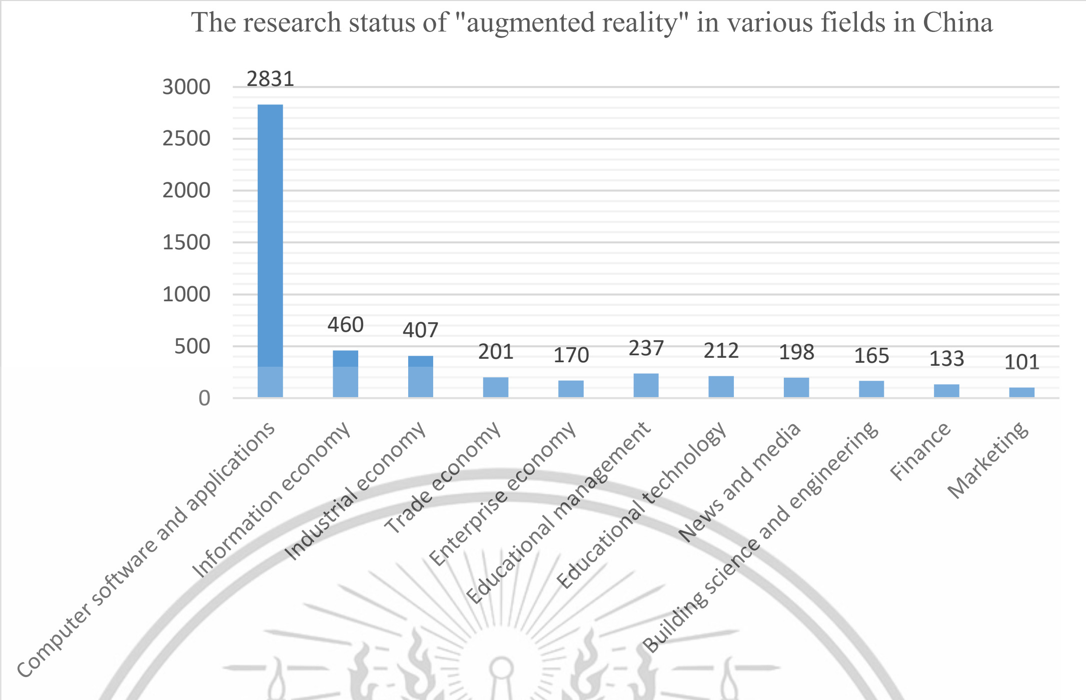


Figure 2.8. The research status of "augmented reality" in various fields in China.

2.4.4.1 AR Research from Multiple Economic Perspectives

From the perspective of the information economy, researchers mainly publish future visions and industry layout ideas based on industry scale (Lao, 2023; Li, 2016), financing situation (Hou, 2018; Yu, 2019), popular games (Liao, 2020; Zhou, 2013; Zhou & Wang, 2019), and industry activities (Guo & Guo, 2019). From the perspective of the industrial economy, researchers are aiming at industrial segments such as workshop layout simulation systems (Pei, 2015; Shangguan, 2021; Shuai, 2012), clothing printing (Gu, 2022; Lu, 2017), automobile maintenance (Luo, 2021; Zhang & Jin, 2018), power grid enterprises (Li et al., 2017; Liu et al., 2017; Pan et al., 2022), intelligent manufacturing (Chen et al., 2021; Square et al., 2023; Zhou et al., 2023), etc., to show the intelligent changes brought by augmented reality. The perspectives of the trade economy and enterprise economy pay more attention to the operation mode (Fang et al., 2021), ecosystem (Li, 2020), and enterprise platform development of enterprises (Gui, 2021).

2.4.4.2 AR Research from Education and Communication Perspectives

The field of education is the third largest area of AR research. From the perspective of education, researchers mainly explore mobile learning (Liu et al., 2022), teaching methods (Wang & Tang, 2017; Yin, 2021), experiential learning (Liu, 2016; Zhang, 2019), and other perspectives of education based on augmented reality. In the field of journalism and communication, it has gradually attracted the attention of researchers in recent years. Zhang (2012) designed and demonstrated the application of AR technology in sports TV programs by analyzing specific application examples of augmented reality in digital TV programs.

Researchers mainly study the impact of AR technology on news narrative innovation (Shi & Zhang, 2016; Zhang, 2021), the construction of communication modes (Zheng, 2016), and the application of studios (Li, 2023; Zhao & Liu, 2018). The research status of "augmented reality" in various fields is shown in Figure 2.8.

2.4.4.3 AR Research from Chinese Consumers' Online Shopping Behaviors Perspectives

1.The Impact of AR Technology on Consumer Decision-Making Behavior

Enhancing Decision Efficiency and Accuracy: AR technology enhances consumers' decision-making efficiency by providing 3D visualization and contextual simulation, significantly reducing perceived risk in online shopping. For example, Dewu App's AR shoe try-on function replicates products at the "pixel level," assisting over 30% of users daily in making purchase decisions (Daily, 2022). Real-time virtual fitting for items such as shoes and watches allows consumers to assess size and appearance from various angles, lowering return rates from approximately 25% in traditional e-commerce settings to 12% in AR-enhanced shopping environments (Xia et al., 2022).

Stimulating Impulse Purchases: AR also fosters emotional engagement and impulsive buying behavior through immersive experiences. Chen (2022) found that on an AR-based home furnishing platform, consumer purchase intention increased by 40% after product interaction within a virtual environment. Similarly, Dewu's AR makeup try-on, which dynamically simulates lighting conditions (e.g., lipstick color under different lighting), has led to a 15% increase in average transaction value (Daily, 2024). Supporting these findings, Kong and Chunhua (2022) demonstrated that AR beauty functions directly influence purchase intention through mediating factors such as interest and perceived similarity, suggesting that AR features enhance consumer willingness to buy via increased personal relevance and enjoyment.

Moderating Effects of Individual Differences: Individual traits also influence the effectiveness of AR in shaping consumer decisions. An experiment with 278 female users showed that risk-averse consumers had higher expectations for AR makeup functionality; service failures such as color mismatches led to a 27% decrease in satisfaction and reduced repurchase intentions (SGIA, 2025). Additionally, younger consumers, especially those from Gen Z, are more inclined to engage in AR-based social sharing (e.g., short try-on videos), completing the "inspiration-to-purchase" loop. Supporting this, Shin and Jeong (2021) identified that technological innovation, discomfort, and perceived security risks significantly affect tourists' attitudes toward using AR, indicating that both the appeal and potential drawbacks of AR can shape consumer engagement across contexts.

Affective Engagement and Attitude Formation: Beyond functional benefits, affective experience plays a crucial role in consumer attitude formation. Liu (2015) found that game players valued emotional experience most, followed by behavioral, sensory, and interactive experiences—highlighting how AR's capacity to stimulate emotion and interaction can influence consumer preference. Similarly, Chen (2017), integrating the Streaming Experience Theory with the Unified Theory of Acceptance and Use of Technology (UTAUT), developed an AR user adoption model, where performance expectation and perceived pleasure were key determinants of usage behavior. This underscores the dual cognitive and emotional pathways through which AR affects consumer attitudes and decisions.

2. AR-Driven Consumer Experience Enhancement

From Functional to Experiential Consumption: AR technology redefines the relationship between consumers, products, and environments by facilitating immersive and interactive experiences. For instance, the Gulangyu Metaverse Project utilizes XR to blend physical tourism with digital storytelling. Visitors explore historical sites with AR digital guides, which has increased their dwell time by 50% (Daily, 2024). Similarly, in e-commerce, Dewu's "Sneaker Museum" enables 3D viewing of product craftsmanship, fulfilling consumers' desire for deeper engagement and cultural exploration (Daily, 2024).

Personalized and Contextualized Experiences: AR empowers brands to deliver personalized, scenario-driven shopping experiences. For example, smart kitchen laboratories use AR and sensor data to tailor recipe recommendations based on user habits, thereby tripling average order value (Wu, 2019). Likewise, AR try-on technology for Miao embroidery garments allows users to access custom designs through QR codes, integrating intangible cultural heritage with modern fashion while increasing perceived technological value by 40% (Castenetto, 2022). These personalized experiences align with findings by Yu (2018), who argued that AR stimulates consumer demand motivation and enhances experiential perception.

Immersion and Retail Appeal: Experiential enhancements in retail environments have also been linked to stronger purchase intentions. Chen et al. (2022) found that AR-induced immersion, enjoyment, and perceived risk contribute to a retail outlet's allure and significantly influence consumer buying behavior, demonstrating the commercial value of affective and sensory stimulation through AR.

3. Consumer Trust and Risk Perception

Building Technological Trust: AR fosters consumer trust by increasing transparency. Dewu's "AR Certificate Scanner," powered by AI, verifies product authenticity with 99.9% accuracy, leading to a 22% rise in repeat purchases (Castenetto, 2022). JD.com's blockchain-based AR tracking further enhances traceability from raw materials to end-use, raising consumer trust levels by 35% (SGIA, 2025). These developments suggest that consumers equate technological transparency with brand reliability and product integrity.

Privacy and Data Security Concerns: However, the extensive use of biometric data in AR applications raises concerns. Sha et al. (2023) noted that AR try-on functions typically require facial and body measurements, posing risks under China's Personal Information Protection Law if not managed properly. While this data enhances the realism and personalization of AR experiences, it also increases the risk of misuse, unauthorized access, and data breaches if appropriate safeguards are not implemented. Such concerns are particularly relevant in the context of China's *Personal Information Protection Law* (PIPL), which stipulates strict regulations regarding the collection, storage, and processing of biometric information (Sun et al., 2024). Non-compliance can lead to significant legal liabilities for companies and erode consumer trust (He & CHen). Therefore, it is critical for AR service providers to implement transparent data policies, obtain explicit user consent, and adopt advanced encryption and anonymization techniques to ensure compliance and build consumer confidence.

4. Technology Acceptance and Behavioral Transformation

Validating the Technology Acceptance Model (TAM): Research consistently supports the Technology Acceptance Model in explaining AR adoption. Xia et al. (2022) demonstrated that perceived ease of use—such as fast interface loading (<3 seconds) and intuitive gesture controls—directly influences continued use. Dewu's AR watch try-on feature, which enables real-time hand synchronization, improved user retention by 18% (Andri et al., 2025). Pan et al. (2019) further argued that information quality, system quality, and satisfaction are key drivers of use intention, mediated by perceived usefulness and ease of use. These findings are echoed by Li and Gao (2023), who verified TAM's predictive power regarding attitudes and behavioral intention toward AR use.

Generational Differences and Usage Intentions: Generational variation also affects AR adoption. Post-90s and Gen Z consumers demonstrate higher engagement rates, as seen in FITURE's AR fitness mirror, where Gen Z users were 42% more likely to complete AR-assisted fitness programs than those using traditional video tools (Department, 2024). In contrast, older consumers report adoption rates below 10%, mainly due to usability challenges (Department, 2024). Furthermore, Du (2022). highlighted that interactive characteristics like visual appeal and spatial presence significantly enhance users' intention to continue using AR. Similarly, Deng and Ye (2022) found that perceived usefulness and satisfaction are critical to long-term engagement, suggesting that enhancing enjoyment and usability is key to broader demographic acceptance.

2.4.4.4 Summary

As Augmented Reality (AR) technology becomes increasingly prevalent in the field of e-commerce, Chinese consumers' online shopping behavior is undergoing profound transformation. A substantial body of literature has explored how AR technology reshapes consumers' decision-making processes, enhances the shopping experience, strengthens trust, and promotes technology adoption. These studies collectively lay a solid theoretical foundation for the development of the conceptual framework and research model in the present study.

In AR shopping environments, realism and technology fluidity have been widely recognized as key external stimulus variables influencing users' initial perceptions and interactive experiences. For example, the AR try-on feature on the Dewu platform significantly enhances product visual realism and presence through pixel-level 3D reconstruction, effectively reducing perceived risk (Daily, 2024; Xia et al., 2022) .Chen et al. (2022) further highlight that AR applications with high fidelity and situational simulation capabilities can evoke emotional resonance and significantly boost purchase intentions. These findings clearly support the role of augmented realism as a critical stimulus in AR environments.

At the same time, technology fluidity has been shown to be another essential factor shaping user experience quality. Studies by Andri et al. (2025) demonstrate that responsive interface design and real-time feedback mechanisms (e.g., motion synchronization in AR smartwatch try-ons) significantly improve operational efficiency and immersion, thereby enhancing users' intentions to continue using the technology. These findings align closely with the S-O-R (Stimulus-Organism-Response) model's assertion that stimulus variables must possess sensory appeal and interactivity.

Importantly, the influence of AR technology is not exerted directly on consumer behavior, but rather indirectly through the activation of cognitive (e.g., perceived usefulness, perceived risk) and affective (e.g., immersion, enjoyment) responses. This mediating mechanism has been validated across multiple empirical studies. On the cognitive dimension, Li and Gao (2023), using the Technology Acceptance Model (TAM), found that information quality, system quality, and user satisfaction significantly predict usage intentions, underscoring the centrality of rational evaluation in technology adoption. On the affective dimension, Chen (2017), integrating flow theory with the Unified Theory of Acceptance and Use of Technology (UTAUT), posits that both emotional enjoyment and performance expectancy jointly drive AR adoption. Liu (2015) further emphasizes that in virtual interaction settings, emotional experiences are often prioritized by users. These findings collectively support the S-O-R model's premise that both cognitive and affective processes are integral to the organism stage.

A growing body of empirical research also confirms the significant impact of AR on consumer behavior. For instance, immersive AR experiences on beauty and home décor e-commerce platforms have been shown to improve purchase conversion rates and average order values (Kong & Chunhua, 2022). In the cultural domain, applications such as Miao embroidery AR try-ons enhance consumers' perceived brand value and emotional attachment (Castenetto, 2022).

However, not all consumer responses are positive. Studies by Sha et al. (2023) and Sun et al. (2024) caution that improper handling of biometric data (e.g., facial recognition information) may lead to privacy concerns and reduce willingness to adopt AR technologies. This indicates that consumer responses are complex outcomes shaped by the interplay between cognitive and affective factors, further validating the applicability of the S-O-R model.

Despite the growing literature on AR, three critical research gaps remain: (1) insufficient systematic modeling of perceived augmented realism and technology fluidity as stimulus variables; (2) a lack of integrated studies examining the dual mediating pathways of cognitive and affective responses; and (3) limited exploration of Chinese consumers' behavioral mechanisms in AR shopping contexts, particularly in light of the heightened privacy awareness following the implementation of the Personal Information Protection Law.

To address these gaps, the present study proposes an integrated model grounded in the S-O-R theoretical framework. The model conceptualizes augmented realism and technology fluidity as stimulus variables, consumer attitude and perceived information quality as cognitive responses, immersion and enjoyment as affective responses, and purchase intention as the ultimate behavioral outcome. This framework aims to provide a comprehensive understanding of the psychological mechanisms and behavioral pathways of Chinese consumers in AR-enhanced e-commerce environments.

2.5 Theoretical Concept of Stimulus-Organism-Response Theory

2.5.1 The Emergence and Development of Stimulus-Organism-Response Theory

The Stimulus-Organism-Response (S-O-R) model of cognitive psychology actually originated from behaviorism and was developed based on the stimulus-response (S-R) theory established by John Watson, the founder of behaviorist psychology (Dong et al., 2018). Watson and John (1917), cited in Dong et al. (2018), believed that external stimuli directly cause people's emotions or behaviors, so people's complex behaviors are summed up as "Stimulus" + "Response" mode. As shown in Figure 2.9.

Figure 2.9. Stimulus-Response model (Watson & John, 1917)

"S-R" is regarded as a simple causal relationship, which only expresses external stimuli and results but cannot express an individual's internal consciousness and psychological activities. With the in-depth research of scholars, the "stimulus-organism-response" model came into being. Mehrabian and Russell (1974) first proposed the "stimulus-organism-response" model in the field of environmental psychology, as shown in Figure 2.10.

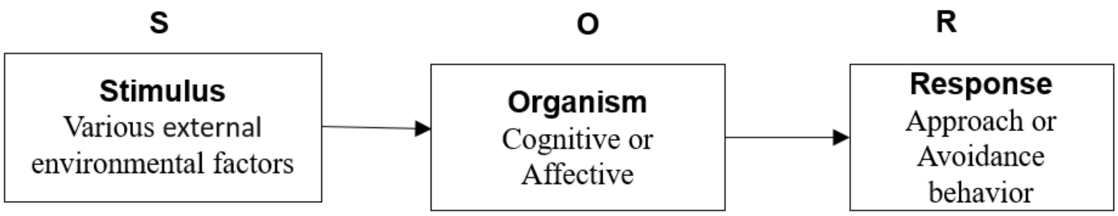


Figure 2.10. "Stimulus-Organism-Response" model (Mehrabian & Russell, 1974)

The S-O-R framework comprises three components: a stimulus, an organism, and a response (Mehrabian & Russell, 1974). Sequential in nature, these components explain how perceived stimuli in an environment (stimulus) evoke cognitive or affective states in an individual (organism), which in turn elicits a behavioral response from that individual (response) (Donovan et al., 1994; Mehrabian & Russell, 1974). In this model, the stimuli are normally associated with different physical cues in the external environment. The organism component in the S-O-R framework focuses on the conversion of perceived environmental stimuli into meaningful information, resulting in a changed cognitive or emotional state (Mehrabian & Russell, 1974). Cognitive states represent consumers' mental processes involving the gaining, processing, and retrieval of information, and cognition includes consumers' understanding, attitudes, and beliefs (Eroglu et al., 2001). Meanwhile, affective states refer to emotions (positive and negative) felt during interaction with environmental stimuli (Eroglu et al., 2001; Islam & Rahman, 2017). Last, the response component in the S-O-R framework refers to the external reaction elicited from consumers in the form of approach or avoidance behavior (Donovan et al., 1994; Vieira, 2013). Mehrabian and Russell (1974), cited in Wang (2020), believed that in the model, we can use various external environmental factors (S) as antecedent variables, affective and cognitive (O) were used as mediating variables, the resulting behavioral response (R) is taken as the dependent variable, such as satisfaction and purchase intention.

With the deepening of the S-O-R model, it is widely believed that the relationship between stimulus (S) and response (R) can be well expressed through mediating variables (O) (Shi et al., 2017). Compared with the "stimulus-response" theory in behavioral psychology, Stimulus-Organism-Response (S-O-R) theory pays more attention to the analysis and explanation of the mental activity process of the organism, systematically explains what psychological factors are responsible for the occurrence of individual behaviors, and realizes the description of the intermediate links of the organism (Wang, 2020). Therefore, more and more scholars have applied it to studying consumer behavior in marketing.

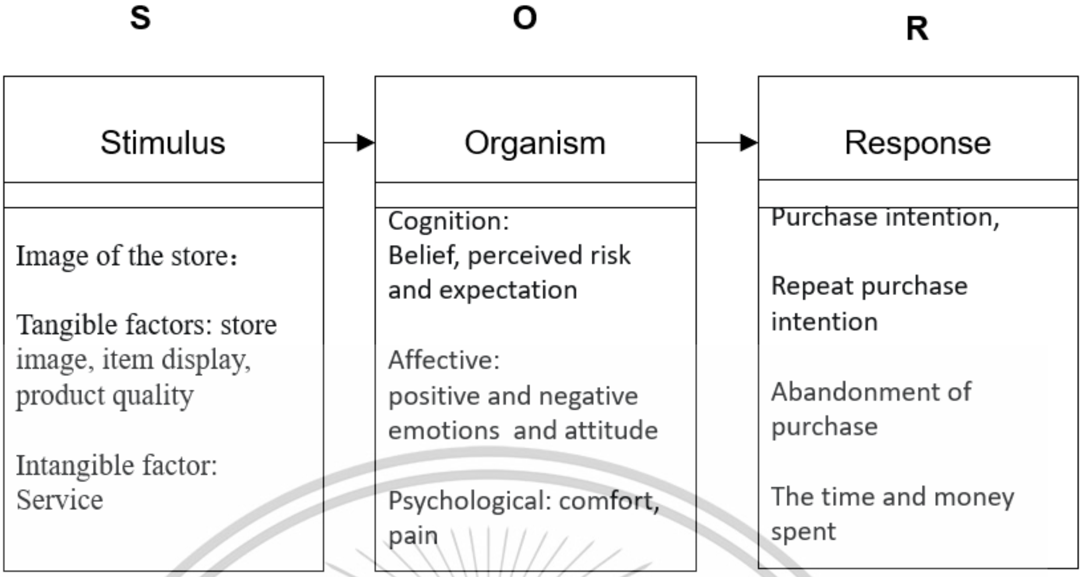


Figure 2.11. Theoretical model of consumer behavior in the traditional shopping.

Source: Based on research by Donovan et al. (1994), Bagozzi (1983), and Bitner and Jo (1992)

Donovan et al. (1994) applied the S-O-R model to purchasing behavior for the first time, and the model shows that consumers' purchasing behavior is precisely caused by stimuli, which can come from consumers' psychological, physiological, and external environmental factors, thus triggering consumers' purchasing behavior. Bitner and Jo (1992), based on the S-O-R theoretical model, a theoretical model framework of the "physical environment - consumer behavior relationship, which holds that the physical environment perceived by consumers will affect the changes in consumers' internal cognition (such as belief and classification), emotion (such as mood and attitudes) and physiology (such as comfort and pain), then it has an impact on consumers' approaching or moving away behavior (Dong et al., 2018). The S-O-R theoretical model of consumer behavior in the traditional shopping environment is shown in Figure 2.11.

According to the literature above review, it is evident that several scholars have expanded and enhanced the S-O-R theoretical model from a marketing perspective. Bitner and Jo (1992) pointed out that in the traditional shopping environment, consumers' purchasing behavior is stimulated by external factors, such as store image, item display, product quality, etc. Such external factors will affect the changes in consumers' internal cognition (such as belief, perceived risk and expectation, etc.), affective (such as emotion and attitudes), and physiology (such as comfort and pain). In turn, it impacts consumer behavior (purchase intention, repeat purchase intention, abandonment of purchase, etc.) (Bagozzi, 1983; Donovan et al., 1994). S-O-R theoretical model clarifies the influence of consumers' internal psychological factors on consumer behavior and better explains the formation mechanism and path of consumer behavior (Bitner & Jo, 1992).

2.5.2 The Consumer Behavior Based on Stimulus- Organism -Response Model in the Online Shopping Environment

With the strong development of the online shopping market, more and more scholars have studied consumers' online shopping behavior based on S-O-R theory. Eroglu et al. (2001) first introduced the S-O-R model into the study of consumer behavior in the context of online shopping and built a research model on the impact of the online store environment on consumers' purchasing decisions. In the model, Eroglu et al. (2003) regarded the online store environment as an external stimulus and consumers' affective and cognition as internal states of consumers, which play an intermediary role in the online store environment and consumers' purchase decisions. They later empirically tested their model and found that the atmosphere cues of online stores can affect shoppers' emotional and cognitive states and thus affect their shopping results.

In recent years, online retail has become an important part of the consumer market, and online shopping has gradually become the normal consumption mode of consumers. Scholars have added more and more stimulating factors to the discussion of the S-O-R model in the online shopping environment.

In terms of network technology factors, Nam et al. (2021) took the S-O-R theoretical model as the framework and took website quality as the stimulus factor and consumer emotion (trust and satisfaction) as the physical factor to study consumers' willingness to buy again. Hong et al. (2014) used the S-O-R model to study users' behavioral intention in social business, taking perceived interactivity, perceived personalization, and perceived social function as stimuli and social support, social presence, and mobility experience as organic factors. Aggarwal and Rahul (2017) explained the effects of perceived useable and perceived information quality on consumers' purchase intention by taking perceived useable and perceived information quality as stimulus factors and consumers' trust and satisfaction with e-retailers as organic factors.

In terms of product and service factors, Yang (2017) based on the S-O-R model and takes marketing platform quality (functional quality, information quality, and service quality) as the stimulus factor, arousal and immersion as the organism factor, and user information attention and information sharing as the response factor. Based on the S-O-R research paradigm, Yu (2017) integrated the theory of social presence, rich media theory, and communication and persuasion theory and studied consumers' online purchase intention by taking the presentation of merchants' commodity information (form and content of information presentation) as the stimulus factor and the sense of social presence, pleasure and trust as the organism factor. Gao (2017) built a theoretical model of personalized service-motivation-stickiness by taking personalized service (interactivity, customization, and recommendation) as the stimulus factor, user motivation (perceived usefulness and flow experience) as the organism factor, and user stickiness as the reaction factor, and adding big data support as the moderating variable. In addition, some scholars studied consumers' purchase intention by taking visual attraction and perceived usability as stimulus factors and website trust as organic factors and found that visual attraction and perceived usability affect consumers' purchase intention through website trust (Kühn & Petzer, 2018; Mariati Tirta Wiyata et al., 2020).

In terms of social factors, Zhang et al. (2017), based on the S-O-R model and integrating rational behavior theory, social exchange theory, social cognition theory, and social capital theory, studied users' willingness to share knowledge in virtual communities, taking outcome expectation and perceptual norms as stimulus factors and trust and pleasure as organism factors. Li (2013) explained consumers' online impulse shopping behavior by taking the environmental characteristics of social shopping communities (design, environmental, and social aspects) as stimulus factors and perceived usefulness, pleasure, and quasi-social relations as organic factors. Lisboa et al. (2023) addressed convenience and channel integration as the stimuli, the relationship among consumer empowerment, trust, satisfaction, and perceived value as the organism, and impulse buying as the response. Some scholars take online reviews as a stimulus factor and trust as an organic factor to study consumers' purchase intentions (Woo et al., 2021).

From the literature review above, it can be seen that when scholars study consumers' online shopping behavior based on S-O-R theory, there are many external stimulus factors introduced, but they can be roughly classified from three aspects: network technology factors, product and service factors, and social factors. The stimulus is an antecedent in the S-O-R structure, whereas organisms serve as intermediaries between the stimulus and behavioral responses (Goi et al., 2014). In this context, the mediation processes are consumers' cognitive or affective states (Eroglu et al., 2003; Ezeh & Harris, 2007). Cognitive states represent consumers' mental processes involving the gaining, processing, and retrieval of information. Cognition includes consumers' understanding, attitudes, and beliefs (Eroglu et al., 2001; Xiao et al., 2019). Affective states represent such as pleasure (feelings of happiness or joy), arousal (feeling stimulated), and dominance (feelings of control or influence over the mediator) (Kisang & SooCheong, 2007). According to the definition and interpretation of cognition and emotion from Kisang and SooCheong (2007), and Xiao et al. (2019), in the above articles, the organism factors are mainly classified into two aspects: cognitive and affective. See Table 2.5 for details.

Table 2.5 Consumer behavior based on the S-O-R model in online shopping

Nomenclature	Content	Studies
External stimulus factor	**Network technology factors:** Website quality, vividness, and interactivity	Nam et al. (2021), Hong et al. (2014), Aggarwal and Rahul (2017)
	Product and service factors: Product information presentation, perceived usefulness, customization	Yang (2017), Yu (2017), Gao (2017), Kühn and Petzer (2018), M. T. Wiyata et al. (2020)
	Social factors: Social features and emotional support, online reviews	Zhang et al. (2017), Li (2013), Lisboa et al. (2023),.
Internal organism factor	**Cognitive:** Social interaction, perceived usefulness, and perceived value	Li (2013), Hong et al. (2014), Gao (2017), Ling (2011), Lisboa et al. (2023)
	Affective: Pleasure, arousal, immersion and presence, trust, satisfaction	Sha and Ye (2012), Yang (2017), Yu (2017), Park et al. (2021), Aggarwal and Rahul (2017)
Behavioral response	Purchase intention and impulse buying	Li (2013), Yu (2017), Park et al. (2021), Mariati Tirta Wiyata et al. (2020), Aggarwal and Rahul (2017)
	Information sharing	Yang (2017), Hong et al. (2014)
	Online stickiness	Gao (2017),

It can be seen from Table 2.5 that when scholars study consumer behavior in an online shopping environment based on the S-O-R model, stimulus (S) factors mainly included the network technology factors (website quality, vividness, and interactivity), product and service factors (product information presentation, perceived usefulness, customization), and social factors (social features, emotional support, online reviews). Organism (O) factors mainly refer to consumer cognitive (social interaction, perceived usefulness, and perceived value) and affective (such as pleasure, arousal, immersion and presence, trust, and satisfaction). Response (R) factors mainly refer to consumers' behavior or willingness to make online purchases, repeat purchases, online stickiness, information sharing, etc. The theoretical model is shown in Figure 2.12.

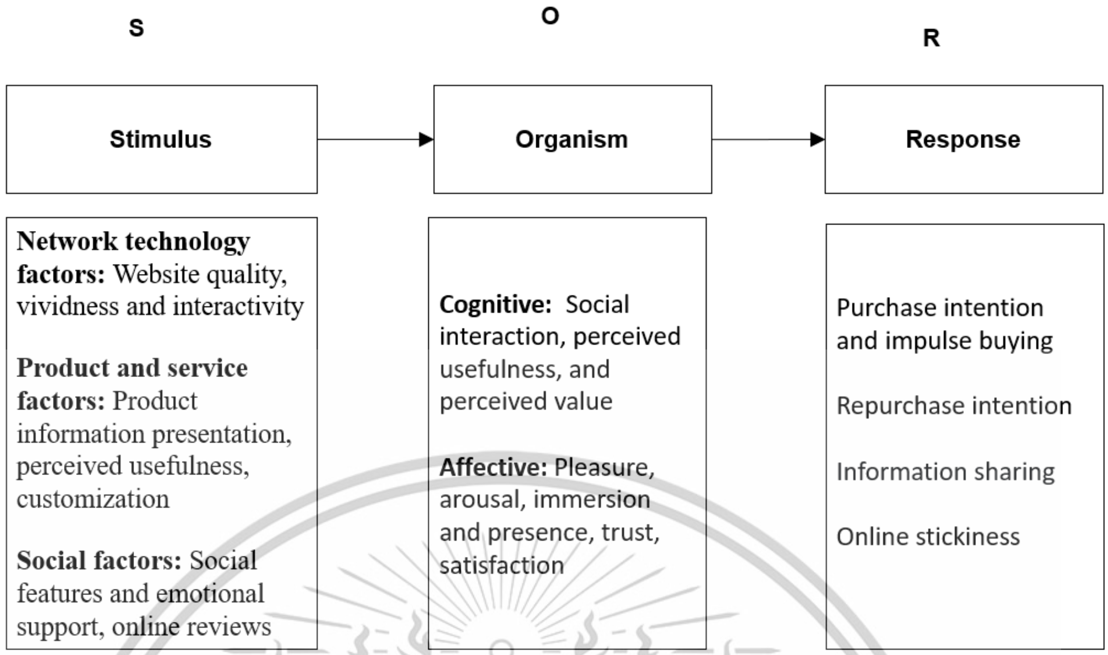


Figure 2.12. S-O-R model of consumer behavior in recent online shopping.

Source: based on the research of Hong et al. (2014), Mariati Tirta Wiyata et al. (2020), Yu (2017), Gao (2017), Li (2013), Park et al. (2021), etc.

To sum up, S-O-R theory has been widely used in the study of consumer behavior in the online environment. According to the S-O-R theory, the external stimulus will affect the cognitive and emotional state of the organism for a certain thing or phenomenon and then affect the consumer's consumption decision (Eroglu et al., 2003; Kim & Lennon, 2013). Most scholars take cognition and emotion as intermediary factors to study the influence of external stimuli such as network technology, products, and services, and social factors on consumer behavior, such as online purchase intention, repurchase intention, information browsing and sharing, and online stickiness. These research results provide a theoretical basis for the study of this article.

2.5.3 Consumer Behavior Based on S-O-R Model in Extended Reality Marketing Environment

In recent years, numerous scholars have investigated the influence of extended reality in the marketing environment, employing the Stimulus-Organism-Response (S-O-R) theory as a theoretical framework. Qin et al. (2021) applied S-O-R theory to research augmented reality (AR) shopping and considered AR as a technology that provides stimuli, affecting cognitive evaluation and essentially giving rise to customer responses, for example, in terms of attitude formation and behavioral intentions. Yang (2021) considered the characteristics of AR media (informativeness, ease of use, and telepresence) as external stimuli, consumers perceived value as the organisms, and purchase intentions as the responses. The results show that informativeness, ease of use, and telepresence have positive effects on consumers' utilitarian value perception and that telepresence and interactivity have positive effects on hedonic value perception. Daassi and Debbabi (2021) applied the S-O-R framework in their research, positing that consumers' behavioral intentions are triggered by augmentation (stimulus), which influences their cognitive state. Specifically, factors such as the sensation of immersion, the experience of product presence, and perceived realism are considered elements of the organism. The findings of the study reveal that perceived augmentation influences consumer behavioral intention through cognitive factors, namely, the sense of immersion, product presence, and perceived realism. In the study of Ghafoor et al. (2023), the stimuli were composed of components of AR experience quality; the organism factor includes augmented reality information privacy concern and customer perceived value, while behavioral intentions are the framework's response component. Nikhashemi et al. (2021) considered attributes of shopping AR apps, including interactivity, quality of augmented reality, AR app vividness, and shopping AR app novelty, as stimuli factors. The study conceptualizes shopping AR app engagement and psychological inspiration as the organism factors and the continuous intention to use the app as the response variable. Han et al. (2021) explored the impact of AR-based presentation styles on customer patronage intention using the S-O-R model, with the mediating roles of immersion, enjoyment, perceived product risk, and attractiveness of the online store.

Apart from examining consumer behavior in augmented reality marketing environments based on the S-O-R theory, scholars have also investigated consumer behavior in virtual reality (VR) or mixed reality (MR) contexts using the S-O-R theoretical framework. Myung et al. (2020) developed a theoretical framework including authentic experience, cognitive and affective responses, attachment, and visit intention with VR tourism using a S-O-R theory, and the results revealed significant impacts of authentic experience on cognitive and affective responses, indicating that authentic experience is an important factor in VR tourism. Han et al. (2023) defined vividness, interaction, and control as stimuli factors, while telepresence and playfulness are characterized as organism factors. The study identifies VR purchasing intention as the response variable in the S-O-R theoretical framework. Sung et al. (2021) applied the S-O-R framework to investigate consumer behavior in a Mixed Reality (MR) environment enhanced by Artificial Intelligence (AI). In their model, the stimulus (S) is conceptualized as the perceived quality of AI integrated within the MR experience. The organism (O) reflects consumers' internal psychological and affective states evoked by the MR mediation process, which includes MR enjoyment, MR immersion, and the perception of novel experiences. These organismic reactions mediate the relationship between AI quality and consumer behavior. The response (R) dimension comprises behavioral intentions, specifically unpaid brand endorsement and purchase intention, indicating how immersive and enjoyable MR experiences can translate into favorable consumer behaviors.

To obtain a clearer and more structured understanding of the current research landscape concerning consumer behavior within Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR) marketing environments—particularly through the lens of the S-O-R theoretical framework—the existing body of literature is systematically summarized in Table 2.6.

Table 2.6 Consumer behavior based on S-O-R model in XR marketing environment

External Stimuli	Internal Organism	Behavioral Response	Type of Technology	Studies
Interactivity, virtuality	Informativeness, ease of use, hedonic	Behavioral intentions, attitudes	AR	Qin et al. (2021)
Informativeness, ease of use, and telepresence	Perceived value	Purchase intention	AR	Yang (2021)
Augmentation	Immersion, product presence, perceived realism	Reuse AR-based apps	AR	Daassi and Debbabi (2021)
AR experience quality	Customer perceived value	Behavioral intentions	AR	Ghafoor et al. (2023)
Interactivity, quality of the augmented reality, AR app vividness, shopping AR app novelty	AR app engagement, psychological inspiration	Continuous intention to use the app	AR	Nikhashemi et al. (2021)
AR-based presentation styles	Immersion, enjoyment, perceived product risk	Customer patronage intention	AR	Han et al. (2021)
Authentic experience	Cognitive and affective responses	Attachment, visit intention	VR	Myung et al. (2020)
Vividness, interaction, control	Telepresence and playfulness	Purchasing intention	VR	Han et al. (2023)
AI quality in MR	MR enjoyment, MR immersion, novel experience	Brand endorsement, Purchase intentions	MR	Sung et al. (2021)

Consumers' emotional states refer to pleasure (feelings of happiness or joy), arousal (feeling stimulated) (Ezeh & Harris, 2007), and dominance (feelings of control or influence over the mediator) (Kisang & SooCheong, 2007). Cognition includes various aspects such as attention, information acquisition, assessment and judgment, and language comprehension (Xiao et al., 2019). Based on the definitions and interpretations of cognition and emotion by Kisang and SooCheong (2007), and Xiao et al. (2019), scholars researching consumer behavior in AR, VR, and MR marketing environments based on the S-O-R theory have developed a theoretical framework, as illustrated in Figure 2.13.

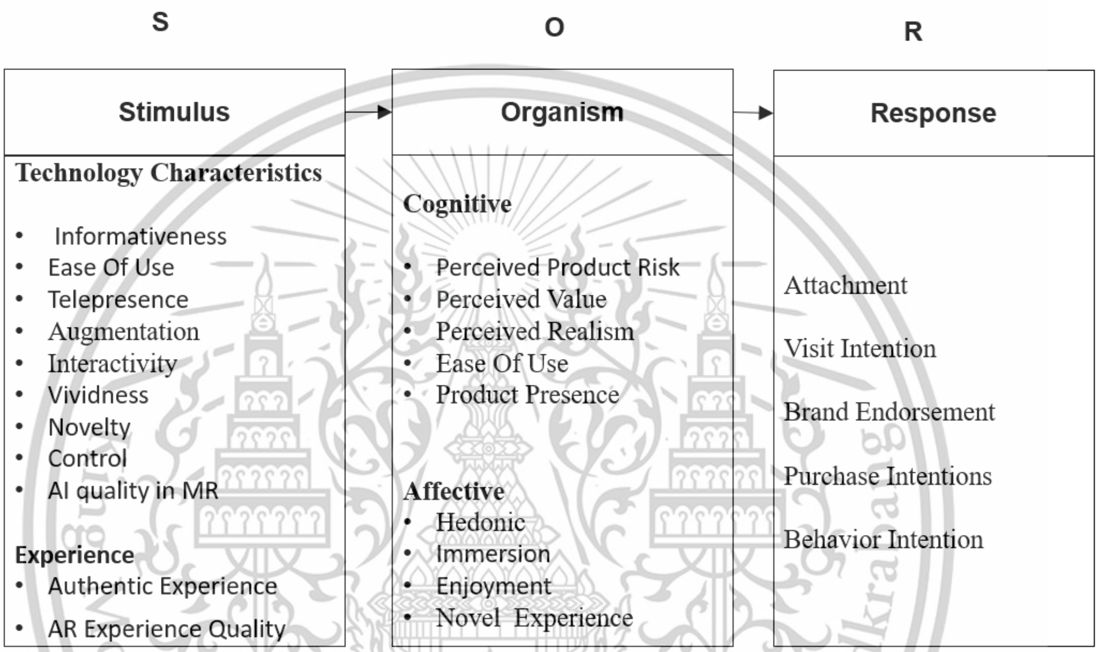


Figure 2.13. S-O-R model of consumer behavior in XR marketing environment.

Source: based on the research of Qin et al. (2021), Sung et al. (2021), Yang (2021), Ghafoor et al. (2023), Nikhashemi et al. (2021), Daassi and Debbabi (2021), etc.

2.5.4 Justification for Using the Stimulus–Organism–Response Model in AR Research

While the Stimulus–Organism–Response (S-O-R) framework offers a useful lens for understanding the sequential relationship between environmental stimuli, internal psychological states, and behavioral outcomes, it is not without its limitations—particularly in the context of complex, interactive environments such as AR. First, the model tends to oversimplify human behavior by assuming a linear and deterministic progression from stimulus to response, thereby neglecting the nonlinear, dynamic, and recursive nature of real-world decision-making. Human responses are often shaped by past experiences, contextual factors, and individual differences that the S-O-R model does not explicitly incorporate (Jiang & Lyu, 2024). Second, the model provides limited consideration of feedback loops, which are prevalent in AR settings where user interactions can modify the digital environment, leading to updated stimuli that, in turn, reshape the user's internal states (Ghafoor et al., 2023). Third, the framework presents a static view of the organism, often treating cognitive and affective responses as momentary and isolated rather than as evolving constructs influenced by ongoing engagement (Alqahtani & AlNajdi, 2024). Furthermore, the S-O-R model tends to underestimate the role of external moderators such as technological fluency, device type, or cultural background, which can significantly alter the strength or direction of stimulus-response relationships (Wang et al., 2024). Lastly, in multifactorial and immersive environments like AR, where visual, auditory, and tactile cues interact simultaneously, the model's capacity to isolate and predict the effects of individual stimuli is constrained, thereby limiting its predictive power and explanatory depth in technologically mediated consumer experiences (Erensoy et al., 2024).

Despite its acknowledged limitations, the S-O-R framework remains a theoretically robust and practically useful model for examining consumer behavior in AR contexts. Its enduring relevance is supported by its structural clarity, conceptual flexibility, and empirical alignment with the characteristics of immersive technologies.

First, the S-O-R model provides a structured yet adaptable foundation for examining the multi-sensory and multidimensional stimuli that characterize AR experiences. In AR environments, users are exposed to rich perceptual and interactive inputs such as spatial presence, perceived realism, novelty, and interactivity (Fan et al., 2022). The S-O-R model allows researchers to systematically trace how these technological stimuli affect internal user states—both cognitive (e.g., perceived informativeness, cognitive load) and affective (e.g., enjoyment, emotional engagement)—and how these internal states, in turn, shape behavioral responses like purchase intention or engagement (Yitong et al., 2024).

Second, the conceptual flexibility of the S-O-R model makes it especially suitable for capturing the hybrid utilitarian and hedonic nature of AR experiences. Recent studies have shown that AR enhances not only the consumer's perceived functional value but also emotional immersion and experiential satisfaction (Attri et al., 2024). The S-O-R model's ability to include both types of organismic variables allows researchers to reflect the full spectrum of user responses to AR.

Third, the model is methodologically compatible with mediation-based approaches, which are common in recent AR research. It enables the examination of indirect pathways, such as how AR interface features like interactivity or fluidity (stimuli) lead to behavioral outcomes (e.g., purchase intention) via mediators like presence or enjoyment (organism) (Kim & Im, 2024). This capacity to model mediation effects enhances the explanatory power of the framework in complex, tech-mediated consumer journeys.

Moreover, the S-O-R model's widespread use in consumer behavior and digital marketing research enhances its utility in AR studies by supporting consistency and comparability across research domains. As noted in several recent literature reviews, the model continues to serve as a foundational lens for exploring digital consumer behavior, including immersive and interactive formats (Erensoy et al., 2024).

Finally, the model's emphasis on internal psychological processing aligns well with the affective and experiential emphasis of AR technologies. Given AR's goal of creating engaging, emotionally rich experiences, the organism stage of the S-O-R model—capturing immersion, presence, and emotional arousal—offers a relevant mechanism for linking system design with behavioral impact (Hu et al., 2023). As such, the S-O-R framework remains a theoretically grounded and empirically validated approach for understanding how consumers respond to AR environments.

2.5.5 Perceived Augmented Realism and Perceived Technology Fluidity as Suitable Stimuli in the S-O-R Model

In the context of AR-based mobile commerce, this study will employ perceived augmented realism and perceived technology fluidity as central stimulus variables within the S-O-R theoretical framework. These constructs are theoretically justified and empirically supported as salient environmental cues that initiate psychological processes leading to consumer behavioral responses. Their inclusion enables a nuanced understanding of how technological features in AR environments influence consumer cognition, emotion, and decision-making.

2.5.5.1 Perceived Augmented Realism as a Stimulus

Perceived augmented realism denotes the degree to which users perceive virtual elements within an AR interface as authentic, spatially coherent, and visually integrated with the physical environment(Javornik, 2016; Yim et al., 2017). This construct encompasses key aspects of perceptual fidelity, such as spatial alignment, lighting consistency, occlusion, and textural resolution. From the S-O-R perspective, perceived augmented realism functions as a sensory-perceptual stimulus, triggering cognitive and affective processes associated with presence, immersion, and situational trust (Scholz & Duffy, 2018).

Empirical studies in AR and retail environments confirm that heightened perceptions of realism significantly enhance consumers' affective engagement and emotional involvement—core organismic responses in the S-O-R model (Abou-Shouk et al., 2024; Hilken et al., 2017). Therefore, in this study, perceived augmented realism is operationalized as an external stimulus (S) that activates both cognitive (e.g., perceived informativeness) and affective (e.g., enjoyment, immersion) organismic states, thereby influencing subsequent behavioral intentions.

2.5.5.2 Perceived Technology Fluidity as a Stimulus

Perceived technology fluidity refers to users' perception of the smoothness, intuitiveness, and ease of interacting with a technological interface (Pan et al., 2019). In AR contexts, it reflects the degree to which users can seamlessly engage with virtual content through effortless navigation, accurate gesture recognition, low latency, and minimal cognitive effort. Perceived technology fluidity is a critical determinant of usability and system affordance, capturing the interactional quality of the AR interface.

Within the S-O-R framework, perceived technology fluidity operates as a functional and interactional stimulus that influences users' emotional states and cognitive appraisals, including attitude toward the AR system, enjoyment, and user satisfaction. Research has shown that fluid technological interactions not only reduce user frustration but also increase engagement and acceptance(Huang & Liao, 2017; Narang & Shankar, 2019). As such, perceived technology fluidity supports positive organismic responses that mediate the pathway from system design to behavioral outcomes, such as usage intentions or purchase behavior (Kim & Im, 2024).

2.5.5.3 Theoretical Appropriateness of Perceived Augmented Realism and Perceived Technology Fluidity in the S-O-R Model

The selection of perceived augmented realism and perceived technology fluidity as stimulus variables in this study aligns closely with the conceptual foundations of the S-O-R framework, which emphasizes the role of environmental stimuli in triggering internal psychological states that subsequently shape behavioral responses (Erensoy et al., 2024; Mehrabian & Russell, 1974). Within the context of AR-based mobile commerce, both perceived augmented realism and perceived technology fluidity serve as salient external technological stimuli that significantly influence consumers' perceptual, cognitive, and emotional processes (Attri et al., 2024; Lee et al., 2022).

Specifically, perceived augmented realism functions as a sensory-oriented stimulus, encapsulating the visual and spatial coherence of virtual elements with the real-world environment. It activates experiential organismic states such as presence, immersion, and emotional engagement, which are critical affective components within the "Organism" phase of the S-O-R model (Javornik, 2016; Scholz & Duffy, 2018). The perceptual fidelity afforded by high levels of augmented realism enhances the consumer's sense of reality and involvement within the AR interface, thereby deepening their emotional connection to the shopping experience (Abou-Shouk et al., 2024; Hilken et al., 2017).

In parallel, perceived technology fluidity operates as a functionality-oriented stimulus, reflecting the smoothness, intuitiveness, and usability of interactions within the AR system. It influences more cognitive evaluations, including perceived ease of use, interaction quality, and attitudinal responses toward the AR technology (Huang & Liao, 2017; Zhou & Wang, 2019). When users perceive the interface as fluid and seamless, the resulting reduction in interactional friction fosters more favorable psychological responses such as increased satisfaction, enjoyment, and technology acceptance (Wang et al., 2024).

Together, perceived augmented realism and perceived technology fluidity offer a complementary and holistic view of the AR experience by capturing both experiential realism and interactional fluency. This dual-dimensional perspective is particularly valuable in understanding how AR technologies shape consumer behavior in mobile commerce environments, where both sensory engagement and system usability are critical for driving consumer outcomes (Alqahtani & AlNajdi, 2024).

Moreover, the mediational structure of the S-O-R model provides a robust analytical foundation for examining the indirect pathways through which these stimuli influence behavior. For instance, high levels of perceived realism may not directly result in increased purchase intentions, but they can enhance intermediary affective states such as immersion and trust, which in turn promote favorable behavioral responses (Hilken et al., 2017; Scholz & Duffy, 2018). Similarly, perceived technology fluidity contributes to positive attitudes and enjoyment, which serve as mediators in translating functional ease into usage intentions and consumer loyalty(Wang et al., 2024).

In summary, the integration of perceived augmented realism and perceived technology fluidity as stimulus variables within the S-O-R framework is both theoretically robust and empirically substantiated. These constructs not only encapsulate the dual nature of AR interactions—balancing perceptual richness with usability efficiency—but also enable a structured and nuanced analysis of how technological environments shape internal psychological mechanisms and downstream behavioral responses. While critiques of the S-O-R model often point to its linearity and limited capacity to account for dynamic feedback loops (Eroglu et al., 2003), its structured yet adaptable nature continues to offer valuable explanatory power in the context of technology-mediated consumer behavior, particularly in immersive AR-driven retail settings.

2.5.6 Summary

From the extensive literature review, the following key findings emerge:

First, a complete S-O-R model is composed of stimulus variables, one or more groups of mediating variables, and response variables, through which the relationship between stimulus and response can be well expressed (Wang & Luo, 2021). The S-O-R theory model can be used to better link the stimulus factors and consumers' internal perceptions with consumption responses (He & Li, 2016). Previous scholars have successfully employed the S-O-R theory to examine consumer behavior in AR, VR, and MR marketing environments, substantiating the theoretical model's validity through empirical studies. Consequently, the S-O-R model stands as a fitting framework for investigating consumer behavior in AR marketing environments.

Second, the utilization of the S-O-R paradigm, as depicted in Table 2.6, has been instrumental in scrutinizing the diverse impacts of AR, VR, and MR technological features or attributes on consumer behaviors. Notably, many scholars have predominantly focused on investigating the mediating effects of organism factors, primarily within the realms of cognitive (e.g., perceived value, presence) or affective aspects (e.g., immersion, enjoyment, playfulness) (Daassi & Debbabi, 2021; Gäthke, 2020; Han et al., 2021; Qin et al., 2021; Watson et al., 2018). However, there is a notable gap in the literature, with only a few scholars considering perceived information quality as a mediating variable of affective response in the S-O-R framework. In contrast, information quality affects perceived usefulness, which in turn affects consumers' behavioral intentions (Pantano et al., 2017).

Third, The S-O-R theory is applicable in the AR environment. The S-O-R model offers a structured yet flexible framework for studying AR experiences, capturing how multi-sensory and interactive stimuli affect users' cognitive and emotional states, which then influence behaviors like purchase intention (Fan et al., 2022). Its ability to account for both utilitarian and hedonic responses make it well-suited for AR, which enhances both functional value and emotional engagement (Attri et al., 2024). The model also supports mediation analysis, allowing researchers to explore how AR features influence outcomes through internal states like presence and enjoyment (Kim & Im, 2024). Widely used in digital marketing, the S-O-R model enables cross-study comparability (Erensoy et al., 2024), and its focus on internal psychological processes aligns with AR's immersive goals, making it a robust tool for understanding consumer responses in AR environments (Ghafoor et al., 2023).

Finally, perceived augmented realism and perceived technology fluidity are suitable for the S-O-R theory. The integration of perceived augmented realism and perceived technology fluidity as stimulus variables aligns well with the S-O-R framework, which explains how external stimuli trigger internal psychological states that shape consumer behavior (Erensoy et al., 2024). In AR-based mobile commerce, perceived augmented realism represents sensory stimuli that enhance presence and emotional engagement, while perceived technology fluidity reflects functional stimuli that improve usability and cognitive valuation (Huang & Liao, 2017; Scholz & Duffy, 2018). Together, they provide a comprehensive view of AR experiences by capturing both experiential realism and interactional fluency (Alqahtani & AlNajdi, 2024). he S-O-R model's mediational structure further allows for analyzing how perceived augmented realism and perceived technology fluidity indirectly influence behaviors like purchase intention through affective and cognitive responses (Hilken et al., 2017). Despite critiques of its linearity, the model remains a valuable tool for understanding consumer responses in immersive, technology-driven environments.

Therefore, according to the S-O-R framework, this study conceptualizes both cognitive and affective responses as organismic (O) variables. Specifically, perceived information quality is positioned as a key cognitive response variable to examine how perceived augmented realism and perceived technology fluidity—as external stimuli (S)—affect consumers' purchase intentions within AR-based marketing contexts. By employing the S-O-R model, this study aims to elucidate the psychological mechanisms through which AR technology, functioning as an environmental stimulus, influences consumer behavior in online shopping environments in China. This approach enables a nuanced understanding of how technological features shape internal psychological states, which in turn drive behavioral outcomes such as purchase intention.

2.6 Theoretical Concept of Perceived Augmented Realism

2.6.1 The Concept of Perceived Augmented Realism

As far as we know, the concept of realism was first explored by communication scholars studying the persuasive power of narratives (Daassi & Debbabi, 2021). The concept of realism is often considered through perceived augmented realism, perceived experience realism, perceived augmentation, and presence, as outlined below.

In the context of AR research, Chen and Lin (2022) define perceived augmented realism as " the reality judgment that reflects user perception of how seamlessly and intuitively the digital items and the physical world are integrated with an AR system".

Perceived experience realism, as outlined by Daassi and Debbabi (2021), pertains to whether the AR-based experience is perceived as realistic, considering the environment augmented by virtual goods and the actions of the consumer. Daassi and Debbabi (2021) assert that the perceived experience realism signifies the level of naturalness and authenticity in the consumer experience, effectively replicating the "real" shopping environment.

Javornik (2016) posits that in the context of AR applications, users' judgments of reality are influenced less by the objective evaluation of simulation quality and more by the subjective illusion that arises when augmented virtual elements are seamlessly integrated with physical reality. This illusion is characterized by the extent to which the mixed environment "looks" and "feels" convincingly real to the user, thereby enhancing the perceived authenticity of the AR experience. Perceived augmentation was therefore conceptualized to reflect perceived realism and congruency between the virtual objects and their spatial placement (Javornik, 2016).

Presence as realism, Rauschnabel, Felix, et al. (2022) defined local presence as "the degree to which a user experiences AR objects as being present in his or her physical environment". Likewise, Verhagen et al. (2014) combine presence with a directly simulated physical experience and define local presence as " the perception of individual experiencing physical things presented online as actually being there with him/her in one's offline environment ." Besides, Smink et al. (2020) define spatial presence as " the degree to which the virtual objects are experienced as actual objects in one's physical environment". The key conceptual definitions of the realism construct are shown in Table 2.7.

To sum up, these definitions of perceived augmentation and augmented realism have evolved around "the degree to which the virtual objects are experienced as actual objects in one's physical environment" (Smink et al., 2020). This study defines perceived augmented realism as the reality judgment that reflects user perception of how effortlessly and intuitively the digital products and the physical environment are combined in an AR system.

Table 2.7 The key conceptual definitions of the realism construct

Nomenclature	Definition	References
Perceived augmented realism	The reality judgment that reflects user perception of how seamlessly and intuitively the digital items and the physical world are integrated in an AR system	Chen and Lin (2022)
Perceived experience realism	Whether the AR-based experience is regarded as realistic with reference to the augmentation environment by the virtual goods and the consumer's behaviors.	Daassi and Debbabi (2021)
Perceived augmentation	Perceived consistency between the virtual and the physical.	Javornik (2016)
Presence	The degree to which a user experiences AR objects as being actually present in his or her own physical environment	Rauschnabel, Felix, et al. (2022)
Local presence	The perception of an individual experiencing physical things presented online as actually being there with him/her in one's offline environment.	Verhagen et al. (2014)
Spatial presence	The degree to which the virtual objects are experienced as actual objects in one's own physical environment.	Smink et al. (2020)

2.6.2 Measurement of Perceived Augmented Realism

Although many studies provide a conceptual discussion of the potential dimensions of perceived realism. However, most scholars conceptualize perceived realism as a unidimensional construct in empirical research (e.g., Baños et al., 2000; Chen & Lin, 2022; Cho et al., 2014; Daassi & Debbabi, 2021). Chen and Lin (2022) investigated the impact of perceived augmented realism on consumer behavior and measured the perceived augmented realism from real, augmented objects similar to reality, virtual objects that seem natural, and the quality of the images of the website objects. Daassi and Debbabi (2021) measured perceived realism by considering factors such as reality, consistency, and feeling like a real environment when examining the impact of immersion, product presence, and perceived realism on the intention to reuse AR-based applications. Additionally, in the study of presence and reality judgment in virtual environments, Baños et al. (2000) measured perceived realism based on factors like perceived reality, quality of images, similarity to reality, and the degree of feeling natural in the virtual world. Further details can be found in Table 2.8 in detail.

Table 2.8 shows scholars' measurement of perceived realism/ perceived augmented realism. According to the definition of perceived realism and perceived augmented realism above, this study posits that perceived augmented realism is essentially synonymous with perceived realism. As can be seen from the table, at present, scholars mostly measure perceived realism/ perceived augmented realism from perceived real, similarity to reality, perceived natural, consistency with reality, and quality of the images. All the above articles have good reliability and validity in measuring scales of perceived realism, and most of them (Chen & Lin, 2022; Daassi & Debbabi, 2021) carry out research in the AR shopping environment, which is highly related to the topic of this study. Building upon the aforementioned literature, this study conceptualizes and measures perceived augmented realism through five key dimensions: perceived realness, similarity to reality, perceived naturalness, consistency with reality, and image quality. These dimensions are derived from prior empirical findings and reflect the extent to which AR content is experienced as realistic, coherent with the physical environment, and visually convincing.

Table 2.8 Measurement of perceived realism

Latent variables	**Measurement items**	**Definition**	**References**
Perceived realism	Perceived real	The experience seems real.	Baños et al. (2000)
	Images quality	The quality of the images.	
	Similarity to reality	The degree of similarity between virtual and reality.	
	Perceived natural	The degree to feel natural in the virtual world.	
	Consistency with reality	The experienced in the virtual world is congruent to the real world.	

Table 2.8 (Continue)

Latent variables	Measurement items	Definition	References
Perceived realism	Perceived real	The augmented environment seemed real.	Daassi and Debbabi (2021)
	Consistency with reality	The experience in an augmented environment seems consistent with real-world experience.	
	Perceived natural	The things that happen in the augmented environment look like the things that happen in real life.	
Perceived realism	Similarity to reality	The augmented reality–based experience was similar to the in-store shopping experience.	Daassi and Debbabi (2021)
Perceived augmented realism	Perceived real	The experience seems real.	Chen and Lin (2022)
	Images quality	The quality of the images.	
	Similarity to reality	The degree of similarity between virtual and reality.	
	Perceived natural	The degree to feel natural in the virtual world.	
	Consistency with reality	The experienced in the virtual world is congruent with the real world.	

2.7 Theoretical Concept of Perceived Technology Fluidity

2.7.1 Concept of Perceived Technology Fluidity

In different research contexts, technology fluidity has different interpretations (Elmqvist et al., 2011). Lin (2004) considered that digital technology's fluidity plays a key role in creating a fluid technology-interaction flow and a dynamic communication experience. The experience of fluid interaction is related to the dimensions of interactivity design and user experience, which have always been the major components important to human-computer interaction (Elmqvist et al., 2011).

From a technical standpoint, fluid interaction is an important component of AR technology affordances that affect many aspects of the user experience, including perceived usability, the ability to manipulate virtual objects, the simplicity of navigation, interoperability, and overall experiential dynamics (Chen & Lin, 2022). Lin (2004) used the concept of technology fluidity to evaluate the Internet's capacity for multitasking and command-line switching between various textual, graphical, audio, and video modalities. Similar to the previous study, fluid interaction in the field of information visualization was also looked at. It is characterized by three affordances or attributes: (1) powerful, seamless, and fluid interaction; (2) responsive, interactive, and quickly updated graphics; and (3) careful, conscientious, and thorough user experiences (Elmqvist et al., 2011). Therefore, without fluid interaction with the technology that allows for a smooth, seamless, and responsive user experience, the best user experience cannot be achieved (Chen & Lin, 2022).

When applying the concept of technology fluidity to user interactions within AR environments, it is essential that the AR system facilitates seamless, responsive, and uninterrupted communication between the user and the digital interface. As noted by Chen and Lin (2022) and Tian et al. (2010), disruptions such as (1) unresponsiveness to user gestures or interactions with virtual elements due to imprecise tapping or ambiguous touchpoints, (2) system response latency, and (3) occlusion issues that inhibit the accurate spatial alignment of virtual objects with real-world elements, can significantly impair users' interactive experience. These technical shortcomings diminish the perceived fluidity of the technology and can interrupt the user's sense of engagement, continuity, and immersion. In contrast, An AR system with high perceived technology fluidity allows users to interact with virtual objects naturally and intuitively, minimizing communication friction. This fosters a more immersive and satisfying experience, as users perceive the system as responsive, coherent, and aligned with their intentions, especially when digital content integrates smoothly with the physical environment.

Building upon Lin (2004) foundational work, this study defines perceived technology fluidity as users' perception that AR technology can simultaneously and effectively convey diverse communication cues—verbal, textual, visual, and contextual. This multidimensional capacity enhances users' sense of presence and immersion, promoting more positive affective and behavioral responses in AR environments.

2.7.2 Measurement of Perceived Technology Fluidity

The concept of technology fluidity has received relatively limited attention in the existing literature, and most empirical studies have conceptualized it as a unidimensional construct (Chen & Lin, 2022; Lin, 2004, 2008). Lin (2008) proposed that technology fluidity could be assessed using a set of 13 measurement items, capturing users' perceptions of seamless interaction and effortless engagement with technological interfaces. Building on this foundational work, Chen and Lin (2022) extended the conceptualization of technology fluidity by drawing on the earlier framework proposed by Lin (2008). Specifically, they adapted and refined the original measurement instrument, selecting a focused set of nine items that more precisely capture the multidimensional nature of the construct within contemporary technological contexts. This adaptation signifies not merely a replication but a thoughtful recalibration of Lin's original scale, aiming to enhance both its empirical sensitivity and contextual relevance.

Such efforts reflect a broader trajectory in the literature: the ongoing endeavor to operationalize abstract theoretical constructs in ways that preserve their conceptual integrity while enhancing their practical utility in empirical research. By refining the measurement of technology fluidity, Chen and Lin contribute to the theoretical continuity of the construct and facilitate its application in evolving domains such as digital transformation, user experience design, and adaptive systems. A comparative summary of these measurement approaches, including both the original and revised item sets, is presented in Table 2.9.

Table 2.9 Measurement of technology fluidity

Latent variables	**Measurement items**	**Definition**	**References**
Technology Fluidity	Surf content	Surf across content features that provide tips, information, and fun.	Chen and Lin (2022)
	Get new content	Get any new content features you need.	
	Get information	Get any information about the content features you need.	
	Get fun content	Get any fun content features you need.	
	Access items	Access any items you need anytime.	
	Review items	Review any items you need anytime.	
	Search archive items	Search any archive items you need anytime.	
	Freely flow	Freely flow from one subject to the next.	
	Medium you want	Make the medium into what you want it to be	

Table 2.9 (Continue)

Latent variables	Measurement items	Definition	References
Technology Fluidity	Move across content	Move across print, audio, and video content modalities	Lin (2008)
	Surf content	Surf across news, information, and entertainment content.	
	Communicate	Communicate interpersonally via chat, mail, or fax.	
	Upload and download	Upload and download product/service orders.	
	Get news	Get any news content you need.	
	Get information content	Get any information content you need.	
	Get entertainment content	Get any entertainment content you need.	
	Access items	Access any items you need anytime.	
	Review items	Review any items you need anytime.	
	Search archive items	Search any archive items you need anytime.	
	Freely flow	Freely flow from one subject to the next.	
	Medium you want	Make the medium into what you want it to be.	

From Table 2.9, it can be seen that scholars mainly measure technology fluidity from fun, convenience, simplicity, and fluency of information acquisition and free flow. This is consistent with the definition of perceived technology fluidity in this study, and both emphasized technology fluidity can effectively convey more explicit content, enabling a smooth flow of communication and capturing the media richness inherent in technology (Lin, 2004). Therefore, this study refers to Lin (2004) and Chen and Lin (2022) and measures technology fluidity from surf content, get new content, get information, get fun content, access items, review items, search archive items, freely flow, medium you want.

2.8 Theoretical Concept of Cognitive Responses

2.8.1 Concept of Cognitive Responses

The stimulus is an antecedent in the S-O-R structure, whereas organisms serve as intermediaries between the stimulus and behavioral responses (Goi et al., 2014). In this context, the mediation processes are consumers' cognitive or affective states (Eroglu et al., 2003; Ezeh & Harris, 2007). Cognitive states represent consumers' mental processes involving the gaining, processing, and retrieval of information. Cognition includes consumers' understanding, attitudes, and beliefs (Eroglu et al., 2001; Xiao et al., 2019). According to Cabanac (2002), cognitive is a mental act or process that helps people learn and understand things through thoughts, experiences, and senses. Attention, information acquisition, memory, working memory, assessment and judgment, calculation and reasoning, decision-making and problem-solving, as well as language comprehension and production, are all aspects of cognition.

2.8.2 Dimensions of Cognitive Responses

The increasing integration of AR, VR, and MR technologies in the retail industry has garnered significant scholarly attention, prompting investigations into their effects on consumer experience, reactions, and behavior (Rauschnabel, Babin, et al., 2022). Additionally, researchers have explored the impact of XR technology on consumer behavior through the lens of cognitive processes. However, there is no consensus on the specific dimensions of cognitive factors. Qin et al. (2021) approached consumer cognitive aspects through two dimensions: informativeness and ease of use. Other scholars, such as Yang (2021), delved into consumer cognition using the dimensions of perceived value and perceived risk. Furthermore, Plotkina and Saurel (2019) and Kowalczuk et al. (2021) assessed cognitive dimensions through the perspectives of usefulness and convenience. Additionally, some scholars adopt a one-dimensional conceptualization of cognition (e.g., Haile & Kang, 2020; Javornik, 2016; Whang et al., 2021). The lack of consensus on cognitive dimensions is evident, as scholars view cognitive states as encompassing a broad range of mental processes involving the acquisition, processing, and retrieval of information, which includes consumers' understanding, attitudes, and beliefs (Eroglu et al., 2001; Xiao et al., 2019)

Attitudes

According to the definition of cognitive, cognitive states represent consumers' mental processes involving the gaining, processing, and retrieval of information; cognitive includes consumers' understanding, attitudes, and beliefs (Eroglu et al., 2001; Xiao et al., 2019). Therefore, consumer attitudes towards products and their attributes are also part of cognition. Previous research has shown that convenience, ease of use, and usefulness affect consumer attitudes and, thus, purchase intentions (Plotkina & Saurel, 2019; Qin et al., 2021). In an AR environment, Javornik (2016) found evidence in the AR case that perceived augmentation affects consumers' attitudes toward brands, and the study by Van Kerrebroeck et al. (2017) also found that by augmented vividness, consumers' attitudes will increase.

Perceived Information Quality

Cognitive responses encompass various evaluations of the experience, including perceived information quality. Perceived information quality is considered a manifestation of cognitive response, representing AR's capacity to deliver useful, trustworthy, personalized, and reliable virtual content to users (Poushneh, 2018). The amount of virtual content displayed on the screen should match the user's expectations and needs (Pessoa et al., 2022). In previous studies, scholars have established a connection between the informativeness of AR and its impact on consumers' purchase intentions (Yang, 2021). Some researchers have considered informativeness as a variable within cognitive responses to explore the influence of AR interactivity on consumer behavior. However, to the best of the authors' knowledge, there is a scarcity of studies linking information quality in AR environments to perceived augmented realism and perceived technology fluidity. In AR environments, 3D-type information, such as that conveyed by an avatar, may contribute more information compared to a 2D textual display (Pessoa et al., 2022). Existing research indicates that the degree of information significantly influences the overall experience in an AR environment (Caboni & Hagberg, 2019). Moreover, AR system quality (Kowalczuk et al., 2021) and augmented reality quality have been shown to impact purchase intention (Nikhashemi et al., 2021).

Therefore, it is reasonable to believe that perceived augmented realism, representing the judgment of reality that reflects the user's perception of how seamlessly and intuitively digital products integrate with the physical environment in an AR system, influences the consumer's cognitive response, including perceived information quality and attitude change. Additionally, in line with Chen and Lin (2022), users experience a more continuous, intuitive, immersive, and satisfying interaction with virtual items in connection to the actual world when using AR technology characterized by high perceived fluidity. This satisfying experience also triggers a cognitive response, impacting perceived information quality and attitude change among consumers. Thus, in this study, attitude and perceived information quality are considered variables within the cognitive response.

2.8.3 Measurement of Attitudes and Perceived Information Quality

Measurement of Attitudes

A general attitude toward behavior is described as "an individual's positive or negative feelings about performing a particular behavior" (Ajzen & Fishbein, 1977). Pessoa et al. (2022) measured consumers' attitudes toward brands in AR environments by evaluating their perceptions along dimensions such as "good or bad" and "like or dislike." These attitudinal judgments reflect the consumers' overall evaluation of the brand based on their AR experience.

Similarly, in a study investigating the impact of augmented reality technology on e-commerce through the lenses of interactivity and vividness, Yim et al. (2017) measured consumers' attitudes toward media, considering aspects such as unfavorable or favorable, unpleasant or pleasant, and negative or positive. The findings confirmed that a more positive consumer attitude toward AR resulted in a higher intention to purchase the displayed products. Rese et al. (2017) explored the impacts of AR interactivity, usefulness, perceived information, and perceived enjoyment on attitudes and intention to use. They drew on Ahn et al. (2004) to measure the attitudes, including five aspects: positive, interesting, makes sense, good idea, and other people should use. Pantano et al. (2017) shared a similar perspective and also assessed attitudes across five dimensions: positive, interesting, makes sense, good idea, and other people should use, particularly in the context of AR virtual try-on. Attitudes toward augmented reality-based apps encompass the emotions associated with using such apps (Daassi & Debbabi, 2021). Hence, this study adopts the approach of Ahn et al. (2004) and Pantano et al. (2017), measuring consumers' attitudes based on positive, interesting, makes sense, good idea, and other people should use, as outlined in Table 2.10.

Table 2.10 Measurement of attitudes and perceived information quality in this study

Latent variables	**Measurement items**	**Definition**	**References**
Attitudes	Positive	The attitudes toward a certain behavior are positive	Ahn et al. (2004) , Pantano et al. (2017)
	Interesting	Feel interested in doing something.	
	Makes sense	It makes sense to do something.	
	Good idea	Think it is a good idea to do something.	
Attitudes	Other people should use	Promote a certain behavior to others.	Ahn et al. (2004) , Pantano et al. (2017)
Perceived information quality	Expected	Information provided is expected.	Pantano et al. (2017), Ahn et al. (2004)
	Trustworthy and reliable	The information provided is trustworthy and reliable.	
	Personalized	The information provided is personalized.	

Table 2.10 (Continue)

Latent variables	Measurement items	Definition	References
Perceived information quality	Detailed information	The information provided is detailed.	Pantano et al. (2017), Ahn et al. (2004)
	Complete information	The information provided is complete information.	
	Helps to make decision	Information provided helps to make decisions.	

Measurement of Perceived Information Quality

While studying the use of augmented reality to enhance online decision-making processes, Pantano et al. (2017) drew on Ahn et al. (2004) and measured information quality from the aspects of information that are expected, provided detailed information, provided complete information, and provided useful information. Similarly, Pessoa et al. (2022) and Yang et al. (2005) measured information quality from the aspects of the information provided being relevant to consumers, the information provided was customized, the information provided being valuable, and the information provided being unique. According to Poushneh (2018), perceived information quality refers to AR's ability to generate useful, trustworthy, personalized, and reliable virtual content for users, AR virtual try-on allows products to be tailored to consumers. Hence, based on the above research, this study constructs a perceived information quality structure including 6 items of expected, trustworthy and reliable, personalized, detailed information, and complete information and helps to make decisions in the AR shopping situation as the substructure of cognitive response, as outlined in Table 2.10.

2.9 Theoretical Concept of Affective Response

Theoretical concept of affective response (immersion and enjoyment) is a psychological concept that explains how emotions and feelings that arise from experiences with technology or media, such as games, websites, or applications, affect the user's sense of immersion and enjoyment.

2.9.1 Concept of Affective Response

Xiao et al. (2019) considered that the term " affective " refers to a person's collection of subjective cognitive experiences. It is a psychological and physiological state in which multiple feelings, thoughts, and behaviors are combined. An essential component of affective is cognitive. Affective states represent such as pleasure (feelings of happiness or joy), arousal (feeling stimulated), and dominance (feelings of control or influence over the mediator)

(Kisang & SooCheong, 2007).

In the study of marketing, affective is considered to be the organism's response to external environmental stimuli and ends with some kind of action. Similarly, affective plays a key role in consumers' decision-making and buying behavior (Holbrook & Hirschman, 1982; Leone et al., 2005).

2.9.2 Dimensions of Affective Response

According to Kisang and SooCheong (2007), affective states in consumer experiences can be categorized into three key dimensions: pleasure, arousal, and dominance. Pleasure reflects the extent to which individuals experience positive emotions such as happiness, satisfaction, or enjoyment during an interaction. In the context of AR, it refers to how good, happy, or satisfied consumers feel with the virtual content and interactive features. Arousal denotes the level of stimulation or excitement evoked by the AR experience, such as feeling energized or mentally engaged (Pessoa et al., 2022). Dominance, although less frequently examined in AR studies, pertains to the consumer's sense of control or influence over the environment or interaction. Together, these affective dimensions help explain consumers' emotional responses to AR environments and their subsequent behavioral tendencies.

Immersion and Enjoyment

As with cognitive response, there is no consensus on the dimensions of affective response. But, most scholars use the two variables Immersion and enjoyment as the main variables of affective response (e.g., Daassi & Debbabi, 2021; Kowalczuk et al., 2021; Pantano et al., 2017; Plotkina & Saurel, 2019). Immersion describes the degree to which AR creates a feeling of being temporarily engaged by a virtual product display (Yim et al., 2017), which, like arousal, indicates the degree of external influence. Enjoyment is defined as the degree to which using AR itself is considered enjoyable (Davis et al., 1992), which is similar to pleasure. Affective is a psychological and physiological state in which multiple feelings, thoughts, and behaviors are combined (Kisang & SooCheong, 2007). Therefore, immersion and enjoyment can also indicate affective states. In addition, in the context of a vivid product presentation, immersion, and enjoyment were identified as the most relevant affective variables (Kowalczuk et al., 2021). Therefore, this study regards immersion and enjoyment as variables of affective response.

2.9.3 Measurement of Immersion and Enjoyment

Measurement of Immersion

Immersion enables users to perceive virtual products as if they were real, fostering what Hans (2004) refers to as “para-authentic” product experiences. In AR shopping contexts, immersion captures the extent to which users become mentally and emotionally engaged with virtual product representations. According to Yim et al. (2017) and Kowalczuk et al. (2021)immersion is commonly assessed through three core aspects: whether the user feels engrossed, absorbed, and focused during the interaction. These dimensions reflect the user's depth of involvement and detachment from the physical environment while engaging with AR content. Therefore, building on the conceptualizations and validated measures in previous studies, this research adopts these three indicators—engrossment, absorption, and focus—as the operational definition of immersion within the AR shopping experience, as presented in Table 2.11.

Measurement of Enjoyment

Regarding the substructure of affective response, Venkatesh (2000) defines enjoyment as "the extent to which an activity using [a] particular system is considered enjoyment, without regard to any performance consequences arising from the use of the system". According to Hans (2004), enjoyment signifies the extent to which consumers derive entertainment from the pursuit of hedonic information technology systems. On mobile social media sites, enjoyment plays an important role in better understanding user behavior (Kim et al., 2017). In particular, in the virtual world, enjoyment is conceptualized as enjoyable, exciting, pleasant, and interesting characteristics (Guo & Barnes, 2011). In the VR tourism context, Myung et al. (2020) constructed an enjoyment structure including four aspects of enjoyable, pleasurable, funny, and happy as a substructure of emotional response. In the AR context, Plotkina and Saurel (2019) conceptualized enjoyment as fun, involved, exciting, and enjoyable. In addition, Yim et al. (2017) measured enjoyment in the AR shopping context through three dimensions: enjoyable, pleasurable, and funny, with reliable and valid results. Building on this, the present study expands the enjoyment structure to include six dimensions—enjoyable, pleasurable, funny, happy, involved, and exciting—as a subcomponent of affective response in AR shopping, as shown in Table 2.11.

Table 2.11 Measurement of immersion and enjoyment in this study

Latent variables	**Measurement items**	**Definition**	**References**
Immersion	Engrossed	Not deeply engrossed–Deeply engrossed.	Yim et al. (2017)
	Absorbed	Not absorbed–Absorbed.	
	Focused	Consumer attention was not focused–Consumer attention was focused.	

Table 2.11 (Continue)

Latent variables	Measurement items	Definition	References
Enjoyment	Enjoyable	Using some kind of virtual shopping platform is enjoyable for consumers.	Guo and Barnes (2011), Plotkina and Saurel (2019)
	Pleasurable	Using some kind of virtual shopping platform is pleasurable for consumers.	
	Funny	Using some kind of virtual shopping platform is funny for consumers.	
	Happy	Using some kind of virtual shopping platform keeps the consumer happy.	
	Involve	Virtual shopping platforms involve consumers.	
	Exciting	Using some kind of virtual shopping platform is exciting.	

2.10 Theoretical Concept of Purchase Intention

2.10.1 Concept of Purchase Intention

The term willingness originated from psychology, which usually expresses the subjective probability that a person's internal state changes and engages in a certain behavior under a certain stimulus. At first, Eagly et al. (1999) believed that willingness is the planned and conscious subjective thinking of an individual before making a behavioral decision, but this kind of thinking is different from individual attitudes. Ajzen (1991) defined willingness as the premise of behavioral activities, and he believed that willingness comes first, then the behavior, and the stronger the willingness, the more likely the behavior will be. Therefore, scholars have extended this concept to the field of marketing. Hill et al. (1977) pointed out that purchase intention is a measure of the possibility of consumers making a purchase, which reflects a subjective tendency of consumers to buy products and make purchase decisions based on this subjective tendency (Meng, 2012). It can predict consumers purchasing behavior (Wu, 2020). According to the previous definition of purchase intention, this study defines purchase intention as the possibility of consumers buying a certain product, which reflects a subjective tendency of consumers to buy products. It can predict consumers purchasing behavior.

Within the S-O-R theoretical framework, purchase intention reflects a consumer's predisposition to engage in a favorable behavioral response following exposure to an external informational stimulus related to a brand or product (Pessoa et al., 2022). In the context of AR shopping environments, such stimuli typically include distinctive features of AR technology—namely interactivity, augmentation, informativeness, vividness, novelty, and aesthetics—which play a pivotal role in shaping consumer perceptions and experiences.

These external stimuli act upon the consumer's internal state (the "organism"), influencing their cognitive and affective responses, such as perceived information quality, immersion, and enjoyment. These internal states, in turn, are critical antecedents to purchase-related behavioral intentions (Kowalczuk et al., 2021; Park & Yoo, 2020; Yim & Park, 2019). For example, Kowalczuk et al. (2021) demonstrated that AR interactivity significantly enhances consumers' emotional engagement—manifested through immersion and enjoyment—which subsequently increases their likelihood to purchase. Accordingly, this study considers purchase intention as a key response variable within the S-O-R framework, particularly as it captures the ultimate consumer decision-making outcome in AR-mediated retail experiences.

2.10.2 Measurement of Purchase Intention

In both general e-commerce research and studies conducted within XR shopping environments, a substantial body of literature (e.g., Kowalczuk et al., 2021; Pessoa et al., 2022; Sung et al., 2021; Yang, 2021) has consistently treated purchase intention as a unidimensional construct in empirical investigations. This approach reflects a focus on the overall likelihood or willingness of consumers to purchase a product or service, without subdividing the construct into distinct dimensions. In line with this established scholarly practice, the present study also adopts a unidimensional conceptualization of purchase intention, thereby ensuring consistency with prior empirical models and facilitating comparability of findings across XR and AR marketing contexts.

Currently, in the AR shopping environment, the measurement of purchase intention is relatively consistent. For instance, Kowalczuk et al. (2021) and Yim et al. (2017) measured purchase intention from the aspects of uncertain or certain, unlikely or likely, improbable or probable, impossible or possible. Additionally, other scholars measured purchase intention through indicators like intend to buy, probability to buy, plan to buy, consider to buy, and willingness to buy (Angella & Kim, 2016; Pessoa et al., 2022). Purchase intention reflects a subjective tendency of consumers to buy products and make purchase decisions based on this subjective tendency (Meng, 2012). The measurement items used by these scholars effectively capture consumers' subjective tendencies to buy specific products and have undergone rigorous validity and reliability testing. Therefore, this study will adopt the measurement approach from Angella and Kim (2016), measuring purchase intention through items such as intend to buy, probability to buy, plan to buy, consider to buy, and willingness to buy, as detailed in Table 2.12.

Table 2.12 Measurement of purchase intention in this study

Latent variables	Measurement items	Definition	References
Purchase intention	Intend to buy	Whether intend to buy the products.	Angella and Kim (2016)
	Probability to buy	The probability that consumers consider buying is high or not.	
	Consider to buy	Whether consider to buy or not.	
	Willingness to buy	Willingness to buy the products is high or not.	
	Plan to buy	Whether there is a purchase plan.	

2.11 Hypotheses Development and Conceptual Model

2.11.1 The Influence of Perceived Augmented Realism on Cognitive Responses (Attitudes and Perceived Information Quality)

The exploration of AR in consumer engagement presents a multifaceted and evolving landscape. Empirical studies, such as those by McLean and Wilson (2019), underlined the pivotal role of vividness or realism in enhancing presence and consumer engagement within virtual reality contexts. This notion is further supported by Daassi and Debbabi (2021), who posited that the presence of a product and its perceived realism in AR settings significantly shape consumer attitudes. Concurrently, Javornik (2016) highlighted that perceived augmentation in AR not only influences brand attitudes but also steers purchase intentions. The impact of AR characteristics on consumer/user attitudes has been a subject of extensive scholarly validation. Qin et al. (2021), through empirical research, determined that AR's interactivity and virtuality sway consumer attitudes via perceived usefulness and ease of use. Elford et al. (2022) contributed to this dialogue by demonstrating how AR's visual appeal enhances perceived usefulness and ease of use, thereby positively influencing consumers' attitudes toward AR use intention. Kowalczuk et al. (2021) introduced another dimension by defining vividness as the graphic quality of the displayed product, encompassing aspects like sharpness, clarity, and detail level. This vividness, as Van Kerrebroeck et al. (2017) asserted, not only enhances perceived realism but also amplifies consumer attitudes. Furthermore, Sun et al. (2022) illustrated that AR can mitigate product uncertainty by augmenting perceived information, presence, and mental imagery, leading to more favorable product attitudes. This is contrasted against non-AR product displays, where AR-based displays are shown to significantly elevate consumers' product attitudes, as evidenced by Sun et al. (2019).

Furthermore, in the context of perceived information quality and its impact on consumer behavior, Pessoa et al. (2022) established that media richness within an AR setting enhances consumers' perceived information quality, indicating that a rich media environment in AR contributes positively to the user's assessment of information. This finding was complemented by Oyman et al. (2022), who further elucidated the direct and positive correlation between perceived augmented reality and aspects such as perceived usefulness and informativeness. Perceived information quality, as defined by Poushneh (2018), encompasses the utility, trustworthiness, personalization, and reliability of virtual content generated in AR environments. This definition underscores the relevance of information utility in shaping consumer perceptions within AR contexts. Consequently, it can be deduced that perceived augmented reality exerts a direct and positive influence on perceived information quality. Furthermore, the research by Chen and Lin (2022) suggested that augmented realism strongly influences consumers' flow experiences, leading to cognitive and affective responses to AR interface mediums, as well as increased purchase intentions, while cognitive response also includes consumers' perceived information quality (Pessoa et al., 2022). Hence, this study assumes that augmented realism influences consumers' perceived information quality.

Based on the aforementioned research, it is evident that perceived augmented realism has the potential to influence a consumer's cognitive response. Consequently, this study posits the following hypotheses:

H1a: Perceived augmented realism positively influences the consumer's cognitive responses (attitudes) in an AR environment.

H1b: Perceived augmented realism positively influences the consumer's cognitive responses (perceived information quality) in an AR environment.

2.11.2 The Relationship and Influence of Perceived Technology Fluidity on Cognitive Responses (Attitudes and Perceived Information Quality)

In the context of e-commerce, utilizing the S-O-R model, researchers have studied the effect of website stimuli on emotional and cognitive responses. These researchers have found that website design elements (i.e., colors, images, interactive features) had a positive influence on consumers' affective (e.g., pleasure) and cognitive, such as perceived information quality (Park et al., 2008; Young & Hyunjoo, 2012). Besides, Angella and Kim (2016) found that brand-related user-generated content (UGC) influences consumers' cognitive response (i.e., perceived information quality). In terms of the impact of technology fluidity on perceived information quality, Pantano et al. (2017) considered that the system has to be able to rapidly reply to their request in terms of acceptable response time (which may vary according to consumer's personal needs), as well as to provide a high quality of information, in terms of availability, accessibility, completeness, accuracy and confirmed that response time has a significant and positive influence on perceived usefulness of the virtual try-on system for glasses. Technology fluidity provides smooth, seamless, and powerful interaction and is highly responsive and interactive (Elmqvist et al., 2011). Hence, technology fluidity allows consumers to perceive the high responsiveness of the system, which in turn affects perceived usefulness. Perceived information quality refers to AR's ability to generate useful, trustworthy, personalized, and reliable virtual content for users (Poushneh, 2018). Therefore, this study infers that perceived technology fluidity affects consumers' perceived information quality.

Furthermore, to effectively engage users, AR platforms need to be equipped with technical fluidity support to enable smooth communication flows and drive perceived media richness and social presence (Lin, 2004). According to Lin (2004), a fluid medium is expected to provide users with a virtual outlet for communication that can effectively convey more explicit content, enabling a smooth flow of communication and capturing the media richness inherent in technology. Therefore, key attributes of the concept of technology fluidity can also be conceptualized as media richness (Sitkin et al., 1992). The role of information quality and media richness have been studied in other online settings. For example, Tae-Im et al. (2017) showed that media richness affects information quality in fair--trade purchases. Besides, media richness has a positive impact on consumers' cognitive responses (attitudes and perceived information quality) (Pessoa et al., 2022). Hence, this study infers that perceived technology fluidity affects consumers' perceived information quality.

In addition, previous research has shown the impact of AR characteristics on attitudes. In comparison to a non-AR-based product display, an AR-based product display heightens the consumers' product attitudes (Xu et al., 2020). In an AR system, perceived usefulness positively affects users' attitudes toward AR applications, which in turn affects their intention to continue using AR (Li & Gao, 2023). Besides, Technology fluidity provides smooth, seamless, and powerful interaction and is perceived ease of use and perceived usefulness affects attitudes toward AR technology (Plotkina & Saurel, 2019).highly responsive and interactive (Elmqvist et al., 2011), allowing users to perceive system quality and media usefulness, informativeness, and vividness (authentic) and Van Kerrebroeck et al. (2017) found that by augmented vividness, consumers' attitudes will increase. Therefore, we can assume that perceived technology fluidity has a positive impact on consumer attitudes. Besides, Chen and Lin (2022) confirmed that in AR systems, perceived technology fluidity positively affects users' flow experience, while the ability of AR technology to provide users with a smooth interactive experience is closely related to their flow state, which measures an individual's cognitive absorption while performing a task (Csikzentimihalyi, 1975). Hence, it is evident that perceived technology fluidity positively affects individuals cognitively. According to the definition of cognitive, consumer attitudes towards products and their attributes are also part of cognitive consumer (Eroglu et al., 2001; Xiao et al., 2019). Therefore, perceived technology fluidity affects consumer attitudes. According to the above research, this study put forward the following hypotheses:

H2a: Perceived technology fluidity positively influences the consumer's cognitive responses (attitudes) in an AR environment.

H2b: Perceived technology fluidity positively influences the consumer's cognitive responses (perceived information quality) in an AR environment.

2.11.3 The Influence of Perceived Augmented Realism on Affective Responses (Immersion and Enjoyment)

In terms of the impact of AR immersion, Javornik (2016) researched consumers' perceived augmented realism and spatiotemporal coherence, suggesting that reality judgments have an impact on their immersive experiences. The level of consumer immersion in AR depends on their subjective assessment; to feel immersive, consumers need to be able to view images of virtual products that are vividly generated from different three-dimensional perspectives (Fiore et al., 2005). Therefore, the level of consumer immersion depends on the highly realistic visualization effect (i.e., interactivity and vividness) provided by AR (Kim & Forsythe, 2008). Yim et al. (2017) confirmed the impact of interactivity and vividness on immersion in an AR environment, and Kowalczuk et al. (2021) also believed that interactivity enhances immersion. Besides, according to Daassi and Debbabi (2021), by embedding digital content in reality, AR-based apps provide richer sensory information about the product and enable interactions with it in real time, thereby offering a "para-authentic" direct experience. Such augmentation has a power to provide an immersive experience by enabling consumers to virtually try-on products (Lee et al., 2022). Thus, perceived augmentation positively affects the sense of immersion (Daassi & Debbabi, 2021). Besides, it has been shown that the joint effect of immersion and interactivity and/or vividness creates an increased real sense of being present in that image-generated world, namely telepresence (Steuer et al., 1995), and media vividness (authenticity) positively affects consumers' immersion (Yim et al., 2017). Additionally, due to a visual output that covers the user's entire field of view and interactive device, most consumers can easily immerse themselves in the VR shopping environment, which leads to a highly perceived presence and immersion (Xi & Hamari, 2021). Similarly, consumers utilizing augmented reality can expect to experience the same, if not better, immersion (Yim et al., 2017). Therefore, this study infers that in an AR environment, perceived augmented realism positively affects consumer immersion.

Generally speaking, consumers can gain positive affective experiences in the XR environment, such as enjoyment (Israel et al., 2019) and affective arousal (Margetis et al., 2019). For example, in VR tourism, authentic experience positively affects enjoyment, which in turn affects tourists' intention to visit (Myung et al., 2020). Furthermore, in an MR System, Sung et al. (2021) demonstrated that the quality of Artificial Intelligence (i.e., speech recognition and synthesis via machine learning) associated with an augmented object increases MR immersion MR enjoyment, which all increases consumer engagement. In AR systems, the level of perceived realism largely depends on the quality of the system. In addition, previous studies have shown that the vividness and realness of virtual images stimulate the user's sensory perception and the formation of mental images. For example, vividness and realness can enhance perceived enjoyment (Pantano et al., 2017). Certain studies have demonstrated that AR interactivity, vividness, and system quality influence consumer enjoyment (Kowalczuk et al., 2021; Yim et al., 2017). Additionally, vividness can be interpreted as realness, realism, or richness (Venkatakrishnan et al., 2020). Therefore, this study infers that perceived augmented realism has an impact on consumer enjoyment. Additionally, enjoyment and immersion are key elements of flow (Kowalczuk et al., 2021). Since previous research has demonstrated the impact of perceived augmented realism on consumer flow (Chen & Lin, 2022), this study assumes that perceived augmented realism positively affects consumers' sense of immersion and enjoyment. Hence, the following hypotheses are proposed:

H3a: Perceived augmented realism positively influences the consumer's affective responses (immersion) in an AR environment.

H3b: Perceived augmented realism positively influences the consumer's affective responses (enjoyment) in an AR environment.

2.11.4 The Influence of Perceived Technology Fluidity on Affective Responses (Immersion and Enjoyment)

According to the theory of technology fluidity, a digital technology's fluidity plays a key role in producing a fluid technology-interaction flow and a dynamic communication experience (Lin, 2004). From a technical standpoint, fluid interaction is a crucial part of the affordances offered by AR technology. It affects a variety of aspects of the user experience, including perceived usability, the ability to manipulate virtual items, navigational simplicity, interoperability, and overall experiential dynamics. (Chen & Lin, 2022). Technology fluidity provides smooth, seamless, and powerful interaction and is highly responsive and interactive (Elmqvist et al., 2011), allowing users to perceive system quality and media usefulness, informativeness, and vividness (authentic). Certain researchers posit that AR technology fluidity influences users' perception of augmentation, consequently augmenting their sense of immersion. (Daassi & Debbabi, 2021). To feel immersed, consumers need to be able to more freely interactively inspect vividly and realistically generated virtual product images from diverse three dimensional perspectives (Choi, 2019). Once consumers recognize potential technological limitations such as slow responses (low interactivity) and/or poor quality of computer graphics (low vividness) in using AR (e.g., computer system), the sense of immersion may be limited (Yim et al., 2017). Thus, technology fluidity affects consumers' immersive experiences; users will have a more continuous, intuitive, immersive, and satisfying experience when interacting with virtual items in connection to the actual world when using AR technology that is high in perceived fluidity (Chen & Lin, 2022). In addition, system quality positively affects consumer immersion (Kowalczuk et al., 2021). While the system quality largely depends on the technology fluidity. Therefore, it can be inferred that the perceived technology fluidity positively impacts the immersion of consumers.

Prior studies have confirmed that the higher the AR interactivity and system quality, the more immersion and enjoyment users feel when using AR (e.g., Kowalczuk et al., 2021; Pantano et al., 2017). Moreover, the more vivid the AR interface, the more immersive the user will be, thus enhancing their enjoyment (Yim et al., 2017). In the MR System, Sung et al. (2021) demonstrate that the quality of Artificial Intelligence (i.e., speech recognition and synthesis via machine learning) associated with an augmented object increases MR immersion and MR enjoyment, which all increase consumer engagement. In VR tourism, authentic experience positively affects enjoyment, which in turn affects tourists' intention to visit (Myung et al., 2020). Technology fluidity provides smooth, seamless, and powerful interaction and is highly responsive and interactive (Elmqvist et al., 2011), allowing users to perceive system quality and media usefulness, informativeness, and vividness (authentic). Therefore, this study infers that the perceived technology fluidity positively impacts the enjoyment of consumers. Besides, AR technology fluidity enhances media richness, and media richness can play an important role in the AR environment, that is, influencing consumer responses in terms of cognitive and affective states (Pessoa et al., 2022).

Based on the above research, this study assumes that perceived technological fluidity affects consumers' affective response and proposes the following hypotheses:

H4a: Perceived technology fluidity positively influences the consumer's affective responses (immersion) in an AR environment.

H4b: Perceived technology fluidity positively influences the consumer's affective responses (enjoyment) in an AR environment.

2.11.5 The Influence of Cognitive Responses (Attitudes and Perceived Information Quality) on Purchase Intention

Moon et al. (2013) believed that there is a correlation between users' brand attitudes and their purchase intentions. Attitudes towards augmented reality-based apps refer to the feelings associated with utilizing such apps (Daassi & Debbabi, 2021). Within the AR environment, positive attitudes toward media richness have been found to positively influence consumers' purchase intentions (Pessoa et al., 2022). Earlier research indicated that the convenience, ease of use, and usefulness of AR impact consumer attitudes, subsequently influencing purchase intentions (Qin et al., 2021). Moreover, a more positive consumer attitude toward AR is associated with a higher intention to purchase the displayed products (Yim et al., 2017). According to Park and Yoo (2020), consumers' attitudes after purchasing cosmetics utilizing augmented reality-based applications affect their behavioral intentions. In other words, behavioral intention is explicitly determined by an individual's attitudes (Elford et al., 2022). Therefore, it can be seen that consumers' attitudes toward AR will affect their purchase intention (Plotkina & Saurel, 2019).

Perceived information quality refers to AR's ability to generate useful, trustworthy, personalized, and reliable virtual content for users (Poushneh, 2018). The amount of virtual content displayed on the screen should match the user's expectations and needs (Pessoa et al., 2022). Therefore, the higher the perceived information quality, the more it can arouse consumers' desire to purchase. In previous studies, Angella and Kim (2016) identified a relationship between consumers' perceived level of social media information quality and their future purchase intentions. Information quality was observed to impact perceived usefulness, subsequently influencing consumers' attitudes and behavioral intentions (Pantano et al., 2017). According to Kim and Niehm (2009), the perceived information quality of a website positively influences recommendation intention. Information quantity and quality demonstrated direct and significant effects on emotion, which, in turn, had a notable influence on purchase intentions (Young & Hyunjoo, 2012). When studying the influence of AR media richness on purchase intention, Pessoa et al. (2022) confirmed that consumer-perceived information quality can affect consumers' purchase intentions. Some results suggest that higher levels of information and high-quality information in AR can reduce product uncertainty (Adam & Pecorelli, 2018), increase useful sexual knowledge, and positively influence purchase intentions (Kowalczuk et al., 2021).

Besides, according to S-O-R theory, the external stimulus will affect the cognitive and affective state of the organism for a certain thing or phenomenon and then affect the consumer's consumption decision (Eroglu et al., 2003; Kim & Lennon, 2013), while consumer attitudes and perceived information quality are also part of cognitive, hence, this study assumes that cognitive responses influence consumers' purchase intentions and proposes the following hypotheses:

H5a: Cognitive responses (attitudes) positively influence purchase intentions in an AR environment.

H5b: Cognitive responses (perceived information quality) positively influence purchase intentions in an AR environment.

2.11.6 The Influence of Affective Responses (Immersion and Enjoyment) on Purchase Intention

According to Mainemelis and Dionysiou (2015), individuals who are highly immersed in an activity may not necessarily perceive positive feelings during the flow experience, but they can perceive positive feelings after the flow experience. Following this view, Drengner et al. (2018) proposed a process perspective of flow and expected enjoyment to be the result of immersion. This sense of presence prevents irrelevant cognitive loads and distractions, so there is no distraction between the real world and the virtual world (Xi et al., 2023). In other words, consumers utilizing AR may not necessarily feel positive during immersion, but positive feelings may emerge after the immersive experience (Kowalczuk et al., 2021). In the context of AR, the more vivid the AR interface, the more immersive the user experience, thereby enhancing enjoyment and purchase intentions (Yim et al., 2017). Additionally, AR immersion has a positive impact on enjoyment (Kowalczuk et al., 2021). Therefore, this study proposes the following hypothesis:

H6: Immersion positively influences enjoyment in an AR environment.

Prior research has identified enjoyment as a main driver of online retail shopping (Childers et al., 2001). In a VR context, Domina et al. (2012) found a significant positive effect of enjoyment on shopping intention. In VR tourism, authentic experience positively affects enjoyment, which in turn affects tourists' intention to visit (Myung et al., 2020). In the MR System, MR enjoyment positively affects consumers' purchase intention (Sung et al., 2021). In the context of AR, some scholars have discussed the impact of enjoyment on consumer behavior. For example, enjoyment positively affects AR reuse intention (Daassi & Debbabi, 2021). Through empirical research, Kowalczuk et al. (2021) demonstrated that interactivity and system quality have a positive impact on consumers' purchase intention through enjoyment. Additionally, perceived interactivity and perceived virtuality influence consumers' hedonic and utilitarian experiences, subsequently affecting their purchase intention (Hilken et al., 2017; Qin et al., 2021). Enjoyment affects consumers' purchase intention through attitudes (Plotkina & Saurel, 2019; Qin et al., 2021). Additionally, Han et al. (2021) found that AR-based presentation styles influence customer patronage intention through enjoyment and perceived risk.

Moreover, enjoyment and immersion can serve as variables of affective response. Grounded in the S-O-R theory, external stimuli impact the cognitive and affective state of the organism in relation to a specific thing or phenomenon, subsequently influencing the consumer's decision-making in consumption (Eroglu et al., 2003; Kim & Lennon, 2013). Consequently, consumers' affective states can have an impact on their behavioral intentions (Ellen & Zhang, 2014). As a result, this study infers that affective response affects consumers' purchase intention and proposes the following hypothesis:

H7: Affective response (enjoyment) positively influences consumer purchase intention in an AR environment.

2.11.7 The Influence of Perceived Information Quality and Enjoyment on Attitudes

A user's utilitarian and hedonic values are observed to exert influence on their Information Technology (IT)/ Information Systems (IS) usage behavior. Utilitarian IT/IS is geared towards enhancing the user's task performance, whereas hedonic values aim to enhance the user's pleasurable experience (Van der Heijden, 2004). Empirical studies have substantiated that both utilitarian and hedonic values play a significant role in shaping IT/IS perceptions and influencing usage behavior (Kim & Hwang, 2012; Pöyry et al., 2013). According to motivation theory, perceptions of utility signify extrinsic motivation, while perceptions of hedonic value signify intrinsic motivation (Zanna & Rempel, 2008). Extrinsic motivation emphasizes engaging in a behavior to attain specific goals or rewards (Vallerand, 1997), while intrinsic motivation pertains to the pleasure and satisfaction derived from performing a particular behavior (Vallerand, 1997).

In the present study, hedonic value is operationally defined as the extent to which a user experiences enjoyment from utilizing an app. Utilitarian value, on the other hand, is operationalized as the degree to which an individual believes that using an app contributes to enhancing their task performance.

Research indicates that consumers exhibit a more favorable attitude towards targeted behaviors, such as online shopping when they perceive these actions as possessing greater value, exemplified by increased convenience and cost-effectiveness. For instance, Overby and Lee (2006) substantiate that preferences (i.e., positive attitudes) within the realm of online shopping are influenced by hedonic and utilitarian values. Furthermore, information quality is intricately connected to perceived value (Kim & Niehm, 2009), an association that is typically intertwined with consumers' attitudes (Hsu et al., 2016). In addition, Pessoa et al. (2022) confirmed that perceived information quality positively influences attitude in their study. Therefore, the following hypothesis is proposed in this study:

H8: Perceived information quality positively influences attitudes.

Similarly, Ducoffe (1996) empirically validates that within the online context, informativeness (cognitive process) and entertainment (affective process) collectively contribute to an enhanced appraisal of web advertising, consequently fostering a more positive attitude towards it. In addition, in the context of AR shopping, Pantano et al. (2017) found in their research that perceived enjoyment has a significant positive impact on consumers' attitudes towards using glasses virtual try-on system. Yim et al. (2017) also confirmed that the more media enjoyment consumers perceive when using AR, the more positive their attitude toward AR. Therefore, the following hypothesis is proposed in this study:

H9: Enjoyment positively influences attitudes.

2.11.8 The Mediating Effects of Cognitive Responses (Attitudes and Perceived Information Quality) on the Relationship Between Perceived Augmented Realism and Purchase Intention

Previous studies have all shown the mediating effects of attitudes. For example, in the context of AR, perceived usefulness and perceived ease of use affect the intention to use AR through attitudes toward using (Rese et al., 2017). Several scholars have substantiated that attitudes serve as a mediating factor in the influence of perceived augmentation and perceived realism on behavioral intention. For example, Pessoa et al. (2022) found that media richness influences brand engagement and willingness to buy through perceived information quality and brand attitudes. The intensity of perceived augmentation correlates with increased consumer immersion, while heightened perceived realism contributes to more favorable attitudes toward AR. Consequently, these factors influence the intention to reuse AR, indicating that perceived augmentation and perceived realism impact the intention to reuse AR through the mediation of attitudes toward AR (Daassi & Debbabi, 2021). Javornik (2016) shared a similar perspective, asserting that the impact of perceived augmentation on purchase intention is mediated by attitudes.

Perceived information quality is considered one of the variables within cognitive responses (Pessoa et al., 2022). In the S-O-R model, the stimulus acts as an antecedent within the S-O-R structure, while organisms (both cognitive and affective) play a mediating role between the stimulus and behavioral responses (Goi et al., 2014). Therefore, perceived information quality can be the mediating variable in the S-O-R model. Several studies have also affirmed the mediating role of perceived information quality. For example, some scholars have confirmed that brand-related user-generated content (UGC) influences consumers' cognitive response (i.e., perceived information quality), which in turn affects consumers' future purchase intention (Angella & Kim, 2016). Furthermore, in the augmented reality (AR) environment, the richness of media positively influences consumers' cognitive response, particularly in terms of perceived information quality, subsequently influencing their purchase intention (Pessoa et al., 2022).

Therefore, consumers' attitudes and perceived information quality play a mediating role in the S-O-R model. Based on the above research discussion, this study proposes the following hypotheses:

H10a: Cognitive responses (attitudes) mediate the relationship between perceived augmented realism and purchase intention in an AR environment.

H10b: Cognitive responses (perceived information quality) mediate the relationship between perceived augmented realism and purchase intention in an AR environment.

2.11.9 The Mediating Effects of Cognitive Responses (Attitudes and Perceived Information Quality) on the Relationship Between Perceived Technology Fluidity and Purchase Intention

According to Qin et al. (2021), hedonic utilitarianism influences purchase intention through attitude; that is, attitude mediates the effect of hedonic utilitarianism on purchase intention. For example, in AR systems, enjoyment, perceived usefulness, and convenience affect consumers' attitudes toward AR technology and, thus, their purchase intention (Plotkina & Saurel, 2019). Li and Gao (2023) also believed that perceived usefulness positively affects users' attitudes toward AR applications, which in turn affects their intention to continue using AR, and in this process, attitude plays a mediating role. Besides, Yim et al. (2017) found that the higher the media usefulness perceived by consumers when using AR, the more positive their attitude towards AR, and the more positive the consumer's attitude towards AR, the higher the consumer's intention to purchase the displayed product.

According to the S-O-R framework, cognitive response and affective response are mediating variables (Goi et al., 2014). Hence, perceived information quality can serve as the mediating variable in the S-O-R framework. For instance, the quality of website design has demonstrated positive direct effects on pleasure, arousal, and perceived information quality, subsequently influencing satisfaction and word-of-mouth (WOM) intention (Young & Hyunjoo, 2012). Additionally, Kim and Niehm (2009) emphasized that perceived information quality plays a mediating role in the relationship between website quality and loyalty intention. In the AR environment, media richness has a positive impact on consumers' cognitive response (perceived information quality) and then affects consumers' purchase intention (Pessoa et al., 2022). Therefore, based on the above research, this study proposes the following hypotheses:

H11a: Cognitive responses (attitudes) mediate the relationship between perceived technology fluidity and purchase intention in an AR environment.

H11b: Cognitive responses (perceived information quality) mediate the relationship between perceived technology fluidity and purchase intention in an AR environment.

2.11.10 The Mediating Effects of Affective Responses (Enjoyment, Immersion and Enjoyment) on the Relationship Between Perceived Augmented Realism and Purchase Intention

In previous studies, scholars have pointed out the mediating role of enjoyment. For example, Melo et al. (2022) argued that the ability of the VR system to immerse users in the virtual environment has a significant role in promoting the development of positive emotions and enjoyment, which has a positive role in promoting users' consumption behavior towards tourism products and services and found the mediating effect of enjoyment. In addition, Myung et al. (2020) found that in VR tourism, authenticity experience positively affects tourists' willingness to visit through emotional response (enjoyment). In the context of AR, the effect of interactivity on AR reuse intentions is mediated through enjoyment (Kowalczuk et al., 2021). Besides, Yim et al. (2017) confirmed that enjoyment plays a mediating role in the relationship between immersion and purchase intentions.

VR users often experience a sense of engrossment and deep focus free from distraction within the VR environment (Massetti, 1996). Likewise, consumers using AR are expected to experience an equal, or hopefully greater, state of immersion as well (Yim et al., 2017). Immersion has been understood to be a mediating enhancer in a variety of virtual experiences (Schuemie et al., 2001). According to Mainemelis and Dionysiou (2015), individuals who are highly immersed in an activity may not necessarily perceive positive feelings during the flow experience, but they can perceive positive feelings after the flow experience. Following this view, Drengner et al. (2018) proposed a process perspective of flow and expected enjoyment to be the result of immersion. This sense of presence prevents irrelevant cognitive loads and distractions, so there is no distraction between the real world and the virtual world (Xi et al., 2023). That is, consumers who use AR do not have a positive feeling when immersed but will have a positive feeling after immersion (Kowalczuk et al., 2021). Besides, Yim et al. (2017) considered that in the AR context, immersive experiences (i.e., immersion) play a mediating role in generating a range of positive consumer reviews and confirmed that immersion mediates the relationship between interactivity/vividness and enjoyment and purchase intentions. Therefore, based on the above research, this study proposes the following hypotheses:

H12a: Affective responses (enjoyment) mediate the relationship between perceived augmented realism and purchase intention in an AR environment.

H12b: Affective responses (immersion and enjoyment) mediate the relationship between perceived augmented realism and purchase intention in an AR environment.

2.11.11 The Mediating Effects of Affective Responses (Enjoyment, Immersion, and Enjoyment) on the Relationship Between Perceived Technology Fluidity and Purchase Intention

In the MR System, Sung et al. (2021) demonstrated that the quality of Artificial Intelligence (i.e., speech recognition and synthesis via machine learning) associated with an augmented object increases MR enjoyment, which in turn has a positive impact on purchase intention. Plotkina and Saurel (2019) explained the impact of the mediating role of perceived hedonic value (enjoyment) and utilitarian value (convenience, ease of use, and usefulness) on attitudes toward shopping technology and purchase intention. In the context of AR, Pantano et al. (2017) argued that aesthetic quality and interactivity influence consumers' attitudes through enjoyment. In addition, according to Haile and Kang (2020), cognitive and affective mediate the relationship between the media characteristics of Mobile AR and purchasing intention, and affective mediate the relationship between entertainment and purchasing intention. In contrast, enjoyment is one of the variables of affective response, so we can infer that enjoyment mediates the relationship between entertainment and purchasing intention.

In addition, it has been shown that the joint effect of immersion and interactivity and/or vividness creates an increased real sense of being present in that image-generated world, namely telepresence (Yim et al., 2017). Mainemelis and Dionysiou (2015) considered that individuals who are highly immersed in an activity may not necessarily perceive positive feelings during the flow experience, but they can perceive positive feelings after the flow experience. Following this view, Drengner et al. (2018) proposed a process perspective of flow and expected enjoyment to be the result of immersion. This sense of presence helps prevent irrelevant cognitive loads and distractions, ensuring a seamless experience without interference between the real world and the virtual world (Xi et al., 2023). That is, consumers who use AR do not have a positive feeling when immersed but will have a positive feeling after immersion (Kowalczuk et al., 2021). Furthermore, Yim et al. (2017) considered that in the context of AR, immersive experiences, represented by immersion, act as a mediating factor in eliciting various positive consumer responses. Their study confirms that immersion serves as a mediator in the relationship between interactivity/vividness and the outcomes of enjoyment and purchase intentions. Kowalczuk et al. (2021) also validated that the influence of AR interactivity on reuse intention is mediated through the variables of immersion and enjoyment. Therefore, this study proposes the following hypotheses:

H13a: Affective responses (enjoyment) mediate the relationship between perceived technology fluidity and purchase intention in an AR environment.

H13b: Affective responses (immersion and enjoyment) mediate the relationship between perceived technology fluidity and purchase intention in an AR environment.

2.11.12 Conceptual Model

The S-O-R theory (Mehrabian & Russell, 1974) explains how perceived stimuli in an environment (stimulus) evoke cognitive or affective states in an individual (organism), which in turn elicits a behavioral response from that individual (response). It provides a framework for understanding consumer behavior by analyzing how external stimuli influence internal states and actions.

The AR interface experience was related to the visual image quality and perceived AR environment realism (Javornik, 2016; Poushneh, 2017). A more realistic AR experience could increase how consumers imagine and visualize possibilities and new ideas to result in higher levels of inspiration for a new reality (Rauschnabel et al., 2019). Furthermore, users experience a more seamless, intuitive, immersive, and gratifying interaction with virtual items when utilizing AR technology characterized by high perceived fluidity (Chen & Lin, 2022). Therefore, in the context of AR technology and online shopping, AR technology acts as a stimulus that impacts cognitive and affective responses, which, in turn, affect purchase intentions. Specifically, the "stimulus" refers to the AR features and capabilities presented to the consumer. This includes how AR technology integrates virtual objects with the real-world environment (perceived augmented realism) and how seamlessly it operates within users' daily routines (perceived technology fluidity). For instance, AR tools that allow consumers to visualize how a product will look in their home or on themselves serve as stimuli. The "organism" encompasses internal responses and psychological processes triggered by AR stimuli, including cognitive and affective responses. Cognitive responses involve attitudes toward AR technology (Xiao et al., 2019) and perceived information quality (Poushneh, 2018). High-quality AR visualizations can positively influence consumer attitudes and perceived information accuracy (Pessoa et al., 2022). Besides, engaging and realistic AR experiences can enhance immersion and enjoyment, leading to more positive affective responses during online shopping (Kowalczuk et al., 2021). The "response" represents the behavioral outcomes of the cognitive and affective states. In this context, purchase intention is the primary response of cognitive and affective responses. Therefore, according to S-O-R theory, this study assumes that positive cognitive and affective responses—such as improved attitudes, higher perceived information quality, greater immersion, and increased enjoyment—can lead to higher purchase intentions.

Consequently, according to the S-O-R theory, this study both considers cognitive response (attitudes and perceived information quality) and affective response (immersion and enjoyment) as organism (O) factors, explores how perceived augmented realism and perceived technology fluidity, as external stimulus (S) affects consumers' purchase intention (R) in the augmented reality marketing environment. It can be seen from the conceptual model that the external stimulus of perceived augmented realism and technology fluidity by AR will cause cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment), which in turn further affect consumers' behavioral intention, that is, their purchase intention. Shown in Figure 2.14.

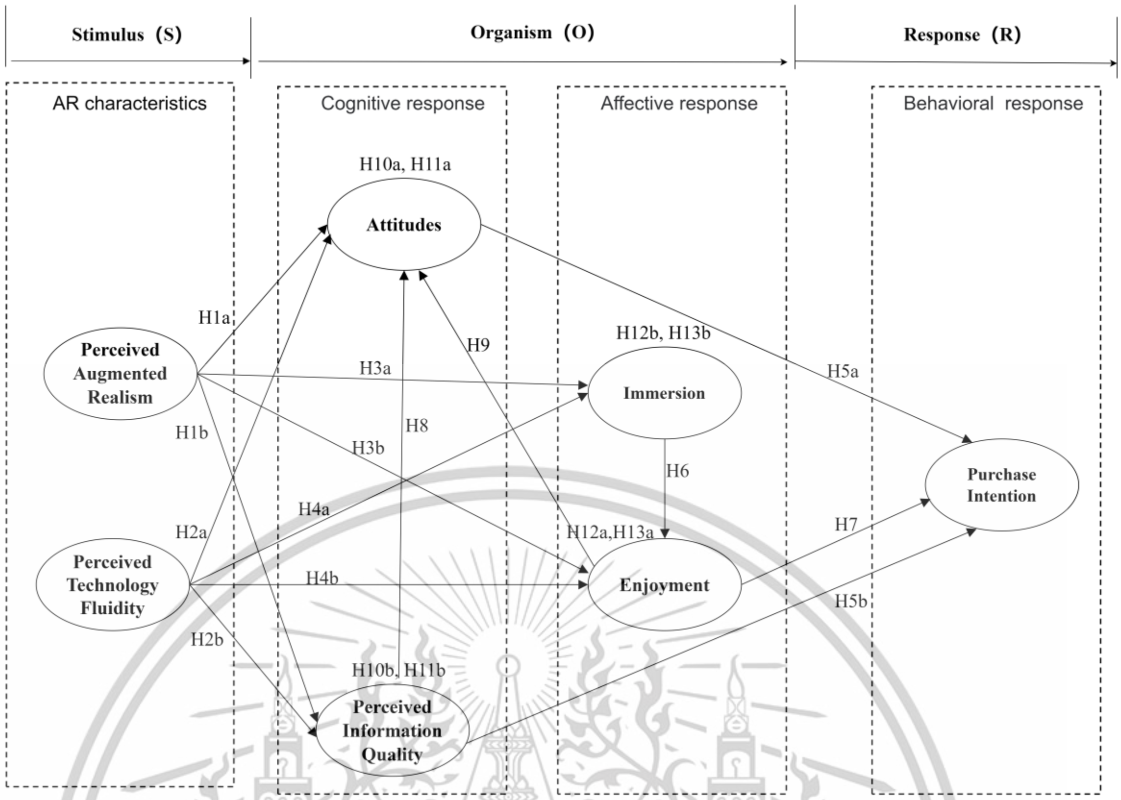


Figure 2.14 The conceptual model of this study

The conceptual model of this study is based on a comprehensive literature review, several relevant research theories, and a detailed discussion of the hypotheses described earlier. The hypotheses are shown in Table 2.13.

Table 2.13 Hypotheses Summary

Number	Hypotheses	References
H1a	Perceived augmented realism positively influences the consumer's cognitive responses (attitudes) in an AR environment.	Daassi and Debbabi (2021), Qin et al. (2021), Kowalczuk et al. (2021), Javornik (2016)
H1b	Perceived augmented realism positively influences the consumer's cognitive responses (perceived information quality) in an AR environment.	Pessoa et al. (2022), Oyman et al. (2022), Chen and Lin (2022)
H2a	Perceived technology fluidity positively influences the consumer's cognitive responses (attitudes) in an AR environment.	Xu et al. (2020), Li and Gao (2023), Plotkina and Saurel (2019), Van Kerrebroeck et al. (2017)

Table 2.13 (Continue)

Number	Hypotheses	References
H2b	Perceived technology fluidity positively influences the consumer's cognitive responses (perceived information quality) in an AR environment.	Tae-Im et al. (2017), Pessoa et al. (2022), Caboni and Hagberg (2019)
H3a	Perceived augmented realism positively influences the consumer's affective responses (immersion) in an AR environment.	Sung et al. (2021), Javornik (2016), Yim et al. (2017), Kowalczuk et al. (2021), Daassi and Debbabi (2021)
H3b	Perceived augmented realism positively influences the consumer's affective responses (enjoyment) in an AR environment.	Myung et al. (2020), Sung et al. (2021), Pantano et al. (2017), Kowalczuk et al. (2021), Yim et al. (2017)
H4a	Perceived technology fluidity positively influences the consumer's affective responses (immersion) in an AR environment.	Daassi and Debbabi (2021), Kowalczuk et al. (2021), Chen and Lin (2022)
H4b	Perceived technology fluidity positively influences the consumer's affective responses (enjoyment) in an AR environment.	Sung et al. (2021), Myung et al. (2020), Pantano et al. (2017), Pessoa et al. (2022)
H5a	Cognitive responses (attitudes) positively influence purchase intentions in an AR environment.	Moon et al. (2013), Park and Yoo (2020), Elford et al. (2022), Yim et al. (2017), Pessoa et al. (2022)
H5b	Cognitive responses (perceived information quality) positively influence purchase intentions in an AR environment.	Kowalczuk et al. (2021), Pessoa et al. (2022), Young and Hyunjoo (2012), Angella and Kim (2016), Pantano et al. (2017)
H6	Immersion positively influences enjoyment in an AR environment.	Mainemelis and Dionysiou (2015), Drengner et al. (2018), Yim et al. (2017), Kowalczuk et al. (2021)

Table 2.13 (Continue)

Number	Hypotheses	References
H7	Affective responses (enjoyment) positively influence purchase intention in an AR environment.	Domina et al. (2012), Myung et al. (2020), Kowalczuk et al. (2021), Han et al. (2021), Plotkina and Saurel (2019)
H8	Perceived information quality positively influences attitudes.	Overby and Lee (2006)， Hsu et al. (2016), Pessoa et al. (2022)
H9	Enjoyment positively influences attitudes.	Kim and Hwang (2012), Pantano et al. (2017), Yim et al. (2017)
H10a	Cognitive responses (attitudes) mediate the relationship between perceived augmented realism and purchase intention in an AR environment.	Rese et al. (2017), Li and Gao (2023), Plotkina and Saurel (2019), Pessoa et al. (2022)
H10b	Cognitive responses (perceived information quality) mediate the relationship between perceived augmented realism and purchase intention in an AR environment.	Young and Hyunjoo (2012), Goi et al. (2014), Pessoa et al. (2022), Javornik (2016)
H11a	Cognitive responses (attitudes) mediate the relationship between perceived technology fluidity and purchase intention in an AR environment.	Pessoa et al. (2022), Javornik (2016), Yim et al. (2017), Daassi and Debbabi (2021), Goi et al. (2014)
H11b	Cognitive responses (perceived information quality) mediate the relationship between perceived technology fluidity and purchase intention in an AR environment.	Goi et al. (2014), Pessoa et al. (2022), Kowalczuk et al. (2021), Javornik (2016), Young and Hyunjoo (2012)
H12a	Affective responses (enjoyment) mediate the relationship between perceived augmented realism and purchase intention in an AR environment.	Melo et al. (2022), Myung et al. (2020), Sung et al. (2021), Plotkina and Saurel (2019), Haile and Kang (2020), Pantano et al. (2017)
H12b	Affective responses (immersion and enjoyment) mediate the relationship between perceived augmented realism and purchase intention in an AR environment.	Yim et al. (2017), Mainemelis and Dionysiou (2015), Drengner et al. (2018), Kowalczuk et al. (2021), Xi et al. (2023)

Table 2.13 (Continue)

Number	Hypotheses	References
H13a	Affective responses (enjoyment) mediate the relationship between perceived technology fluidity and purchase intention in an AR environment.	Sung et al. (2021), Plotkina and Saurel (2019), Haile and Kang (2020), Pantano et al. (2017), Melo et al. (2022), Myung et al. (2020)
H13b	Affective responses (immersion and enjoyment) mediate the relationship between perceived technology fluidity and purchase intention in an AR environment.	Mainemelis and Dionysiou (2015), Yim et al. (2017), Drengner et al. (2018), Kowalczuk et al. (2021), Xi et al. (2023)

CHAPTER 3
METHODOLOGY

3.1 Overview

This study investigates the impact of perceived augmented realism and technology fluidity on the cognitive aspects (attitudes and perceived information quality), affective aspects (immersion and enjoyment), and purchase intention among Chinese consumers in the context of AR virtual try-on. The research is implemented by mixed methods i.e. (1) Quantitative research. (2) Qualitative research.

This chapter presents the adopted research methodology aimed at accomplishing the objectives and addressing the research questions stated in Chapter One. The subsequent steps of the research procedure are outlined, as illustrated in **Figure 3.1**.

Step 1: Literature review, construction of a conceptual framework, and proposal of research hypotheses. This step involves conducting a comprehensive literature review examining relevant theories, concepts, articles, online statistics, and academic papers to establish the foundation of this research study. This rigorous examination facilitated the identification of study variables, research problem elucidation, and recognition of existing research gaps. Subsequently, based on the findings from this investigation, specific research objectives and questions were formulated to address the identified problems and bridge these gaps effectively. Consequently, a conceptual framework was developed encompassing two independent variables, four mediating variables, and one dependent variable. The questionnaire that is used in this study consisted of 39 observed items.

Step 2: Questionnaire development and data collection. This step involves quantitative research. First, participants will be recruited to engage in an experiment designed to compare the outcomes of virtual try-on experiences utilizing the AR virtual try-on function within a mobile e-commerce app against scenarios where the AR virtual try-on function is not utilized in the mobile e-commerce app. Second, a Chinese online questionnaire platform, "Wen JuanXing," will be utilized to collect data regarding participants' experiences post-experiment. All measurement scales are borrowed from established scales by previous scholars, and the study queries are assessed using a 7-point Likert scale, where "1" represents strongly disagree and "7" signifies strongly agree. Finally, the collected data from the respondents undergoes a process of cleaning and filtering, followed by rigorous testing for reliability and validity. If deemed satisfactory, an analysis is performed employing the Structural Equation Model (SEM) via AMOS.

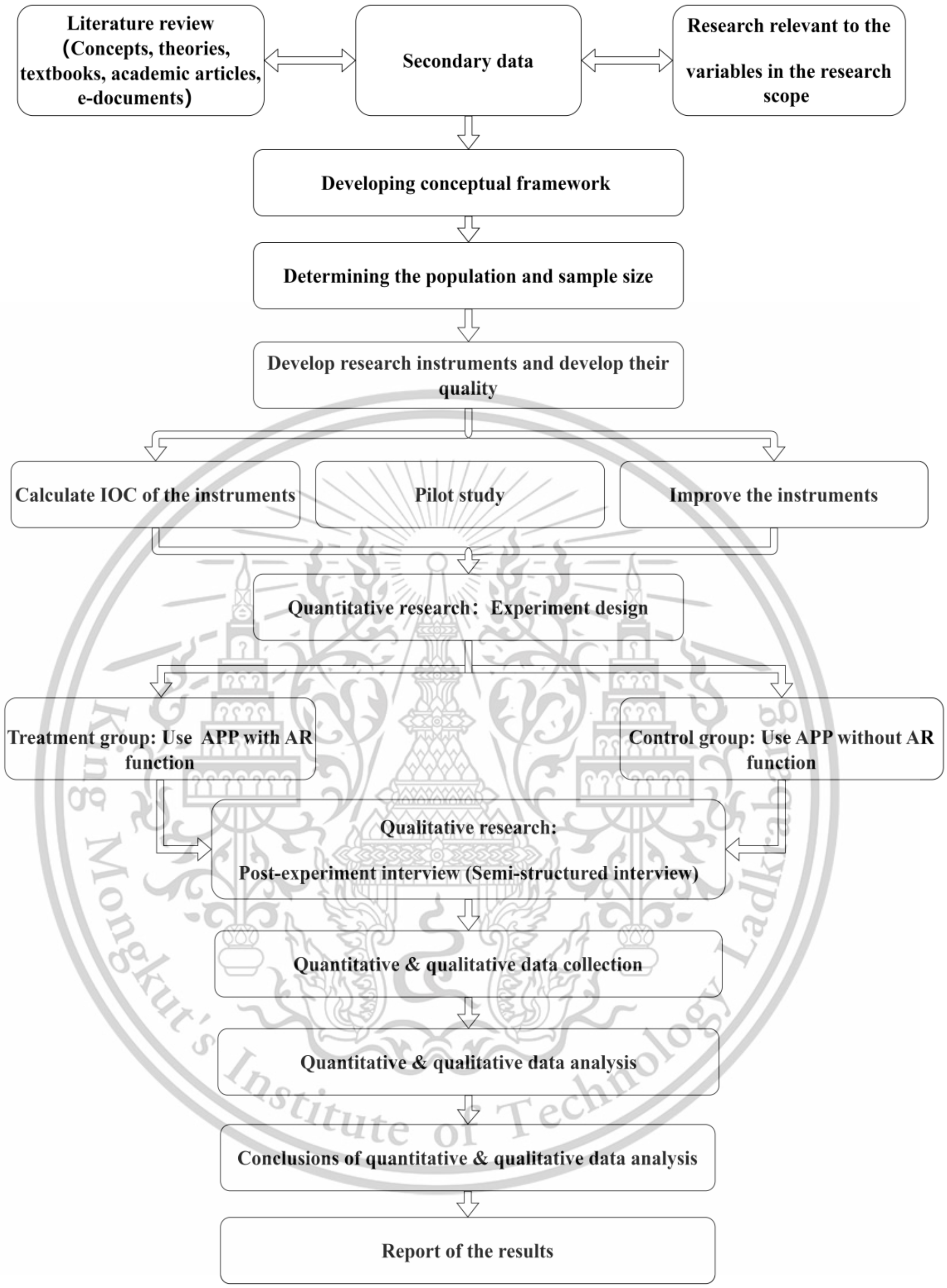


Figure 3.1 Research procedure

Step 3: Quantitative data analysis and conclusion. The data will be analyzed through model fit analysis, descriptive statistics, correlation analysis, SEM, and mediation effect analysis, with findings presented accordingly. Ultimately, a conclusion will be drawn.

Step 4: Qualitative data collection. Upon completion of the experiment, 40 participants will be randomly selected from the four universities, with 10 participants (5 from each experimental condition) chosen from each university for semi-structured interviews. The interview content will be recorded and transcribed.

Step 5: The data underwent decoding and grouping for subsequent conclusions, interpretations, and findings in qualitative research, aiming to shed light on and strengthen findings by incorporating qualitative data.

3.2 Quantitative Research

There are several reasons for using questionnaires in data gathering. First of all, this kind of quantitative method could guarantee the privacy of the participants and the confidentiality of the information accumulated (Mischel et al., 2011). Meanwhile, questionnaires are easier and more effective in practicable application due to the convenience of distribution as well as the universality of testing scope. Furthermore, the quantitative research method is deductive, which aims to examine theories rather than create them like the qualitative method usually does (Hammersley, 2002). Because the research objective was settled before gathering the data, and every process was designed in advance. However, this does not indicate quantitative data could not be helpful in testing hypotheses. On the contrary, they help generalize and make predictions. Besides the advantages summarized above, using the quantitative method would help the researcher to gain more objective conclusions than qualitative methods like observation. It also could promote the study to realize high standards in data collecting, regardless of reliability or quantity (Matveev, 2002).

3.2.1 Research Design

3.2.1.1 Experimental Design

The present study adopts a posttest-only between-group experimental design to examine the effects of perceived augmented realism and perceived technology fluidity on Chinese consumers' cognitive responses (attitudes and perceived information quality), affective responses (immersion and enjoyment), and purchase intentions in the context of AR virtual try-on. Two experimental conditions were established: one group used the Dewu mobile shopping app with the AR virtual try-on function, while the other group used the same app without the AR feature. This design enables a comparative analysis of consumer responses under varying technological experiences.

Participants will be recruited from four geographically diverse universities in China—University of Science and Technology Beijing, Shanghai Jiao Tong University, Sichuan University, and Guangxi University—thereby enhancing the representativeness and generalizability of the sample. The experiment will be conducted in classroom settings at each university, with approximately 50 participants per session. Participants will complete the experiment using their personal smartphones to simulate a naturalistic mobile shopping environment.

A systematic multi-stage recruitment process will be employed to ensure participants met the inclusion criteria, which included being current university students within a defined age range, possessing basic proficiency in mobile device usage, and having prior experience with or openness to using AR shopping technologies. Screening questions will be incorporated to verify eligibility, including items on AR familiarity and device compatibility. Recruitment will be conducted through targeted channels such as university communication systems, student WeChat groups, and online bulletin boards. To facilitate comprehension and encourage informed consent, participants were provided with a brief explanation or demonstration of the experimental procedures prior to enrollment. Small incentives will be offered to enhance participation rates and engagement. Before the experiment commenced, participant qualifications were rechecked to ensure appropriate allocation to either the AR or non-AR group. Moreover, trained research assistants were appointed to support the administration of the experiment across sites, ensuring procedural consistency and data quality. This comprehensive design and recruitment strategy enhances the internal validity of the study and strengthens the reliability of the experimental outcomes.

The experimental procedures are designed with inspiration from previous studies, as they incorporate similar research methodologies utilized by prior researchers. For example, to compare consumer responses to the IKEA Place app and the IKEA mobile website on smartphones, Kowalczuk et al. (2021) recruited university students to participate in the experiment and randomly assigned them to one of two conditions: either using the IKEA Place AR application or browsing the IKEA mobile website on their smartphones to select tables and chairs within the price range of 149-250 euros. Subsequently, participants were invited to complete an online questionnaire. Similarly, Chen and Lin (2022) also compared three experimental conditions, mobile app-based AR interface, web-based AR interface, and non-AR, to explore the impact of technological mobility in augmented reality and augmented reality (AR) applications on consumer decision-making. Additionally, Daassi and Debbabi (2021) employed similar experimental procedures to examine the influence of AR technology characteristics on consumer behavior. This demonstrates the feasibility of the experimental methods and procedures employed in this study. The experimental procedures are illustrated in Figure 3.2, and the detailed procedures are outlined as follows.

Step 1: At the University of Science and Technology Beijing, Shanghai Jiao Tong University, Sichuan University, and Guangxi University, students will be recruited. Each university will recruit 200 students and randomly divide them into two groups. They will receive a comprehensive introduction to the experiment's background and objectives.

Step 2: Start the experiment and set two experimental conditions at Each university. In one experimental condition, participants will use the AR virtual try-on function within the Dewu APP, while in another condition, participants will not use the AR virtual try-on function within the Dewu APP.

First, all participants need to download the Dewu APP. Secondly, provide instructions on how to utilize the Dewu APP. Thirdly, participants must select shoes priced between 200 and 400 RMB on the Dewu APP.

Treatment group: participants utilizing the AR virtual try-on function should employ it to check the effect of AR virtual try-on, such as color preference and the effect of shoes on feet. The participants will have at least thirty minutes at their disposal (Merle et al., 2012).

Control group: those participants who do not utilize the AR virtual try-on function should browse relevant shoe information and imagine its effects based on textual descriptions, pictures, and videos. The participants will have at least thirty minutes at their disposal (Merle et al., 2012).

Step 3: All participants must complete a questionnaire comprising diverse items derived from the measurement scale employed in this study. The questionnaire contains variables of perceived technological fluidity and augmented realism, cognitive (attitude and perceived information quality), affective (immersion and enjoyment), and purchase intention. In addition, some basic information about the participants will be included, such as gender, age, and prior experience (whether they have AR shopping experience). The data will be collected online by a Chinese online questionnaire designing platform, "Wen JuanXing". All participants will administer the questionnaire; however, two distinct questionnaire links will be generated - one for the control group and another for the treatment group.

Step 4: The data collected under the two experimental conditions will be compared to analyze the influence of independent variables on dependent variable and examine any potential mediation effects.

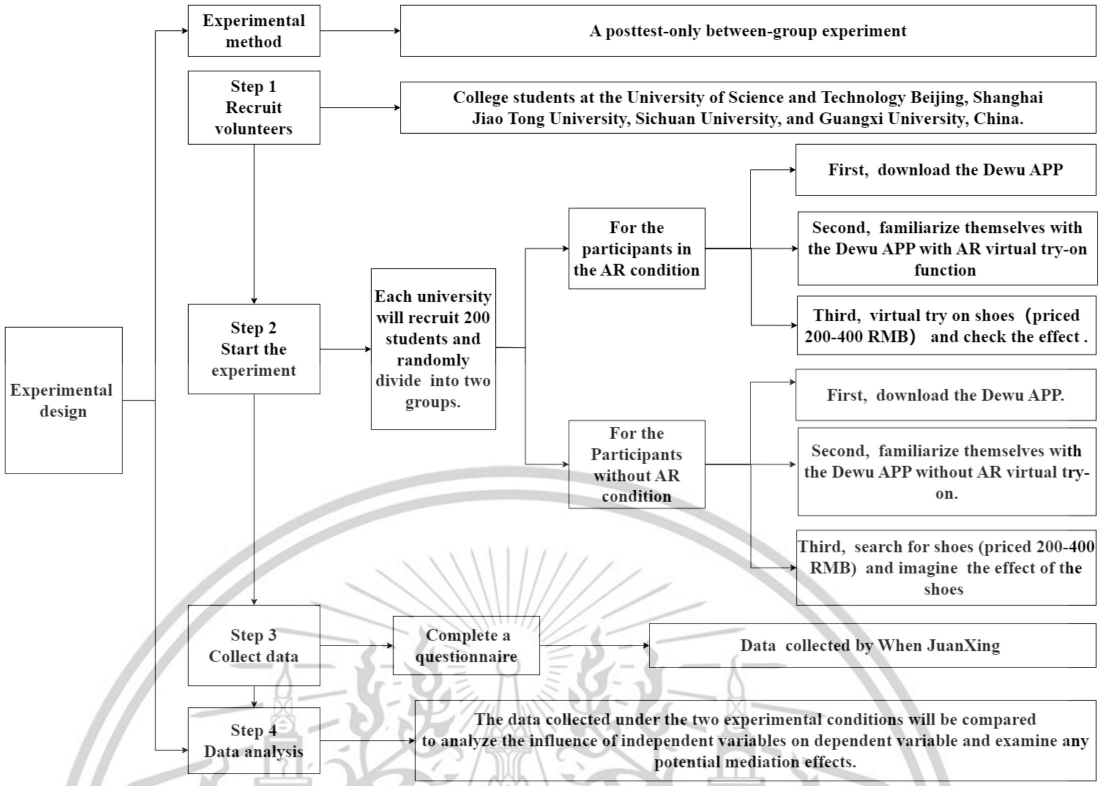


Figure 3.2 The experimental procedures (adopted from Kowalczuk et al. (2021), Chen and Lin (2022))

3.2.1.2 Why Experimental Research?

Most scholars have investigated AR virtual try-on through experiments. For example, Yim et al. (2017) experimented to compare the impact of augmented reality and web-based product displays on consumers' intention to purchase sunglasses and watches sunglasses and watches. Pantano et al. (2017) conducted experiments to investigate the influence of aesthetic quality, interactivity, response time, and information quality on behavioral intention after AR virtual sunglasses were tried on. In addition, other scholars have investigated the influence of AR characteristics on reuse intention (Daassi & Debbabi, 2021; Kowalczuk et al., 2021) and purchase intention (Chen & Lin, 2022; Haile & Kang, 2020; Kowalczuk et al., 2021; Pessoa et al., 2022; Plotkina & Saurel, 2019) through experiments. The experimental methods employed by predecessors will serve as crucial references for the experimental design of this study.

Additionally, the experimental design enables the researcher to manipulate the independent variables, facilitating a more robust determination of causality. By comparing the control group with the experimental group, greater confidence can be placed in inferring the impact of a specific variable on the outcome (Arceneaux, 2010). Therefore, through experiments, participants can gain a more nuanced understanding of the realism of AR virtual try-on and the extent of technology fluidity in the virtual try-on process. Experimental design allows for the manipulation of key independent variables, mitigating the influence of confounding variables and providing a more reliable exploration of the impact of these AR virtual try-on experiences on participants' purchase intentions. Furthermore, experiments offer an opportunity for precise measurement, enabling a scientific evaluation of the effects of AR virtual try-on experiences through quantitative analysis. This experimental research approach employed in this study strongly supports its comprehensive investigation into the impact of AR technology on consumer psychology and behavior.

3.2.1.3 Why Are Shoes Considered a Treatment Product?

According to the 2024 China E-commerce Development Report, clothing, shoes, and hats account for 22.62% of the online retail sales of physical goods (China, 2025), as shown in Table 3.1. This shows that from the perspective of commodity structure, clothes, shoes, and hats are the most popular products purchased online by Chinese consumers. However, inherent issues in online shopping for shoe products, such as the inability to try on and fitting experience, can affect the sector's growth potential and are considered a big obstacle in clothing and shoe online shopping in China (Nawaz, 2022). Online retail is receiving great attention from Chinese consumers, and it is highly anticipated that AR "Virtual Try-On" facilities can be applied to the shoe and apparel industry to solve the challenges of online shopping (Nawaz, 2022).

Moreover, certain scholars emphasize that consumers might express concerns about privacy risks, particularly when they are required to display and expose their face, fingers, hands, or body in front of a camera (Cowan & Ketron, 2019). Additionally, there may be apprehensions about being tracked in location-based AR applications that necessitate the use of GPS services. (Cowan et al., 2021; Lele & Shaw, 2021; Rauschnabel et al., 2018). However, AR virtual try-on for shoes does not necessitate the appearance of the face and does not involve privacy concerns, making it more acceptable to people. Moreover, the application of AR virtual try-on technology is predominantly seen in luxury products, such as bags and jewelry necklaces from certain renowned brands. These products are targeted at high-income groups and are not representative, making them unsuitable for study among the general consumer population in this research.

Table 3.1 2024 Online retail sales by category and YoY growth

Commodity category	**Proportion of online retail sales (%)**	**Online retail Sales growth (%)**
Clothing, shoes and hats, needle textiles	18.1％	18.1％
Daily necessities	15.1％	15.1％

Table 3.1 (Continue)

Commodity category	Proportion of online retail sales (%)	Online retail Sales growth (%)
Household appliances and audio-visual equipment	11.2%	11.2%
Communication equipment	8.3%	8.3%
Grain, oil, food	7.6%	7.6%
Cosmetics	6.2%	6.2%
Cultural office supplies	5.9%	5.9%

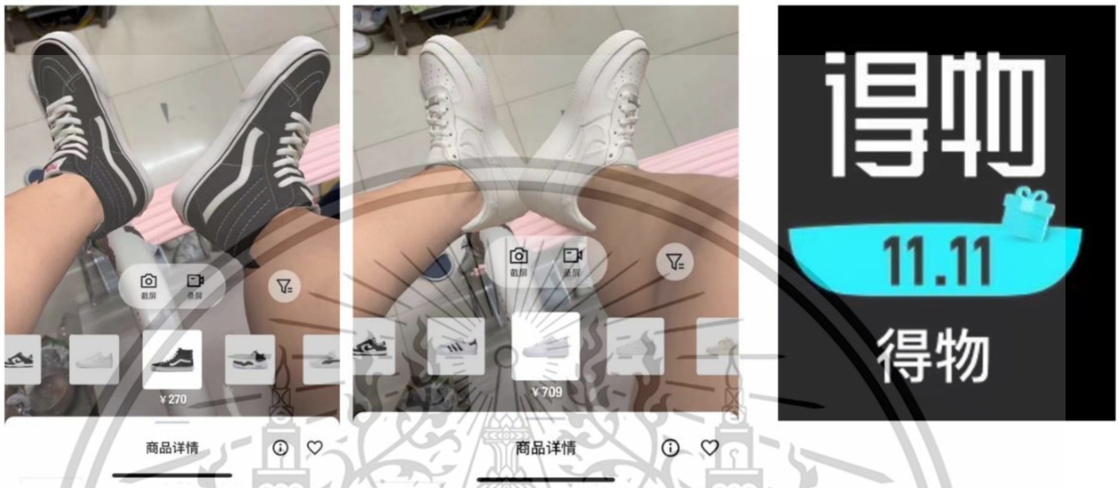
3.2.1.4 Why Dewu APP?

The Dewu App (internationally known as "Poizon") is a prominent Chinese e-commerce platform that initially gained recognition as a marketplace for limited-edition sneakers and streetwear. Over time, it has diversified its product offerings to include fashion, beauty, accessories, and technology, catering primarily to younger consumers such as Gen Z and millennials. The platform's emphasis on authenticity, quality assurance, and exclusive, trendy products has solidified its popularity among these demographics.

In early 2020, Dewu became an industry pioneer by introducing an AR try-on function, enabling users to experience immersive "cloud try-on" shopping for sneakers. This functionality has since been expanded to include AR makeup try-ons and AR watch try-ons, among other lifestyle and consumption scenarios. Among these, the AR virtual shoe try-on remains the most widely used and highly regarded feature. To achieve realistic try-on experiences, Dewu has developed multiple patented innovations in areas such as model fit, motion stability, and restoration authenticity, positioning itself as a leader in AR technology within the international e-commerce industry.

The AR technology on the Dewu App significantly enhances the online shopping experience, particularly for sneakers and eyewear. Users can select a product and virtually "try it on" in real time using their smartphone cameras. The app overlays a 3D model of the product onto the user's feet (for sneakers) or face (for eyewear), providing a realistic visualization of the item's appearance. The AR try-on feature also supports real-time movement tracking, allowing users to rotate their feet to view shoes from various angles or turn their heads to evaluate the fit and style of eyewear. This interactive and immersive experience, as illustrated in Figure 3.3, exemplifies Dewu's innovative approach to integrating AR technology into e-commerce.

The advanced development of AR virtual try-on technology featured on the Dewu App in China demonstrates a high level of technological maturity and user adoption. This level of sophistication makes Dewu an exemplary platform for exploring the impact and functionality of AR virtual try-on in mobile e-commerce contexts. Given its widespread usage and integration of state-of-the-art AR features, Dewu provides an appropriate and relevant setting for conducting this study. By selecting Dewu as the research platform, this study ensures that the findings are grounded in a real-world application of mature AR technology, thereby enhancing the reliability and practical significance of the results.



AR virtual try-on shoes on the Dewu APP

Dewu APP

Figure 3.3 AR virtual try-on shoes effect on Dewu APP

3.2.2 Population and Sampling Design

Population

In this study, the population consists of young Chinese consumers who are familiar with mobile technology and online shopping. They will be selected as the primary sample because they represent a tech-savvy consumer group likely to use AR-based virtual try-on applications in mobile e-commerce environments.

Sampling Design

This study will employ a regionally stratified convenience sampling strategy to enhance both the representativeness and practical feasibility of data collection. Specifically, one comprehensive university will be selected from each of the northern, eastern, southern, and western regions of China: Beijing University of Science and Technology, Shanghai Jiao Tong University, Guangxi University, and Sichuan University. The selection of these four institutions was guided by a combination of theoretical and practical considerations. From a theoretical perspective, geographic stratification will be adopted to account for the socio-cultural and economic heterogeneity across China, ensuring the inclusion of students from diverse regional backgrounds. This geographic dispersion contributes to the external validity of the findings by mitigating the risk of regional bias (Burger & Silima, 2006). Additionally, the chosen universities represent a range of institutional types, academic orientations, student body sizes, and administrative structures. Such institutional diversity helps to reduce the risk of overrepresenting any single category of university, thereby enhancing the generalizability of the results. From a practical standpoint, convenience sampling will be employed, leveraging existing academic networks and institutional access to facilitate recruitment and data collection. Students will be recruited on a voluntary basis through the distribution of a research announcement within each university. By integrating strategic regional representation with practical considerations, this sampling approach aims to minimize systematic sampling bias while ensuring a balanced and feasible study design.

At the end of recruitment at each university, participants will be randomly divided into two groups. The utilization of random grouping is intended to mitigate individual differences, temporal influences, and confounding variables, thereby bolstering both the internal and external validity of the experimental outcomes (Kim & Steiner, 2016). This methodological approach ensures that observed disparities between the experimental and control groups predominantly result from the intervention of AR virtual try-on technology, minimizing the impact of extraneous factors. The overarching objective of this methodology is to establish a scientifically robust foundation for a comprehensive understanding of the impacts of AR virtual try-on technology on participants' shopping experiences, as well as its effects on psychological and behavioral aspects. Furthermore, the rationale behind selecting college students as the study sample is primarily guided by the following considerations.

First, the 51st Statistical Report on China's Internet Development indicates that college students possess the highest potential for online shopping consumption. Notably, more than 30% of their total daily consumption is attributed to online shopping, surpassing consumption patterns observed in other age groups (CNNIC, 2023).

Second, college students are frequently employed as subjects in experimental research conducted on this topic. The utilization of college students as experimental participants is common practice for investigating the impact of AR virtual try on behavioral intention. (e.g., Chen & Lin, 2022; Haile & Kang, 2020; Kowalczuk et al., 2021; Pessoa et al., 2022; Plotkina & Saurel, 2019). Because college students are the typical age group to buy fashion products online (Yim et al., 2017), they are generally considered to be more technologically proficient, more confident, and more likely to become early adopters than other groups (Lee, 2014). Students are usually easily attracted to new technologies (Rauschnabel et al., 2018), belong to the Gen-Z cohort, and are interested in seeking consumer-computer interaction (Priporas et al., 2017). For these reasons, we can safely assume that they belong to the group of potential consumers most willing to use AR in the future (Owyang, 2010).

Finally, the use of a student sample is deemed appropriate for examining emerging technologies in retail contexts, as supported by prior research (Harris & Dennis, 2011). Employing a relatively homogeneous sample enhances internal validity by minimizing the influence of extraneous variables (Chuah et al., 2016). Moreover, the inclusion of students from four universities located across different regions of China—namely the east, south, west, and north—adds to the geographical diversity of the sample, thereby improving its representativeness and the generalizability of the findings.

3.2.3 Sample Size

The sample size will be drawn from the population of college students at the University of Science and Technology Beijing, Shanghai Jiao Tong University, Sichuan University, and Guangxi University in China. Schumacker and Lomax (2004) advocated that, when utilizing Structural Equation Modeling (SEM), the sample size for most studies should fall within the range of 200-500. In addition, according to previous research, the sample size mainly depends on the number of items in the questionnaire (Ho & So, 2016). Huang and Yang (2004) recommended that, when employing Structural Equation Modeling (SEM) for data analysis, the number of valid questionnaires should ideally be at least 10-15 times the total number of items in the questionnaire.

Furthermore, in preceding studies, the experimental sample size in research closely aligned with the topic of this study has consistently been set at no fewer than 200 participants. For instance, in the investigation conducted by Kowalczuk et al. (2021) on consumers' cognitive, affective, and behavioral responses to augmented reality in e-commerce, the experimental sample comprised 400 participants, and the Partial Least Squares Structural Equation Model (PLS-SEM) was employed to validate the findings. Similarly, in the study by Chen and Lin (2022), which delved into the effects of flow through augmented realism and technology fluidity, the experimental sample size was determined to be 238, and the hypotheses were validated using the Structural Equation Model (SEM). Additionally, in the investigation of augmented reality interactivity and vividness on purchase intention by Yim et al. (2017), an experimental sample size of 258 was designated, and the analysis was carried out using the SEM.

As outlined by Huang and Yang (2004), SEM requires an adequate sample size to ensure model stability, parameter estimation accuracy, and statistical power. Given the 38 measurement items included in the present study's questionnaire, the recommended sample size ranges between 380 and 580 respondents. This aligns with the commonly accepted SEM guideline of having at least 10–15 participants per observed variable. To meet the minimum threshold and account for potential non-responses or invalid submissions, this study aims to recruit a total of 400 participants, thereby satisfying both the lower bound of the recommended sample size and aligning with sample sizes adopted in comparable empirical research within the AR and XR marketing domains. As shown in Table 3.2, the sample will be evenly distributed across two universities, with 200 participants randomly selected from each institution. This stratified approach helps ensure sample representativeness while enhancing the generalizability of the study's findings.

Table 3.2 Sample size for each university

Areas	Universities	Sample Size
Northern China	University of Science and Technology Beijing	200
Eastern China	Shanghai Jiao Tong University	200
Southern China	Guangxi University	200
Western China	Sichuan University	200

3.2.4 Research Instrument

3.2.4.1 Developing Measurement Tools

1. Gather information from studies about the conceptual framework as well as concepts, theories, documentation, and recommendations.

2. Investigate the interrelationships among endogenous, exogenous, and observable variables before formulating examination and interview questions.

3. To evaluate the Index of Item-Objective Congruence (IOC) between the questionnaire items and the research objectives and challenges, a panel of four experts from universities in Thailand, along with one marketing expert from a Chinese university, will review the test questionnaire. Each question is assigned three points: zero for uncertainty, one for certainty that the study objectives do not align with the question, and one for certainty that they do. The average score, or IOC, should fall between 0.6 and 1.0. If the IOC score is less than 0.6, the test questions will be revised to ensure that each question aligns with the testing objectives.

4. Examine the questionnaire in light of the suggestions made by the experts.

5. Conduct a pilot study. Before the actual implementation of the questionnaire, it is imperative to conduct a pilot study to ensure that all questions are unambiguous, pertain to the same subject matter, and guide respondents toward a unified direction.

6. Calculate the reliability coefficient, such as Cronbach's alpha, to assess the consistency of the questionnaire results. The Cronbach's alpha should meet or exceed the established threshold of 0.70 (Cronbach & Warrington, 1951).

7. Refine the test questionnaire to generate the final version that will be employed for data collection in the subsequent stage.

3.2.4.2 Measurements Scales

Perceived Augmented Realism

Chen and Lin (2022) investigated the impact of perceived augmented realism on consumer behavior and drew on Baños et al. (2000) to measure the perceived augmented realism from real, augmented objects similar to reality, virtual objects that seem natural, quality of the images of the website objects. The measurement scales employed demonstrated high reliability and validity in capturing perceived augmented realism. Therefore, this study will refer to the study conducted by Baños et al. (2000) to measure perceived augmented realism. Specifically, 6 items from Baños et al. (2000) that are most relevant to the current study context will be adapted to measure perceived augmented realism on a 7-point scale (ranging from "absolutely untrue = 1" to "absolutely true = 7"). These items are used to construct the "perceived augmented realism" scale, as shown in Table 3.3.

Table 3.3 Measurement scale of perceived augmented realism

Latent Variable	Labels	Items	Adapted from
Perceived Augmented Realism	PAR1	How real did the virtual objects on the APP with AR function (without AR function) seem to you?	Baños et al. (2000)
	PAR2	To what extent did the experience on the APP with AR function (without AR function) seem real to you?	Baños et al. (2000)
	PAR3	To what extent were the shoes on the APP with AR function (without AR function) similar to reality?	
	PAR4	To what extent did your interactions with the virtual object on the APP with AR function (without AR function) seem natural to you, like those in the real world?	
	PAR5	In your opinion, how was the quality of the images of the APP with AR function (without AR function) objects?	
	PAR6	To what extent was what you experienced on the APP with the AR function (without the AR function) congruent to other experiences in the real world?	

Perceived Technology Fluidity

Existing literature on technology fluidity is limited, and the majority of studies conceptualize it as a unidimensional structure in empirical research (Chen & Lin, 2022; Lin, 2004, 2008). Lin (2008) proposed that technology fluidity could be assessed utilizing 13 items.

Additionally, Chen and Lin (2022), following Lin (2008) approach, measured technology fluidity utilizing 8 items.

Table 3.4 Measurement scale of perceived technology fluidity (ranging from 1 = strongly disagree to 7 = strongly agree)

Latent Variable	Labels	Items	Adapted from
Perceived Technology Fluidity	PTF1	The APP with AR function (without AR function) can surf across content features that provide tips, information, and fun.	Lin (2008)
	PTF2	I can get any new content features I need on the APP with AR function (without AR function).	
	PTF3	I can get any information about the content features I need on the APP with AR function (without AR function).	Chen and Lin (2022)
	PTF4	On the APP with AR function (without AR function), I can get any fun content features I need.	
	PTF5	On the APP with AR function (without AR function), I can access any items I need anytime.	
	PTF6	I can review any items I need anytime on the APP with the AR function (without the AR function).	
	PTF7	I can search for any archive items I need anytime on the APP with the AR function (without the AR function).	
	PTF8	I can freely flow from one subject to the next on the APP with the AR function (without the AR function).	

In this study, the measurement of perceived technology fluidity will be adapted from the well-established and reliable scale of technology fluidity (Lin, 2008). On a 7-point scale (ranging from 1 = strongly disagree to 7 = strongly agree), 8 items will be employed to measure the flexibility and fluidity of users' interactions with an augmented reality system (an online shopping platform) to facilitate their achievement of various tasks within the digital environment. These items will be merged to create a composite variable of technology fluidity, as shown in Table 3.4.

Attitudes

Yim et al. (2017) measured consumers' attitudes toward media from three items: unfavorable or favorable, bad or good, unpleasant or pleasant, and negative or positive, and confirmed that the more positive the consumers' attitudes toward AR, the higher the consumer's intention to buy the products on display. Moreover, Pantano et al. (2017) drew on Ahn et al. (2004) and measured attitudes from five items: positive, interesting, makes sense, good idea, and other people should use when studying AR virtual try-on, and the reliability and validity of the scales are high. In addition, attitudes toward augmented reality-based apps refer to the feelings associated with using such apps (Daassi & Debbabi, 2021). According to this, items from Ahn et al. (2004) and Pantano et al. (2017) are most relevant to the concept of attitude in the current study. Therefore, in the current study, attitudes toward AR adapted from Ahn et al. (2004) and Pantano et al. (2017) will be measured utilizing 5 items and utilizing a 7-point Likert scale (ranging from 1 = strongly disagree to 7 = strongly agree), as shown in Table 3.5.

Table 3.5 Measurement scale of attitude towards AR (ranging from 1 = strongly disagree to 7 = strongly agree)

Latent Variable	Labels	Items	Adapted from
Attitudes	A1	I am positive about the APP with AR function (without AR function).	Ahn et al. (2004)
	A2	The use of the APP with AR function (without AR function) is a good idea.	
	A3	It just makes sense to use the APP with the AR function (without the AR function).	Pantano et al. (2017)
	A4	The APP with AR function (without AR function) is so interesting that I just want to learn more about it.	
	A5	I would recommend the APP with AR function (without AR function) to others.	

Perceived Information Quality

While investigating the application of augmented reality to enhance online decision-making processes, Ahn et al. (2004) measured information quality from the items of information that are expected, provide detailed information, provide complete information, and provide useful information. According to Poushneh (2018), perceived information quality refers to AR's ability to generate useful, trustworthy, personalized, and reliable virtual content for users. AR virtual try-on allows products to be tailored to consumers. In addition, based on adapting the scale of Ahn et al. (2004), Pantano et al. (2017) measured information quality from the items of information that are expected, provide detailed information, provide complete information, provide information that is useful, and information provided helps to make the decision. Therefore, based on the aforementioned research findings, this study constructs a perceived information quality structure including 6 items of expected, trustworthy and reliable, personalized, detailed information, and complete information, and helps to make decisions in the AR shopping situation as the substructure of cognitive response. Perceived information quality adapted from maturity scales from Pantano et al. (2017) will be measured using 6 items and utilizing a 7-point Likert scale (ranging from 1 = strongly disagree to 7 = strongly agree), as shown in Table 3.6.

Table 3.6 Measurement scale of perceived information quality (ranging from 1 = strongly disagree to 7 = strongly agree)

Latent Variable	Labels	Items	Adapted from
Perceived Information Quality	PIQ1	The APP with AR function (without AR function) provided me with the information I expected.	Ahn et al. (2004)
	PIQ2	The APP with AR function (without AR function) provides trustworthy and reliable information about shoes.	
	PIQ3	The APP with AR function (without AR function) provides detailed information about shoes.	
	PIQ4	The APP with AR function (without AR function) provides complete information about shoes.	
	PIQ5	The APP with AR function (without AR function) provides personalized information about shoes.	Pantano et al. (2017)
	PIQ6	The APP with AR function (without AR function) provides information that helps me make decisions.	

Immersion

Several scholars, such as Kowalczuk et al. (2021) and Yim et al. (2017) have assessed immersion in the AR shopping context by examining three core dimensions: the extent to which users feel engrossed, absorbed, and focused during their interaction with virtual product displays. Immersion, in this context, reflects the depth of users' psychological and perceptual engagement—indicating how fully they are drawn into the AR experience (Yim et al., 2017). Building on these prior conceptualizations, the present study adopts the operationalization of immersion from Yim et al. (2017) as a reference framework. Accordingly, immersion will be measured using three items: whether the respondent felt engrossed, absorbed, and focused during the AR interaction. Each item will be rated on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree), to capture the degree of immersive experience. The detailed measurement items are presented in Table 3.7.

Table 3.7 Measurement scale of immersion (ranging from 1 = strongly disagree to 7 = strongly agree)

Latent Variable	**Labels**	**Items**	**Adapted from**
Immersion	I1	Shopping on the APP with the AR function (without the AR function) made me deeply engrossed.	Yim et al. (2017)
	I2	Shopping on the APP with AR function (without AR function) makes me absorbed.	
	I3	Shopping on the APP with AR function (without AR function) focused my attention.	

Enjoyment

According to Hans (2004), enjoyment signifies the extent to which consumers derive entertainment from the pursuit of hedonic information technology systems. Within the realm of mobile social media platforms, the experience of enjoyment plays an important role in better understanding user behavior (Kim et al., 2017). In particular, in the virtual world, enjoyment was conceptualized as enjoyable, exciting, pleasant, and interesting characteristics (Guo & Barnes, 2011). In the VR tourism context, Myung et al. (2020) drew on Guo and Barnes (2011) and constructed an enjoyment structure including 4 items: enjoyable, pleasurable, funny, and happy as a substructure of affective response. In the AR context, Plotkina and Saurel (2019) conceptualized enjoyment as fun, involved, exciting, and enjoyable. In addition, Kowalczuk et al. (2021) and Yim et al. (2017) also measured enjoyment from 3 items: enjoyable, pleasurable, and funny in the AR shopping context. The aforementioned measurement scales exhibit commendable levels of reliability and validity. Building upon the foundation laid by prior research, this study will construct an enjoyment structure including six items of enjoyable, pleasurable, fun, happy, involved, and exciting in the AR shopping situation as the substructure of affective response. Enjoyment, adapted from Guo and Barnes (2011) and Plotkina and Saurel (2019), will be measured utilizing 6 items and utilizing a 7-point Likert scale (ranging from 1 = strongly disagree to 7 = strongly agree), as shown in Table 3.8.

Purchase Intention

Currently, within the AR shopping environment, the measurement of purchase intention appears relatively standardized. For instance, both Kowalczuk et al. (2021) and Yim et al. (2017) measured purchase intention based on items indicating degrees of uncertainty or certainty, unlikelihood or likelihood, improbability or probability, and impossibility or possibility. Moreover, other scholars have measured purchase intention through items such as intend to buy, probability to buy, plan to buy, consider to buy, and willingness to buy (Angella & Kim, 2016; Pessoa et al., 2022; Poushneh, 2017). All the measurement items employed by the aforementioned scholars effectively capture the subjective inclination of consumers toward purchasing a particular product and have successfully undergone rigorous tests for both validity and reliability. Consequently, in alignment with the methodologies utilized by Angella and Kim (2016), this study will measure purchase intention utilizing items such as intend to buy, probability to buy, plan to buy, consider to buy, and willingness to buy. Purchase intention, adapted from Angella and Kim (2016), will be measured using 5 items and utilizing a 7-point Likert scale (ranging from 1 = strongly disagree to 7 = strongly agree), as shown in Table 3.9.

Table 3.8 Measurement scale of enjoyment

Latent Variable	Labels	Items	Adapted from
Enjoyment	E1	Shopping on the APP with AR function (without AR function) is enjoyable.	Guo and Barnes (2011)
	E2	Shopping on the APP with AR function (without AR function) is pleasurable.	
	E3	Shopping on the APP with AR function (without AR function) is fun for its own sake.	
	E4	Shopping on the APP with AR function (without AR function) is happy.	
	E5	Shopping on the APP with AR function (without AR function) involves me in the shopping process.	Plotkina and Saurel (2019)
	E6	Shopping on the APP with AR function (without AR function) is exciting.	

Table 3.9 Measurement scale of purchase intention (ranging from 1 = strongly disagree to 7 = strongly agree)

Latent Variable	Labels	Items	Adapted from
Purchase Intention	PI1	I intend to buy my shoes on the APP with AR function (without AR function).	Angella and Kim (2016)
	PI2	The probability that I would consider buying the shoes on the APP with the AR function (without the AR function) is very high.	
	PI3	If I plan to buy shoes, I would very probably buy them on the APP with AR function (without AR function).	
	PI4	I would consider to buy the shoes on the APP with the AR function (without the AR function).	
	PI5	My willingness to buy shoes on APP with AR function (without AR function) is high.	

3.2.4.3 Questionnaire Structure

The quality of the measurement used in the study is very important for obtaining true, effective, and reliable research conclusions. To some extent, the quality of the measurement determines the validity of the final data obtained from the survey and then affects the correctness and reliability of the final conclusions of the whole study. In order to ensure that the measurement used in the study can truly reflect the objective situation of the object of study, according to the suggestions of Churchill Jr (1979) and Anderson and Gerbing (1988), the initial items of this study are formed through the following procedures. Firstly, according to the preliminary theoretical framework established in this study, extensive reading of foreign literature related to variables in this study is needed to find a mature measurement suitable for this study. For example, the scale of perceived augmented realism is mainly adapted from Baños et al. (2000), the scale of perceived technology fluidity is mainly adapted from Lin (2008), the scale of attitude towards AR is mainly adapted from Ahn et al. (2004) and Pantano et al. (2017), the scale of perceived information quality also adapted from Ahn et al. (2004) and Pantano et al. (2017), the scale of immersion mainly adapted from Yim et al. (2017), the scale of enjoyment mainly adapted from Guo and Barnes (2011) and Plotkina and Saurel (2019) and the scale of purchase intention mainly adapted from Angella and Kim (2016).

The questionnaire is divided into two segments. The first segment encompasses inquiries related to demographic information about the respondents. The second segment is dedicated to questions associated with the study constructs. The questionnaire is designed and employs closed-ended questions. All items within the questionnaire will be measured utilizing a 7-point Likert scale, spanning from 1 = strongly disagree to 7 = strongly agree. The scale is delineated as follows: 1 = strongly disagree, 2 = disagree, 3 = moderately disagree, 4 = neutral (agree), 5 = moderately agree, 6 = agree, and 7= strongly agree. The measurement items are in English in the original version and will be translated into Chinese version by a professor or instructor who is an expert both in Mandarin and English. This study follows a back-translation procedure (Brislin, 1980) from another bilingual academic to ensure equivalence of the measures in the Chinese and the English versions. The questionnaire is structured as shown in Table 3.10.

Table 3.10 Questionnaire Structure

Variables	**Total Questions**	**Form/ Variable**
Screening Question	1	Nominal Variable
Part 1: Personal data of the respondents		
1.1 Gender	1	Nominal Variable
1.2 Age	1	Interval Variable
1.3 Current level of education	1	Ordinal Variable
1.4 AR experience (Whether have previous AR shopping experience)	1	Nominal Variable
Part 2: Questions about latent variables		
2.1 Perceived Augmented Realism	6	Ratio Variables
2.2 Perceived technology fluidity	8	
2.3 Attitude	5	
2.4 Perceived information quality	6	
2.5 Immersion	3	
2.6 Enjoyment	6	
2.7 Purchase Intention	5	

3.2.4.4 Translation and Back Translation of Questionnaire

This method enhances the reliability and validity of translated questionnaires, ensuring that they consistently measure the same constructs across different languages and cultural contexts. Kamrani and Ali (2011) summarized the advantages of back translation. This translation process includes the following stages:

Translation: First, a bilingual expert translates the questionnaire from the source language (e.g., English) into the target language (e.g., Chinese).

Back Translation: After the initial translation, a second bilingual expert, who has not seen the original questionnaire, translates the document back from the target language to the source language.

Comparison: The original questionnaire is then compared with the back-translated version to identify any discrepancies or differences in meaning. This step ensures that the translated questionnaire accurately reflects the original content and that no significant concepts have been lost or altered during translation.

Adjustment: If discrepancies are found, the translation is adjusted, and the process may be repeated until the back-translated version closely matches the original questionnaire, ensuring that the final translated version is both accurate and culturally appropriate.

To ensure the reliability and authenticity of the questionnaire, the author will invite experts proficient in Chinese and English to translate the scale into Chinese and then send them to Chinese language teachers majoring in Chinese language and literature to check the meanings and context to confirm that they make sense and are easy to understand. Then, all questionnaires in Chinese will be translated back to English by the bilingual linguist who has been engaged in language research and teaching for many years. That means all scales and questions used in this study will be translated into Chinese and then back to English to try to make each of them clear and flawless by utilizing the method of back-translation (Brislin, 1980). At the same time, to ensure the accuracy of translation and avoid misunderstandings with Western culture and language use, several English professionals will be invited to review the questionnaire, which will achieve the same results and ensure that the subjects understand all the questions in the questionnaire.

3.2.4.5 Quality of Research Instrument

A sample questionnaire will be distributed to four experts within the Thai educational domain and one expert from China. They will critically evaluate the questionnaire to ascertain its comprehensive coverage of essential topics and ensure that respondents possess an adequate grasp of the subject matter, utilizing language accessible to them. This process aims to gauge the quality of the questionnaires. Following this expert review, the questionnaires will be subjected to empirical testing to ensure validity and reliability. This step is critical to ensure that the instrument accurately measures the intended constructs and consistently produces reliable data. The detailed information and qualifications of the five experts involved in this evaluation process are presented in Table 3.11.

Table 3.11 Names of experts validating the questionnaire via IOC method

No.	Name-Surname	Position
1	Assoc.Prof.Dr.Krisda Tanchaisak	Vice president of Ramkhamhaeng University.
2	Dr.Navidreza Ahadi	Lecturer at the College of Creative Industry, Srinakarinvirot University.
3	Dr.Jiaohao Chen	Lecturer at the Business School, Guangxi University.
4	Dr.Sarist Gulthawatvichai	Lecturer at the KMITL Business School.
5	Dr.Vasu Keerativutises	Lecturer at the KMITL Business School.

Validity

Content Validity

Each question in the questionnaire will be rated by five experts. For each query, the score value is then averaged to calculate the Index of Item-Objective Congruence (IOC). It is preferable if each query has an IOC of 0.6 or higher.

Score+1 = if the expert is certain that the item accurately calculates the attribute

Score 0 = if the expert is not certain that the item accurately calculates the attribute

Score -1 = if the expert is certain that the object does not calculate the attribute

According to Champabhoti and Sae-Joo (2019), the content validity formula is as follows.

$IOC = \frac{\Sigma R}{N}$

R = Congruent score

N = number of experts

1 = Congruent

0 = Questionable

-1 = Incongruent

The Index of Item-Objective Congruence (IOC) score ranges from -1 to +1, where values closer to +1 indicate a higher degree of agreement among experts regarding the relevance and appropriateness of an item in measuring a specific objective (Wuthisuthimethawee et al., 2021). The criteria for judging content validity are shown in Table 3.12.

Table 3.12 The criteria for judging content validity

IOC score	**Analysis result**
0.6≤ IOC score ≤1	Passed/ The item has a high consistency with the research objectives
0.5≤ IOC score ＜ 0.6	Unpassed/ The item must be reviewed
IOC score ＜ 0.5	Unpassed/ The item must be eliminated.

Construct Validity

Instrument validity establishes that the items used to measure the intended concept are supposed to be measured. The researcher has provided insight into the instrument's validity by stating that it should evaluate the correct concept (Bougie & Sekaran, 2019). Concerning the validation of the questionnaire structure, this study primarily employs factor analysis. Before conducting factor analysis, the Kaiser-Meyer-Olkin (KMO) test and Bartlett test are imperative to ensure the questionnaire's suitability for factor analysis. The KMO statistic ranges from 0 to 1. Higher values indicate more suitable data for factor analysis. Typically, a KMO value above 0.6 or 0.7 is considered acceptable, suggesting that the variables are interrelated enough for factor analysis to be meaningful.

Reliability

The reliability and validity analysis of the questionnaire is to ensure the validity and accuracy of the questionnaire design and then to ensure that the collected data can accurately reflect the actual situation to ensure the accuracy and validity of the research. Reliability mainly refers to the consistency, reliability, and stability of measurement items. In this study, the constructs of perceived augmented realism, perceived technology fluidity, cognitive (attitudes and perceived information quality), affective (immersion and enjoyment), and purchase intention will be incorporated for investigation. All of the constructs' scale items used to measure these constructs will be taken from previously published research. In this study, the Cronbach-α coefficient will be used to measure the reliability of the questionnaire and to evaluate the consistency of items within the questionnaire. In general, the larger the coefficient, the higher the reliability of the expression and the more stable the questionnaire, as shown in Table 3.13.

Table 3.13 Cronbach-α coefficient

Cronbach's Alpha	**External Consistency**
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good

Table 3.13 (Continue)

Cronbach's Alpha	External Consistency
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Source: Gliem and Gliem (2003).

Cronbach's Alpha, a measure of internal accuracy, can be used with a rating scale and is measured as follows (Cronbach, 1951).

$$\alpha = \frac{K}{K-1}\left[1 - \frac{\sum S_i^2}{S_t^2}\right]$$

α = Coefficient of reliability

k = the number of items or indicators in the instrument

S_i^2= the variance of each item

S_t^2= the variance of the total score

Interpretation: High reliability is described as reliability coefficients or Cronbach's Alpha Coefficients of 0.70 or higher calculated from at least 30 sets of a standard version of the experiment questionnaire (Cronbach, 1951; Hair et al., 2010). The validity and reliability of this research will be illustrated more in Chapter 4.

3.2.5 Data Collection

3.2.5.1 Primary Data

After completing the AR virtual try-on experiment, subjects will be asked about their experience with/without AR virtual try-on. The evaluation of the experience with/without AR virtual try-on will be gauged through the following constructs: perceived technology fluidity and perceived augmented realism, cognitive and affective responses, and purchase intention. The data will be collected online by a Chinese online questionnaire designing platform, "Wen JuanXing," because online survey techniques can reduce sampling error and bias, make it more convenient, easy to administer, and assess the population characteristics (Fornell & Larcker, 1981). Therefore, a well-designed and structured questionnaire is essential to minimize errors. A self-administered online survey technique will be utilized to collect the necessary data in this study. The rationale for selecting this approach is that it is a time-consuming and low-cost procedure. The online survey is effective for explanatory research (Zikmund et al., 2013). The questionnaire has integrated all the study construct items into a single questionnaire to ask about the entire study phenomenon. The specific operations are as follows:

Step 1: The questionnaire will be created in “Microsoft Word".

Step 2: A Chinese online questionnaire designing platform, "Wen JuanXing," will be used to develop an online link and Quick Response (QR) code for further administration.

Step 3: After the experiment, participants will receive the questionnaire link or QR code to facilitate data collection. Online surveys will automatically collect and store participant responses.

Step 4: The completeness of the questionnaire will be examined and evaluated, followed by the cleaning of actual data and later analysis.

3.2.5.2 Secondary Data

The secondary data consists of information sourced from various outlets, encompassing books, academic sources, theories, concepts, statistical data, journals, articles, and other publications by both domestic and foreign scholars. The research objectives and hypotheses of the study are derived from an analysis of secondary source data, and the findings of the data analysis will be discussed in the discussion sections.

3.2.6 Data Analysis

Upon the receipt of questionnaires from all participants in the experiment, a thorough examination will ensue to ascertain their accuracy, validity, and reliability. This process encompasses the elimination of missing data, identification, and removal of outliers, along with any values incongruent with the overall dataset. The study adhered to a 5 percent level of significance, signifying a statistical alpha (α) of 0.05. The SPSS software will be primarily utilized for descriptive statistics, normality tests, correlation analysis, and reliability analysis. The Structural Equation Model (SEM) will be used to test the model fit and hypotheses. According to Zhang Yunlai’s research and summary in 2006, we can understand that (1) SEM not only deals with the measurement of latent variables but also with the structure of latent variables in the same model; (2) SEM can deal with many related problems at the same time. (3) SEM makes the whole model fit reasonably.

That means SEM, as a multivariate technique, can simultaneously deal with many interrelated latent variables and relationships (Esbensen et al., 2002). Therefore, the SEM is very suitable for checking the design proposed in this study. In this study, the theoretical model is quite complicated and contains 7 latent variables as well as a great many items, so with the help of the SEM, it could be measured correctly, properly, and simultaneously. Another one of the main strengths of SEM is its ability to test the fit or the matching of the model and data. If we have the model with a good fit or it is acceptable, the assumed hypotheses or the relationships between latent and observed variables are considered as being supported by the data. SEM is regarded as the confirmatory factor analysis (CFA) model (Nuckols, 1953). That is another reason why this study employs SEM as a means to assess model fit, thereby determining whether the collected data substantiates the assumed model. In SEM, three major analyses will be carried out:

The first analysis is the measurement model and structural model test, which encompasses a model goodness-of-fit test and an evaluation of latent variables, specifically examining the impact of independent variables on dependent variables as postulated by the stated hypotheses. This analysis will be conducted separately for data from two groups of experiments (APP with AR and without AR).

The second objective involves a multi-group SEM analysis, comparing the statistics of two experimental groups (APP with AR and without AR). This multi-group analysis aims to assess whether there is a discernible difference between the two groups concerning the relationship between independent and dependent variables in the study.

The third analysis will evaluate the effects of the mediating variables (attitudes, perceived information quality, immersion, and enjoyment) on the relationship between the latent independent variables and the latent dependent variable(s). This analysis will be conducted for both two groups of experiments (APP with AR and without AR).

3.2.6.1 Descriptive Statistics

Descriptive statistics involves calculating characteristics of the variables used in the data, such as mean， mode, median， standard deviation， percentiles， skewness， kurtosis, and maximum and minimum values. The purpose of conducting the descriptive analysis is to understand the characteristic behavior of the data before engaging in deep statistical analysis.

In this study, effective questionnaires will be collected from the formal survey, including basic information about the subjects, such as age, gender, major of study, and prior experience (whether the participants have AR shopping experience). The distribution statistics of percentage and sample frequency will be carried out. In descriptive statistical analysis of perceived augmented realism, perceived technology fluidity, cognitive (attitudes and perceived information quality), affective (immersion and enjoyment), and purchase intention, the mean and standard deviation will be calculated to understand the basic characteristics of sample data.

3.2.6.2 Normality Test

The diagnostic tests will be conducted to assess the statistical validity of the data. Some of the diagnostic tests include a Normality Test, which is based on Greene (2008) argument that the error terms in linear regression should follow a normal distribution. The normality tests will be performed using Skewness and Kurtosis, as suggested by Dufour et al. (2003).

Skewness interpretation: Skewness is a statistical measure used to quantify the degree of asymmetry in the probability distribution of a real-valued random variable relative to its mean. Skewness can take on positive, zero, negative, or, in certain cases, undefined values, reflecting the direction and extent of deviation from a symmetrical distribution.

The interpretation of skewness values is summarized in Table 3.14. Typically, an absolute skewness value of less than or equal to 0.5 is regarded as indicative of an approximately symmetrical or acceptable level of skewness. Conversely, an absolute skewness value greater than 1 indicates a substantial deviation from normality, reflecting significant asymmetry in the data distribution. This may violate the assumptions of parametric tests, warranting further examination and, if necessary, data transformation or the use of non-parametric methods to ensure valid statistical analysis.

Table 3.14 Table Interpretation of Skewness

Skewness	**Distribution shape of data**	**Interpretation**
< 0	Left or negative distribution	The tail on the left side of the distribution is longer or fatter than the tail on the right side. The mean and median will be less than the mode.
0	Normal distribution	Data are symmetrically distributed.
> 0	Right or positive distribution	The tail on the right side of the distribution is longer or fatter. The mean and median will be greater than the mode.

Source: Dufour et al. (2003)

Kurtosis interpretation: Kurtosis, derived from the Greek words "kyrtos" or "kurtos," signifying "curved" or "arching," respectively, serves as a measure of the "tailedness" exhibited by the probability distribution of a real-valued random variable within the domains of probability theory and statistics. Kurtosis interpretation as shown in Table 3.15. In general, an absolute kurtosis value within ±1 is considered acceptable, indicating that the data distribution does not significantly deviate from normality in terms of peakedness. A kurtosis value greater than 1 suggests a leptokurtic distribution, characterized by a sharper peak and heavier tails than the normal distribution, implying more extreme values. Conversely, a kurtosis value less than 1 indicates a platykurtic distribution, which is flatter and has lighter tails, suggesting fewer extreme values. Assessing kurtosis is essential in evaluating the suitability of data for parametric statistical analyses.

Table 3.15 Interpretation of Kurtosis

Kurtosis	**Distribution shape of data**	**Interpretation**
< 3 (or Kurtosis – 3< 0)	Platykurtic	Data disperse out of the mean and distribution has thinner tails.
3 (or Kurtosis – 3= 0)	Mesokurtic	Data exhibit a normal distribution.
> 3 (or Kurtosis- 3>0)	Leptokurtic	The data center around the mean and distribution has fatter tails.

Source: Dufour et al. (2003).

3.2.6.3 Correlation Analysis

In this investigation, Pearson correlation analysis will be employed to scrutinize the associations among perceived augmented realism, perceived technology fluidity, cognitive factors (attitudes and perceived information quality), affective factors (immersion and enjoyment), and purchase intention. This analytical approach aims to substantiate and quantify the interrelationships among these variables. Pearson's Correlation Analysis will be conducted to evaluate the correlation between and among the study variables. This is a basic analysis of the SEM.

The Pearson Product-Moment Correlation Coefficient (PPMCC) values for observed variables range from -1 to 1. A positive sign indicates that two observed variables are positively related, while a negative sign indicates a negative relationship between the variables. The correlation analysis consideration criteria are presented below in Table 3.16.

Table 3.16 Levels of the correlation coefficient

Correlation Coefficient (r)	**Levels of relationships**
$\|r_s\| \geq 0.8$	Very high
$0.6 \leq \|r_s\| \leq 0.8$	Quite high
$0.4 \leq \|r_s\| \leq 0.6$	Moderate
$0.2 \leq \|r_s\| \leq 0.4$	Quite low
$\|r_s\| \leq 0.2$	Low

Source: Massey Jr (1951).

3.2.6.4 Measurement Model Assessment

The primary goal of measurement model assessment is to verify whether observed variables (or measurement indicators) accurately reflect their respective latent constructs (latent variables or factors), focusing on verifying the reliability and validity of the measurement instruments, ensuring that observed variables accurately reflect their latent constructs.

1. Model Fit Test: CFA

Absolute Fit Indices: Indicators of how well the research model aligns with empirical data, such as the p-value of Chi-square (χ^2), Relative Chi-square (χ^2/df), Goodness of Fit Index (GFI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA).

Incremental Fit Indices: Measures of how well the estimated research model compares to a baseline model assuming uncorrelated observed variables, including the Incremental Fit Index (IFI), Comparative Fit Index (CFI), and Normed Fit Index (NFI).

Parsimony Fit Indices: Indicators aiding in selecting the most appropriate model among competing models based on their relative complexity and goodness of fit, such as the Adjusted Goodness of Fit Index (AGFI). Further elaboration is provided in Table 3.17.

2. Internal Reliability and Validity

Furthermore, in SEM, different statistical indicators are used to assess the quality of the measurement model, including internal consistency (reliability), cohesion (convergent validity), and discrimination (discriminant validity) of the constructs.

Internal reliability: According to Hair et al. (2010), reliability is measured by Composite Reliability (C.R. > 0.7) and Cronbach's alpha (α) values ($\alpha > 0.7$), which indicates the shared variance among the set of observed variables of a latent variable (internal consistency reliability). The calculation formula of Composite Reliability is as follows.

$$\text{C.R.} = \frac{(\sum \text{Standardized factor loading})^2}{[\,(\sum \text{Standardized loading})^2 + \sum \text{Variance(error)}\,]}$$

Variance(error) = variance of the error term for the ith indicator.

Convergent validity: Assesses the degree of coherence among a set of observed variables in representing their respective latent constructs. A crucial indicator of convergent validity is the standardized factor loading, whereby each observed variable should exhibit a loading greater than 0.7, signifying its strength within the measurement model (Hair et al., 2010). Furthermore, to evaluate convergent validity, the Average Variance Extracted (AVE) for each latent variable should be equal to or greater than 0.5. This indicates that the observed variables effectively converge to represent their latent constructs (Hair et al., 2010). The formula for calculating AVE is as follows.

$$\text{AVE} = \frac{\sum \text{Standardized factor loading}^2}{[\sum \text{Standardized factor loading}^2 + \sum \text{Variance(error)}]}$$

Communality or Common Variance= ∑Standardized factor loading

Discriminant validity: On the other hand, examines whether distinct constructs are indeed measuring different underlying phenomena. This involves assessing the relationship between measures from different constructs, which should demonstrate minimal correlation. Specifically, the square root of the AVE for each construct is greater than the correlation coefficients between that construct and other constructs (AVE) (Hair et al., 2010). This criterion ensures that measures of disparate constructs remain distinct and do not overlap excessively, thus affirming discriminant validity. The formula for calculating the square root of AVE is as follows.

$$\text{Square Root of AVE} = \sqrt{\text{AVE}}$$

3.2.6.5 Structural Model Assessment

In SEM, the structural model assessment involves the systematic evaluation of the hypothesized relationships between latent variables. This process aims to determine whether the proposed causal or correlational paths among latent constructs are empirically supported by the data. The structural model, as a core component of SEM, specifies how latent variables influence one another—either directly or indirectly—and how these influences contribute to explaining variations in observed outcomes. Unlike the measurement model, which focuses on the reliability and validity of the constructs, the structural model emphasizes theoretical relationships grounded in prior literature or hypotheses.

Structural model assessment encompasses several key components. These include the significance and strength of path coefficients, the directionality and plausibility of hypothesized relationships, and the overall explanatory power of the model, often reflected in metrics such as R^2 values for endogenous constructs. In addition, the global model fit is evaluated using indices such as the Chi-square statistic, RMSEA, CFI, TLI, and SRMR, to determine how well the proposed model aligns with the empirical data. Together, these assessments provide a comprehensive understanding of whether the structural model adequately captures the underlying theoretical framework and whether it offers meaningful insights into the relationships among the latent constructs.

1. Model Fit Test

Model fit indices (such as χ^2, RMSEA, CFI, etc.) are also important indicators for evaluating the fit of the structural model. These indices assess the overall fit between the structural model and the data, including relationships between latent variables and between latent variables and observed variables.

Chi-Square Test (χ^2): This statistic tests whether the observed covariance matrix significantly differs from the model-implied matrix. A non-significant p-value ($p > 0.05$) suggests a good model fit. However, due to its sensitivity to large sample sizes, it is often supplemented by other indices.

Chi-Square to Degrees of Freedom Ratio (χ^2/df): This ratio adjusts the chi-square value by the model's degrees of freedom. A value less than 3.0 is generally considered acceptable, and values below 2.0 indicate a good fit.

Root Mean Square Error of Approximation (RMSEA): RMSEA accounts for model complexity and approximation error. Values below 0.08 indicate a reasonable fit, while values under 0.05 suggest a close fit to the data.

Comparative Fit Index (CFI): CFI compares the fit of the hypothesized model to a null model. Values greater than 0.90 reflect a good fit, with values above 0.95 indicating excellent fit.

Tucker-Lewis Index (TLI): TLI adjusts for model complexity, and like CFI, values above 0.90 are considered acceptable.

Standardized Root Mean Square Residual (SRMR): SRMR measures the average discrepancy between observed and predicted correlations. Values below 0.08 represent a good fit, and those below 0.05 indicate very good fit.

2. Estimation and Significance Testing of Path Coefficients

Estimation and significance testing of path coefficients are crucial steps in SEM. The estimation process involves determining the strength and direction of relationships between latent variables, typically using maximum likelihood estimation or other robust methods. Significance testing evaluates whether these estimated path coefficients are statistically significant, often using t-tests or p-values. Generally, a p-value < 0.05 is considered statistically significant. These tests help to ascertain the reliability and validity of the hypothesized model relationships, ensuring that the paths are not only strong but also statistically meaningful. Furthermore, if the structural model includes assumptions about causal relationships, meaning that one latent variable directly influences another, it is necessary to test these causal relationships. This can be achieved by examining the signs and significance of the path coefficients, which provides insights into the strength and validity of the proposed causal links within the model (Hair et al., 2010).

3. Model Explanatory Power

In this study, SEM will be used to evaluate the fit between the conceptual research framework and empirical data, with multiple fit indices considered to assess model adequacy and validity, as shown in Table 3.17. First, Chi-square (χ^2) will test the overall consistency between the model and data. A p-value greater than 0.05 suggests a good fit. To account for sample size effects, Relative Chi-square (χ^2/df or CMIN/df) will be used, with values below 2.00 indicating a well-fitting model. Next, the Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI) will be applied to evaluate the model's overall fit, considering model complexity. Both indices are expected to exceed 0.90, signifying a good fit. For residual fit indices, Standardized Root Mean Square Residual (SRMR) and Root Mean Square of Approximation (RMSEA) will be employed to evaluate unexplained covariance. SRMR values below 0.05 and RMSEA values under 0.05 suggest small residuals and a good fit. In addition, Incremental Fit Index (IFI), Comparative Fit Index (CFI), Normed Fit Index (NFI), and Tucker-Lewis Index (TLI) will be assessed. These indices compare the fit of the hypothesized model to the baseline model (which assumes no correlations between observed variables). Values greater than 0.90 for each index indicate a strong relative fit. Finally, Factor Loadings (FL) will be evaluated to measure the strength of relationships between observed and latent variables. A value greater than 0.50 indicates strong explanatory power, ensuring good convergent validity.

Table 3.17 SEM Statistical Criteria for Research Model

Statistics	**Symbol**	**Objectives**	**Accepted level**
Chi-square	X^2	To test the null hypothesis that the conceptual research framework model is overall fit empirical data.	Ns. ($p>0.05$)
Relative Chi-square	X^2/df or CMIN/df	To test the consistency between the conceptual research framework model and empirical data.	< 2.00
Goodness of Fit Index	GFI	To measure the goodness of fit of SEM as a whole	> 0.9
Standardized Root Mean Square Residual	Standardized RMR (SRMR)	The SRMR evaluates unexplained covariance by calculating the square root of the discrepancy between the sample covariance matrix and the model's predicted covariance matrix. SRMR values range from 0 to 1.	< 0.05
Root Mean Square of Approximation	RMSEA	To show conceptual framework errors in for of RMSEA between 0-100	< 0.05

Table 3.17 (Continue)

Statistics	Symbol	Objectives	Accepted level
Incremental Fit Index	IFI	To test how well the estimated model fits the baseline (null model) that assumes all observed variables are uncorrelated regardless of sample size.	> 0.90
Comparative Fit Index	CFI	To analyze the model fit by examining the discrepancy between the empirical data and the hypothesized model. Values range between 0-1.00.	> 0.90
Normed Fit Index	NFI	To analyze the discrepancy between the chi-squared value of the hypothesized model and the chi-squared value of the null mode.	> 0.90
Tucker Lewis Index	TLI	To measure TLI, between 0-1.00	> 0.90
Adjusted Goodness of Fit Index	AGFI	To evaluate the overall goodness of fit of SEM by considering differing degrees of model complexity by penalizing more complex models and favoring those with a minimum number of free paths. AGFI values range between 0-1.	> 0.90
Factor Loadings	FL	To measure the strength of the relationship between observed and latent variables	> 0.50

Source: Wheaton et al. (1977)

3.2.6.6 Mediation Effect Test

There are several ways to test mediating effects based on the literature review. Commonly, the BK method, Sobel, and bootstrapping are used and recommended. A large amount of recent methodological literature recommends using the bootstrap method for examining indirect effects (e.g., MacKinnon, 2012; Mallinckrodt et al., 2006; Preacher et al., 2007). Bootstrapping is a non-parametric resampling method for assessing and testing the effects of the sample statistics and observations (Preacher et al., 2007; Shrout & Bolger, 2002). Shrout and Bolger (2002) believed that bootstrapping was useful and strong enough when the data distribution of the mediation effects was nonzero or skewed. Cheung and Lau (2008) continued the study of MacKinnon (2012) and stated that bootstrapping could yield better results than the Sobel test. Those researchers also believed that the bootstrapping method is more useful if there is no specific information on the sample distribution.

Shrout and Bolger (2002) elucidated the procedural steps of the bootstrap percentile method for scrutinizing the mediation effect in the following manner:

Step 1: In an original data set consisting of N observations, a desired number of bootstrap samples are created by randomly replacing observations. In other words, create a desired number of bootstrap samples by randomly selecting N observations with replacements from the original dataset. Each bootstrap sample is of the same size as the original dataset but may contain duplicated observations.

Step 2: For each bootstrap sample, a, b, and ab are calculated, and the results are saved. The details are as follows: "a" represents the effect of the independent variable (IV) on the mediator variable (MV). "b" represents the effect of the mediator variable (MV) on the dependent variable (DV). "ab" is the product of the "a" and "b" coefficients and represents the indirect effect of IV on DV through MV. Then, save the calculated ab value for each bootstrap sample.

Step 3: Steps 1 and 2 are repeated j times. This results in j estimates of the indirect effect (ab), each based on a different bootstrap sample.

Step 4: The distribution of the estimates is examined, and if α=0.5, ab values and confidence intervals for the 2.5 and 97.5 percentiles of the distribution are determined.

By performing this bootstrap resampling and calculating the indirect effect for each sample, this study can estimate the distribution of the indirect effect under the null hypothesis (no mediation effect) and determine a confidence interval to assess the significance of the mediation effect. The bootstrap percentile method is a robust and flexible approach for mediation analysis, especially when dealing with non-normally distributed data or complex models. The mediation effect testing model is shown in Figure 3.4.

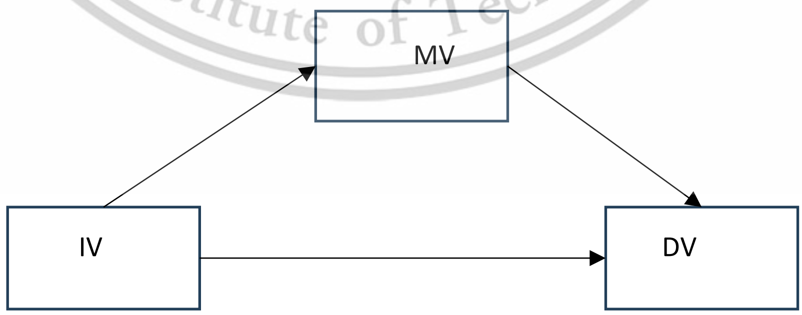


Figure 3.4 The mediation effect testing model

3.2.6.7 Multi-group Structural Equation Model Analysis

Multi-group Structural Equation Modeling (SEM) is an analytical method for assessing the invariance between two groups. Multi-group SEM analysis presupposes that the two sample groups are independent. For this study, the multi-group analysis focused on evaluating whether the difference in the effect of the independent variables on the dependent variable is significant in the AR and non-AR conditions. Therefore, two groups will be compared, where Group 1 (APP with AR) has a sample size of 200 participants while Group 2 (APP without AR) has a sample of 200 participants. According to Byrne (2013), the operation steps of multi-group SEM are as follows:

Step 1: Establishing Multiple Group Models: For each group, construct an independent structural equation model, which may include parameters such as paths, factor loadings, covariances, etc., either identical to or distinct from the baseline model.

Step 2: Assessing the Fit of Multiple-Group Models: Conduct separate fit assessments for each group's model using common fit indices such as CMIN/DF, RMSEA, CFI, TLI, etc. Ensure adequate fit for each model within individual groups.

Step 3: Conducting Parameter Invariance Tests: Perform parameter invariance tests on the multiple-group models to ascertain whether the parameters in the model exhibit invariance across different groups. Common tests for parameter invariance include configural invariance, metric invariance, and error variance invariance.

Step 4: Comparing Differences Between Models: Compare model parameters between different groups, such as path coefficients, factor loadings, intercepts, etc., to identify structural disparities among the models across different groups. Typically, employ difference testing methods for parameter estimation (e.g., Wald tests or Likelihood Ratio Tests).

Step 5: Interpreting Differences and Consistencies: Analyze the reasons behind model disparities and explicate the consistencies and discrepancies among models across different groups.

Step 6: Reporting Findings: Thoroughly document comparative findings, including model fit, parameter estimation, and results of difference testing, ensuring a clear presentation of differences and consistencies among models across different groups.

Through the aforementioned steps, a comparison of multiple-group SEM models can be conducted, facilitating a deeper understanding of the performance and characteristic disparities of the models across dif1.ferent groups and laying the groundwork for further research and interpretation.

3.3 Qualitative Research

Upon analyzing the quantitative data derived from the samples, a subsequent analysis will be conducted to identify congruence and utilization, aiming to elucidate and corroborate findings with the qualitative data. In this study, a semi-structured interview will be used for qualitative research after the experiment. The qualitative research process is delineated as follows.

3.3.1 Sampling and Sample Size for Qualitative Research

Qualitative data will be collected through semi-structured interviews with 10 randomly selected participants from each university (5 from the AR group and 5 from the non-AR group). Participants will be informed in advance that a brief interview will follow the experiment, and only those who provide consent will be interviewed using open-ended questions.

Therefore, a total of 40 participants will be interviewed. The number of interview participants (n=40) is determined based on the principle of data saturation and information power (Guest et al., 2006; Malterud et al., 2016). Given the clear research objective, homogeneous participant characteristics (i.e., university students), and structured yet open-ended interview guide, 10 participants per university were deemed sufficient for capturing diverse yet comparable perspectives. The details are shown in Table 3.18.

The interviews will center on seven key variables from the conceptual framework: perceived augmented realism, technology fluidity, consumer attitudes, perceived information quality, immersion, enjoyment, and purchase intention. Each session, lasting approximately 10 minutes, aims to gather in-depth insights into participants' perceptions and experiences during the experiment. This qualitative approach enhances contextual understanding and supports the quantitative findings through methodological triangulation.

Table 3.18 Sample size of interviews

Universities	**Sample size from the group with AR condition**	**Sample size from the group without AR condition**	**Sample size of interviews for each university**
University of Science and Technology Beijing	5 participants	5 participants	10 participants
Shanghai Jiao Tong University	5 participants	5 participants	10 participants
Guangxi University	5 participants	5 participants	10 participants
Sichuan University	5 participants	5 participants	10 participants

3.3.2 Instrument for Qualitative Research

In the qualitative phase of this research, a semi-structured interview approach will be employed to explore participants' subjective experiences and perceptions in greater depth. The interview questions will be systematically developed based on the key constructs identified in the quantitative study, namely perceived augmented realism, perceived technology fluidity, consumer attitudes, perceived information quality, immersion, and enjoyment.

The use of semi-structured interviews allows for flexibility in probing individual responses while maintaining consistency across participants. This approach will facilitate the collection of rich, descriptive data that can reveal underlying motivations, behavioral patterns, and contextual factors not captured in the quantitative phase. Moreover, the interviews aim to validate the quantitative findings through data triangulation and to enhance the overall credibility of the study. The interview guide outlining the key questions and topics is presented in Table 3.19.

Table 3.19 Interviews outline

Part 1 Personal information of key informants such as gender, age, etc.	Answer
Part 2 Interview questions about the feelings during the experiment.	Answer
Q1: On the APP, did you perceive the products to look realistic? (If yes), do you consider the level of realism to be high or low? Q2: When browsing products on the APP, how would you rate the system fluidity and interface responsiveness? Would you consider it high or low? Q3: Did the realism of the product and the fluidity of the APP system affect your perception of the quality of product information and your attitude towards the product? Q4: Did the realism of the product and the fluidity of the APP system affect your perception of enjoyment and immersion in the shopping process? Q5: Do you think realism, system fluency, attitude, perceived information quality, enjoyment, and immersion influence your purchase intentions?	
Part 3 The importance of these factors to purchase intention - Perceived Augmented Realism - Perceived Technology Fluidity - Attitudes - Perceived Information Quality - Immersion - Enjoyment	Answer

3.3.3 Qualitative Data Collection

The semi-structured interviews will collect notes and voice recordings from the participants to gain a profound understanding of the participants' experiences. Different methods will be employed to ensure comprehensive data collection, including:

Firstly, utilizing document analysis, specifically, dissertations, relevant research studies, concepts, and theories, served as guiding principles for data collection.

Secondly, upon completion of the experiment, a total of 40 participants will be selected from the four universities, with 10 participants chosen from each university for interviews. The process of interviewer selection is as follows: First of all, explain clearly to the participants the purpose of the interview, the expected duration, and the voluntary nature of the participation after the experiment. Secondly, select 5 participants willing to undergo interviews within each experimental condition at each university. Finally, interview time and location flexibility should be ensured to accommodate participants' convenience.

Thirdly, this study employs a semi-structured interview approach, recording and transcribing the interviews. Each interviewee is expected to spend 10 minutes responding to relevant questions.

Finally, the interview data will be summarized, serving as research evidence and aiding in the comprehensive analysis of data to support the quantitative research.

3.3.4 Qualitative Data Analysis

This study will use thematic analysis to analyze qualitative data. This is because, through thematic analysis, one can delve into and comprehend the significant themes and patterns emerging from the interviews, thereby obtaining a more profound and detailed insight. In addition, according to Braun and Clarke (2012), thematic analysis has several benefits, which is why this study chose it. (1) Flexibility. Thematic analysis emphasizes a profound understanding of meaning and patterns within the text, offering a more flexible approach to exploring emotions, perspectives, and experiences. (2) In-depth Understanding. This method facilitates the capture of key themes and essential concepts among participants in the experimental process, providing a deep understanding of emotions and perceptions. (3) Applicability. Thematic analysis is typically employed in research contexts where there is a heightened demand for in-depth understanding and subjective experiences.

Following the interview data collection, specialized qualitative data analysis tools can augment both efficiency and visualization. According to Edhlund and McDougall (2018), the following are the steps for conducting the thematic analysis of semi-structured interview data utilizing NVivo software:

Step 1: Import Data. Import semi-structured interview data into NVivo software, which may include audio recordings, transcriptions of text, and notes.

Step 2: Create Nodes. Establish nodes in NVivo to tag various themes or concepts within the data. Each node represents a potential theme.

Step 3: Initial Coding. Commence initial coding of the data by associating relevant portions with their corresponding nodes.

Step 4: Search for Themes. Utilize NVivo's search and query functions to locate and identify potential themes within the data rapidly. This can be achieved by examining nodes, tags, and keywords.

Step 5: Review and Define Themes. Examine and refine nodes already created in NVivo, ensuring they accurately represent significant themes within the data.

Step 6: Define and Name Themes. Assign clear and specific names to each node (theme) to reflect its inherent meaning. In NVivo, node names typically serve as representatives of the themes.

Step 7: Create Theme Summaries. In NVivo, generate summaries for each theme, consolidating all related nodes and text fragments to provide a comprehensive understanding of the themes.

CHAPTER 4
RESULTS AND DATA ANALYSIS

4.1 Overview

This study used quantitative and qualitative research to explore the impact of perceived augmented realism and technology fluidity on the cognitive aspects (attitudes and perceived information quality), affective aspects (immersion and enjoyment), and purchase intention among Chinese consumers in the context of AR virtual try-on.

4.1.1 Quantitative Research

In this study, 802 volunteers were recruited from Guangxi University, Sichuan University, University of Science and Technology Beijing, and Shanghai Jiao Tong University. Of these, 400 were randomly assigned to the group with AR and 402 to the group without AR. After the experiment, participants completed a questionnaire, yielding 802 responses (400 from the AR group and 402 from the non-AR group).

Subsequently, data analysis was conducted, which involved a detailed examination of the collected data using SPSS and AMOS software. SPSS was primarily utilized for descriptive statistics, normality tests, correlation, and reliability analyses. The SEM analysis using AMOS primarily includes the following steps—first, measurement model evaluation. Then, the structural model evaluation was performed, which included assessing model fit (e.g., using fit indices), testing hypotheses (e.g., evaluating path coefficients and their significance), and examining other relevant metrics. Furthermore, mediation analysis was performed to explore the mediating effects of attitudes, perceived information quality, immersion, and enjoyment on the relationship between perceived augmented realism, perceived technology fluidity, and purchase intentions. Finally, a multi-group SEM analysis was conducted to compare model parameters across different groups and assess the invariance of the structural relationships. This comprehensive analysis approach allowed for a thorough investigation of the complex interplay between variables and provided valuable insights into the mechanisms driving consumer behavior in AR environments.

4.1.2 Qualitative Research

The second part of this chapter presents the qualitative findings. Participants were informed before the experiment that a brief interview would follow upon completion. Consequently, 40 participants were randomly selected from 4 universities in China for interviews (10 from each university), with their consent. Semi-structured interviews were conducted to collect notes and voice recordings from the 40 experiment participants to gain a deeper understanding of their experiences and to elucidate and corroborate the quantitative findings with qualitative data.

Finally, the interview content was encoded and transcribed, and the data was summarized, serving as research evidence and aiding in the comprehensive analysis of data to provide support for the quantitative research.

4.2 Quantitative Research Result

4.2.1 Pilot Study

The pilot study objective of the pilot study is to evaluate the reliability and validity of the questionnaire, as well as to examine the clarity, comprehensibility, and appropriateness of each item. Specifically, the pilot aims to determine whether the scale items are clearly worded, whether respondents can accurately interpret and understand the questions, whether the question formulations are precise, and whether the overall structure and sequencing of the questionnaire are logical and coherent. Moreover, the pilot serves to identify any potential issues or ambiguities within the instrument and to uncover any unforeseen problems that may arise during the experimental procedure, thereby facilitating necessary refinements prior to the main data collection phase.

Before the pilot study, four experts from Thailand and one expert from China were invited to evaluate the Index of IOC between the questionnaire items and the research objectives. These five scholars are all experts in the field of e-commerce. To calculate the IOC for each question in the questionnaire, the scores provided by the five experts will be averaged. If the average rating is 0.6 or higher, it suggests that the question effectively aligns with the research objectives. If it falls below 0.6, further revisions or adjustments to the question may be necessary to improve its congruence with the objectives. After comparing the average rating with the 0.6 threshold, it was found that there was one item with a score of 0.4, while all the other items had a rating above 0.6. Therefore, the item with a score of 0.4 in the questionnaire was deleted. Details of IOC are presented in Appendix G. To ensure the reliability and authenticity of the questionnaire, translation and back translation were carried out in this study.

After completing the translation and back-translation procedures and revising the questionnaire based on the IOC results, a pilot study was conducted to assess the reliability and validity of the measurement instruments, as well as the clarity and comprehensibility of the questionnaire items. A total of 106 college students were recruited from Nanning University, with 53 participants randomly assigned to the AR condition and 53 to the non-AR condition. The primary objective of the pilot study was not to conduct hypothesis testing or draw statistical inferences, but rather to evaluate the internal consistency of the scales (e.g., using Cronbach's alpha), the preliminary factor structure, and the overall usability of the instrument.

According to methodological literature, a sample size between 30 and 100 participants is generally considered sufficient for pilot testing purposes (Hertzog, 2008; Johanson & Brooks, 2010). The balanced sample size across the two conditions in this study satisfies this standard and allows for meaningful preliminary comparisons across conditions. Data were analyzed using SPSS 26 software, and the results contributed to refining the instrument for the subsequent full-scale study. This rigorous pilot testing process enhances the overall validity and credibility of the research design and ensures that the questionnaire is suitable for broader application.

4.2.1.1 Structural Validity

This study adopts factor analysis as the primary method to examine the validity of the questionnaire structure. Before conducting factor analysis, the Kaiser-Meyer-Olkin (KMO) test and Bartlett test must be performed to ensure the questionnaire's suitability for factor analysis. The KMO statistic ranges from 0 to 1. Higher values indicate that the data are more suitable for factor analysis. Generally, KMO values exceeding 0.6 or 0.7 are acceptable, implying sufficient inter-variable correlations, thus rendering the meaning of the factor analysis.

The KMO values of the questionnaire for the group with AR and without AR conditions in the pilot study are shown in Table 4.1 and Table 4.2, which can be seen that the KMO values of the two questionnaires are greater than 0.6, indicating that there is sufficient correlation between the variables, and the questionnaires have good structural validity.

Table 4.1 The KMO value of the questionnaire for the group with AR condition

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.657
Bartlett's Test of Sphericity	Approx. Chi-Square	2012.403
	df	703
	Sig.	.000

Table 4.2 The KMO value of the questionnaire for the group without AR condition

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.618
Bartlett's Test of Sphericity	Approx. Chi-Square	2377.070
	df	703
	Sig.	.000

4.2.1.2 Reliability Analysis

In the pilot study, the constructs of perceived augmented realism, perceived technology fluidity, cognitive (attitudes and perceived information quality), affective (immersion and enjoyment), and purchase intention were incorporated for investigation. All of the constructs' scale items used to measure these constructs were taken from previously published research.

Regarding the reliability of the questionnaire, each correlation coefficient or corrected item-total correlation (CITC) should be 0.2 or higher (Ferguson, 1981), and the reliability assessed through Cronbach's alpha (α) must exceed 0.7 (Cronbach, 1951). The CITC values and Cronbach's alpha values of the questionnaire for the group with AR condition and the questionnaire for the group without AR condition in the pilot study are shown in Table 4.4 and Table 4.5. In addition, Table 4.3 shows the label interpretation used for the statistics. According to Table 4.4 and Table 4.5, the analysis results show that the total scale scores of all items are ＞ 0.2, and the Cronbach's Alpha values are all ＞ 0.7. Therefore, the reliability of these two questionnaires is very high in this study.

Table 4.3 Label interpretation

Label	interpretation	Label	interpretation
PAR	Perceived Augmented Realism	PAR1	1. The virtual objects on the APP with the AR function (without the AR function) seem real to me.
		PAR2	2. The experience on the APP with the AR function (without the AR function) seems real to me.
		PAR3	3. The shoes on the APP with AR function (without the AR function) are similar to reality.
		PAR4	4. My interactions with the virtual object on the APP with AR function (without the AR function) seem natural to me, like those in the real world.
		PAR6	5. In my opinion, the quality of the images of the APP with AR function (without the AR function) objects is high.
PTF	Perceived Technology Fluidity	PTF1	7. The APP with AR function (without AR function) can surf across content features that provide tips, information, and fun.
		PTF2	8. I can get any new content features I need on the APP with AR function (without AR function).

Table 4.3 (Continue)

Label	interpretation	Label	interpretation
PTF	Perceived Technology Fluidity	PTF3	9. I can get any information about the content features I need on the APP with AR function (without AR function).
		PTF4	10. On the APP with AR function (without AR function), I can get any fun content features I need.
		PTF5	11. On the APP with AR function (without AR function), I can access any items I need anytime.
		PTF6	12. I can review any items I need anytime on the APP with the AR function (without the AR function).
PTF	Perceived Technology Fluidity	PTF7	13. I can search for any archive items I need anytime on the APP with the AR function (without the AR function).
		PTF8	14. I can freely flow from one subject to the next on the APP with the AR function (without the AR function).
A	Attitudes	A1	15. I am positive about the APP with AR function (without AR function).
		A2	16. The use of the APP with an AR function (without an AR function) is a good idea.
		A3	17. It just makes sense to use the APP with the AR function (without the AR function).
		A4	18. The APP with AR function (without AR function) is so interesting that I just want to learn more about it.
		A5	19. I would recommend the APP with AR function (without AR function) to others.
PIQ	Perceived Information Quality	PIQ1	20. The APP with AR function (without AR function) provided me with the information I expected.
		PIQ2	21. The APP with AR function (without AR function) provides trustworthy and reliable information about shoes.

Table 4.3 (Continue)

Label	interpretation	Label	interpretation
PIQ	Perceived Information Quality	PIQ3	22. The APP with AR function (without AR function) provides detailed information about shoes.
		PIQ4	23. The APP with AR function (without AR function) provides complete information about shoes.
		PIQ5	24. The APP with AR function (without AR function) provides personalized information about shoes.
		PIQ6	25. The APP with AR function (without AR function) provides information that helps me in my decision.
I	Immersion	I1	26. Shopping on the APP with the AR function (without the AR function) made me deeply engrossed.
		I2	27. Shopping on the APP with AR function (without AR function) made me absorbed.
		I3	28. Shopping on the APP with AR function (without AR function) focused my attention.
E	Enjoyment	E1	29. Shopping on the APP with AR function (without AR function) is enjoyable.
		E2	30. Shopping on the APP with AR function (without AR function) is pleasurable.
		E3	31. Shopping on the APP with an AR function (without an AR function) is fun for its own sake.
		E4	32. Shopping on the APP with AR function (without AR function) make me happy.
		E5	33. Shopping on the APP with an AR function (without an AR function) make me exciting.
PI	Purchase Intention	PI1	34. I intend to buy my shoes on the APP with the AR function (without the AR function).
		PI2	35. The probability that I would consider buying the shoes on the APP with the AR function (without the AR function) is very high.

Table 4.3 (Continue)

Label	interpretation	Label	interpretation
PI	Purchase Intention	PI3	36. If I plan to buy shoes, I would very probably buy them on the APP with AR function (without AR function).
		PI4	37. I would consider to buy the shoes on the APP with the AR function (without the AR function).
		PI5	38. My willingness to buy the shoes on APP with AR function (without AR function) is high.

Table 4.4 CITC and α values of the questionnaire for the group with AR condition

Reliability Statistics					
Cronbach's Alpha			N of Items		
.916			38		
Item-Total Statistics					
Latent Variables	**Cronbach's Alpha**	**Items**	**Corrected Item-Total Correlation**	**Cronbach's Alpha if Item Deleted**	**Interpretation**
Perceived augmented realism	.955	PAR 1	.525	.913	Passed
		PAR 2	.574	.912	Passed
		PAR 3	.627	.911	Passed
		PAR 4	.653	.911	Passed
		PAR 5	.618	.911	Passed
		PAR 6	.559	.912	Passed
Perceived technology fluidity	.937	PTF 1	.472	.914	Passed
		PTF 2	.274	.915	Passed
		PTF 3	.487	.914	Passed
		PTF 4	.386	.914	Passed
		PTF 5	.302	.915	Passed
		PTF 6	.380	.914	Passed
		PTF 7	.427	.914	Passed
		PTF 8	.364	.915	Passed
Attitudes	.854	A 1	.417	.914	Passed
		A 2	.296	.915	Passed
		A 3	.457	.914	Passed
		A 4	.364	.915	Passed

Table 4.4 (continue)

Latent Variables	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Interpretation
Attitudes	.854	A 45	.425	.914	Passed
Perceived information quality	.933	PIQ 1	.317	.916	Passed
		PIQ 2	.618	.911	Passed
		PIQ 3	.513	.913	Passed
		PIQ 4	.660	.911	Passed
		PIQ 5	.621	.911	Passed
		PIQ 6	.499	.913	Passed
Immersion	.944	I 1	.303	.916	Passed
		I 2	.276	.916	Passed
		I 3	.279	.916	Passed
Enjoyment	.712	E 1	.278	.916	Passed
		E 2	.284	.916	Passed
		E 3	.270	.916	Passed
		E 4	.247	.916	Passed
		E 5	.216	.916	Passed
Purchase intention	.927	PI 1	.482	.913	Passed
		PI 2	.651	.911	Passed
		PI 3	.702	.910	Passed
		PI 4	.691	.910	Passed
		PI 5	.598	.912	Passed

Table 4.5 CITC and α values of the questionnaire for the group without AR condition

Reliability Statistics	
Cronbach's Alpha	N of Items
.892	38

Item-Total Statistics

Latent Variables	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Interpretation
Perceived augmented realism	.948	PAR 1	.414	.889	Passed
		PAR 2	.601	.886	Passed
		PAR 3	.596	.886	Passed

Table 4.5 (Continue)

Latent Variables	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Interpretation
Perceived augmented realism	.948	PAR 4	.526	.887	Passed
		PAR 5	.544	.887	Passed
		PAR 6	.543	.887	Passed
Perceived technology fluidity	.946	PTF 1	.221	.892	Passed
		PTF 2	.254	.892	Passed
		PTF 3	.355	.890	Passed
		PTF 4	.270	.892	Passed
		PTF 5	.336	.891	Passed
		PTF 6	.354	.890	Passed
		PTF 7	.314	.891	Passed
		PTF 8	.290	.891	Passed
Attitudes	.965	A 1	.451	.889	Passed
		A 2	.493	.888	Passed
		A 3	.592	.886	Passed
		A 4	.592	.886	Passed
		A 45	.539	.887	Passed
Perceived information quality	.928	PIQ 1	.261	.892	Passed
		PIQ 2	.234	.892	Passed
		PIQ 3	.287	.891	Passed
		PIQ 4	.235	.892	Passed
		PIQ 5	.209	.892	Passed
		PIQ 6	.225	.892	Passed
Immersion	.901	I 1	.502	.888	Passed
		I 2	.341	.891	Passed
		I 3	.570	.886	Passed
Enjoyment	.925	E 1	.273	.892	Passed
		E 2	.293	.891	Passed
		E 3	.232	.892	Passed
		E 4	.231	.892	Passed
		E 5	.282	.891	Passed

Table 4.5 (Continue)

Latent Variables	Cronbach's Alpha	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Interpretation
Purchase intention	.954	PI 1	.502	.888	Passed
		PI 2	.510	.888	Passed
		PI 3	.422	.889	Passed
		PI 4	.412	.889	Passed
		PI 5	.467	.889	Passed

4.2.1.3 Manipulation Check: T-Test

An independent samples t-test was conducted to test the manipulation's success. As shown in Table 4.6, there was a significant difference in the mean scores between the two independent variables, with the group with AR scoring significantly higher than the group without AR. This indicates that participants in the AR condition perceived a significantly higher sense of augmented realism and technology fluidity compared to the non-AR condition. This finding aligns with the expected hypothesis, demonstrating that the manipulation was successful.

Table 4.6 The results of the T-Test for the pilot study

	Group Statistics				
	Group	**N**	**Mean**	**Mean Difference**	**Sig.**
Perceived augmented realism	0	53	6.531	1.013	.000
	1	53	5.519		
Perceived technology fluidity	0	53	6.071	.557	.000
	1	53	5.514		

Note: 0 stands for the group with AR, and 1 stands for the group without AR.

4.2.2 The Main Study

4.2.2.1 Descriptive Statistical Analysis

The distribution of characteristics of the two groups of samples (the experiment group and the control group) includes variables such as gender, age, education level, AR shopping experience, and AR shopping frequency.

Characteristic distribution of the group with AR

Gender: There are 192 males, accounting for 48%; and 208 females, accounting for 52%.

Age: There are 127 individuals aged 18-23 years, accounting for 32%; 162 individuals aged 23-28 years, accounting for 40.5%; 80 individuals aged 28-33 years, accounting for 20%; and 26 individuals aged over 33 years, accounting for 6.5%.

Current Education Level: There are 237 undergraduate students, accounting for 59.2%; 124 master's students, accounting for 31%; and 39 doctoral students, accounting for 9.7%.

AR Shopping Experience: There are 330 individuals with AR shopping experience, accounting for 83%; and 70 individuals without AR shopping experience, accounting for 18%.

AR Shopping Frequency: 118 individuals shop with AR once a week, accounting for 36%; 106 individuals who shop with AR twice a week, accounting for 32%; 76 individuals who shop with AR three times a week, accounting for 23%; and 30 individuals who shop with AR more than three times a week, accounting for 9%.

Characteristic distribution of the group without AR

Gender: There are 191 males, accounting for 48%; and 211 females, accounting for 52%.

Age: There are 3 individuals under 18 years old, accounting for 1%; 163 individuals aged 18-23 years, accounting for 40.5%; 141 individuals aged 23-28 years, accounting for 35%; 72 individuals aged 28-33 years, accounting for 18%; and 23 individuals aged over 33 years, accounting for 5.7%.

Current Education Level: There are 245 undergraduate students, accounting for 59.7%; 119 master's students, accounting for 30%; and 38 doctoral students, accounting for 9.4%.

AR Shopping Experience: There are 338 individuals with AR shopping experience, accounting for 84%; and 64 individuals without AR shopping experience, accounting for 16%.

AR Shopping Frequency: There are 132 individuals who shop with AR once a week, accounting for 39%; 88 individuals who shop with AR twice a week, accounting for 26%; 91 individuals who shop with AR three times a week, accounting for 27%; and 27 individuals who shop with AR more than three times a week, accounting for 8%.

The overall characteristic distribution of the group with AR and without AR group is similar, though there are some discrepancies. For instance, in the age distribution, the experimental group has 15% of individuals aged over 33 years, while the control group has 11% in this age category. This may suggest that the control group has a younger age distribution. Additionally, in the experimental group, the frequency of "twice a week" for AR shopping accounts for 32%, whereas in the control group, this frequency accounts for 26%, indicating that the control group may have a higher frequency of AR shopping. However, further tests are needed to confirm whether there are significant differences in the distribution characteristics between the two groups. The characteristic distribution of the group with AR and without AR is shown in Table 4.7.

Table 4.7 The characteristic distribution of the group with AR and without AR

Variables	**Option**	**Group with AR**		**Group without AR**	
		Frequency	**Percentage**	**Frequency**	**Percentage**
Gender	Male	192	48%	191	48%
	Female	208	52%	211	52%
Age	Under 18 years	0	0	3	1%
	18-23 years	162	40.5%	163	40.5%
	23-28 years	132	33%	141	35%
	28-33 years	80	20%	72	18%
	Over 33 years	26	6.5%	23	5.7%
Current Education Level	Undergraduate	237	59.2%	245	59.7%
	Master's student	124	31%	119	30%
	Doctoral student	39	9.7%	38	9.4%
Prior AR shopping experiences	Yes	330	83%	338	84%
	No	70	18%	64	16%
AR shopping frequency	Once a week	118	36%	132	39%
	Twice a week	106	32%	88	26%
	Three times a week	76	23%	91	27%
	More than three times a week	30	9%	27	8%

4.2.2.2 The Normality Test

The normality test results of the data for the group with AR and without AR are shown in Table 4.8. According to the results, it can be seen that the mean score of each variable is between 4 and 5, and the scale scoring method is 1-7 forward scoring. Therefore, it can be seen that the shopping experience and behavioral response of the object group in this study are above the medium level.

The normality test of each measurement item was tested by skewness and kurtosis. According to the standard proposed by Kline (1998), if the absolute value of the skewness coefficient is within 3 and the absolute value of the kurtosis coefficient is within 8, the data can be considered to meet the requirements of approximately normal distribution. According to the analysis results in Table 4.8, it can be seen that the absolute values of skewness and kurtosis coefficients of each measurement item in this study are within the standard range (the absolute value of skewness coefficient ＜3, the absolute value of kurtosis coefficient ＜8). Therefore, it can be shown that the data of each measurement item satisfy the approximate normal distribution for the group with AR and without AR.

Table 4.8 The normality test results of the measurement items for the group with AR

Variables	Items	M	SD	Skewness	Kurtosis	M	SD
Perceived augmented realism	PAR1	4.84	1.582	-0.235	-0.781	4.836	1.260
	PAR2	4.86	1.537	-0.296	-0.659		
	PAR3	4.84	1.520	-0.192	-0.909		
	PAR4	4.87	1.515	-0.239	-0.697		
	PAR5	4.79	1.603	-0.318	-0.779		
	PAR6	4.82	1.515	-0.244	-0.660		
Perceived technology fluidity	PTF1	4.70	1.631	-0.062	-1.093	4.749	1.303
	PTF2	4.74	1.663	-0.181	-1.040		
	PTF3	4.74	1.578	-0.281	-0.788		
	PTF4	4.80	1.543	-0.258	-0.646		
	PTF5	4.77	1.634	-0.158	-0.945		
	PTF6	4.80	1.606	-0.178	-0.964		
	PTF7	4.76	1.566	-0.191	-0.780		
	PTF8	4.70	1.554	-0.099	-0.879		
Attitudes	A1	4.81	1.576	-0.212	-0.841	4.775	1.314
	A2	4.78	1.588	-0.310	-0.726		
	A3	4.78	1.561	-0.254	-0.742		
	A4	4.79	1.568	-0.178	-0.872		
	A5	4.73	1.605	-0.223	-0.920		
Perceived information quality	PIQ1	4.69	1.600	-0.109	-0.937	4.696	1.298
	PIQ2	4.75	1.558	-0.274	-0.701		
	PIQ3	4.67	1.579	-0.113	-0.976		
	PIQ4	4.62	1.632	-0.117	-0.980		
	PIQ5	4.79	1.617	-0.270	-0.943		
	PIQ6	4.66	1.559	-0.133	-0.936		

Table 4.8 (Continue)

Variables	Items	M	SD	Skewness	Kurtosis	M	SD
Immersion	I1	4.88	1.590	-0.339	-0.803	4.803	1.376
	I2	4.81	1.606	-0.272	-0.912		
	I3	4.72	1.590	-0.097	-1.024		
Enjoyment	E1	4.82	1.522	-0.272	-0.678	4.802	1.259
	E2	4.75	1.536	-0.284	-0.668		
	E3	4.83	1.569	-0.248	-0.776		
	E4	4.80	1.579	-0.247	-0.759		
	E5	4.82	1.489	-0.344	-0.357		
Purchase intention	PI1	4.85	1.541	-0.238	-0.722	4.756	1.309
	PI2	4.69	1.571	-0.179	-0.799		
	PI3	4.86	1.582	-0.295	-0.825		
	PI4	4.69	1.595	-0.168	-0.795		
	PI5	4.70	1.631	-0.166	-0.959		

Table 4.9 The normality test results of the measurement items for the group without AR.

Variables	Items	M	SD	Skewness	Kurtosis	M	SD
Perceived augmented realism	PAR1	4.27	1.619	-0.068	-0.771	4.298	1.309
	PAR2	4.36	1.569	-0.066	-0.735		
	PAR3	4.24	1.647	-0.112	-0.892		
	PAR4	4.38	1.637	-0.114	-0.730		
	PAR5	4.27	1.695	-0.076	-1.018		
	PAR6	4.27	1.600	0.062	-0.801		
Perceived technology fluidity	PTF1	4.34	1.571	-0.044	-0.775	4.329	1.257
	PTF2	4.36	1.592	-0.076	-0.674		
	PTF3	4.33	1.590	-0.119	-0.694		
	PTF4	4.31	1.590	-0.097	-0.612		
	PTF5	4.26	1.574	-0.187	-0.669		
Perceived technology fluidity	PTF6	4.33	1.538	-0.170	-0.650		
	PTF7	4.38	1.578	-0.105	-0.795		
	PTF8	4.32	1.664	-0.075	-0.796		
Attitudes	A1	4.37	1.607	-0.078	-0.864	4.323	1.313
	A2	4.33	1.640	0.056	-0.881		

Table 4.9 (Continue)

Variables	Items	M	SD	Skewness	Kurtosis	M	SD
Attitudes	A3	4.30	1.662	-0.157	-0.910		
	A4	4.38	1.556	-0.051	-0.677		
	A5	4.24	1.612	0.059	-0.775		
Perceived information quality	PIQ1	4.34	1.582	-0.059	-0.754	4.274	1.305
	PIQ2	4.25	1.654	-0.090	-0.892		
	PIQ3	4.22	1.661	-0.112	-0.888		
	PIQ4	4.29	1.684	-0.110	-0.980		
	PIQ5	4.21	1.654	0.023	-0.837		
	PIQ6	4.34	1.659	-0.060	-0.960		
Immersion	I1	4.27	1.619	-0.068	-0.771	4.369	1.341
	I2	4.36	1.569	-0.066	-0.735		
	I3	4.24	1.647	-0.112	-0.892		
Enjoyment	E1	4.38	1.637	-0.114	-0.730	4.379	1.339
	E2	4.27	1.695	-0.076	-1.018		
	E3	4.27	1.600	0.062	-0.801		
	E4	4.34	1.571	-0.044	-0.775		
	E5	4.36	1.592	-0.076	-0.674		
Purchase intention	PI1	4.33	1.590	-0.119	-0.694	4.352	1.285
	PI2	4.31	1.590	-0.097	-0.612		
	PI3	4.26	1.574	-0.187	-0.669		
	PI4	4.33	1.538	-0.170	-0.650		
	PI5	4.38	1.578	-0.105	-0.795		

4.2.2.3 Random Assignment Test and Manipulation Check

1. Random Assignment Test: Mann-Whitney U Test

The Mann-Whitney U test, also known as the Wilcoxon rank-sum test, is a non-parametric statistical test used to compare the two independent samples to determine if there is a significant difference between them. Different from the t-test, the Mann-Whitney U test applies to two independent samples and does not require the data to follow a normal distribution, making it suitable for ordinal or interval data, especially when the data do not meet the normality assumption required for analysis of variance (ANOVA).

The fundamental principles of the Mann-Whitney U test are as follows:

Independence of Samples: Assumes that two independent samples are drawn from the same population.

Data Ranking: Merge the data from both samples and rank all the data points in ascending order.

The sum of Ranks Calculation: Compute the sum of ranks for each sample, representing the sum of ranks for each sample's data in the merged dataset.

Calculation of U Value: Calculate the U statistic based on the sum of ranks. The U value represents the difference between the sum of the ranks of the two samples. According to Mann and Whitney (1947), the formula for calculating the U value is as follows.

$$U_1 = R_1 - \frac{n_1(n_1+1)}{2}$$

$$U_2 = R_2 - \frac{n_2(n_2+1)}{2}$$

Before performing the Mann-Whitney U test, the data of the two groups were tested for normality, and the results are shown in Table 4.10. Shapiro-Wilk test results show that the statistical value of the group with AR is 0.9842, the degree of freedom is 330, and the significance (p-value) is 0.001. The statistical value of the group without AR is 0.9682; the degree of freedom is 338; the significance (p-value) is 0.000. For the Shapiro-Wilk test, the P values of the group with AR and the group without AR are far less than 0.05 ($P=0.001 < 0.05$), which means that the two groups of data do not follow the normal distribution, and further, Mann-Whitney U test is needed.

Table 4.10 The results of the Shapiro-Wilk test for the group with AR and without AR

Test of normality							
Variables	**Groups**	**Kolmogorov-Smirnov[a]**			**Shapiro-Wilk**		
		Statistics	df	Sig.	Statistics	df	Sig.
1. Gender	Without AR	0.356	338	0.000	0.635	338	0.000
	With AR	0.355	330	0.000	0.635	330	0.000
2. Age	Without AR	0.278	338	0.000	0.754	338	0.000
	With AR	0.234	330	0.000	0.814	330	0.000
3. Current Education Level	Without AR	0.309	338	0.000	0.756	338	0.000
	With AR	0.267	330	0.000	0.771	330	0.000

Table 4.10 (Continue)

		Test of normality					
Variables	**Groups**	**Kolmogorov-Smirnov[a]**			**Shapiro-Wilk**		
		Statistics	df	Sig.	Statistics	df	Sig.
4. Prior AR shopping experiences	Without AR	0.281	338	0.000	0.789	338	0.000
	With AR	0.277	330	0.000	0.723	330	0.000
5. AR shopping frequency	Without AR	0.392	338	0.000	0.603	338	0.000
	With AR	0.218	330	0.000	0.844	330	0.000

a. Lilliefors Significance Correction

The purpose of the Mann-Whitney U test in this study is to determine whether there are significant differences in sample characteristics between the group with AR and without AR. If there are no significant differences, it indicates that the random assignment is successful. The specific results of the Mann-Whitney U test are shown in Table 4.11 and Table 4.12. The results of the data analysis are as follows.

Gender: The rank sum of the group with AR is 160,208.00, and the rank sum without AR is 161,795.00, corresponding to the U value is 19200.0, P=0.526＞0.05. It indicates that there is no significant difference between the group with AR and the group without AR in terms of gender.

Age: The rank sum of the group with AR is 175862.00, and the rank sum without AR is 146141.00, corresponding to the U value is 33306.0, P=0.067＞0.05, indicating that there is no significant difference between the group with AR and the group without AR in terms of age.

Current Education Level: The rank sum of the group with AR is 167017.50, and the rank sum without AR is 154985.50, corresponding to the U value is 22077.0, P=0.152 ＞0.05. It indicates that there is no significant difference between the group with AR and the group without AR in terms of current education level.

Prior AR shopping experiences: The rank sum of the group with AR is 161870.00, and the rank sum without AR is 160133.00, corresponding to the U value is 12291.0, P=0.161＞0.05, indicating that there is no significant difference between the group with AR and the group without AR regarding prior AR shopping experiences.

AR shopping frequency: The rank sum of the group with AR is 127013.00, and the rank sum without AR is 96433.00, corresponding to the U value is 13874.5, P=0.056＞0.05, indicating that there is no significant difference between the group with AR and the group without AR in terms of AR shopping frequency.

Furthermore, based on the success of the random assignment and the results of the statistical tests, it can be reasonably inferred that demographic variables have minimal influence on the main variables (perceived augmented realism, technology fluidity, attitudes, perceived information quality, immersion, enjoyment, purchase intention). Therefore, if there are differences between the experimental group (group with AR) and the control group (group without AR) in the main variables, it can be more confident to attribute these differences to the experimental treatment (i.e., the use of AR technology) rather than to the influence of demographic variables.

Table 4.11 The results of the Mann-Whitney U test

	Rank			
Variables	**Groups**	**N**	**Rank mean value**	**Sum of ranks**
1. Gender	With AR	400	400.52	160208.00
	Without AR	402	402.48	161795.00
2. Age	With AR	400	439.66	175862.00
	Without AR	402	363.53	146141.00
3. Current Education Level	With AR	400	417.54	167017.50
	Without AR	402	385.54	154985.50
4. Prior AR shopping experiences	With AR	400	404.68	161870.00
	Without AR	402	398.34	160133.00
5. AR shopping frequency	With AR	330	384.89	127013.00
	Without AR	338	285.30	96433.00

Table 4.12 The results of the statistics

Variables	**Mann-Whitney U**	**Wilcoxson W**	**Z**	**Asymptotic significance (two-tailed)**	**Results**
1. Gender	80008.000	48064.0	0.426	0.89	Not significant
2. Age	78300.000	63672.0	1.833	0.49	Not significant

Table 4.12 (Continue)

Variables	**Mann-Whitney U**	**Wilcoxson W**	**Z**	**Asymptotic significance (two-tailed)**	**Results**
3. Current Education Level	79072.500	46997.0	1.426	0.64	Not significant
4. Prior AR shopping experiences	79130.000	32551.0	1.406	0.55	Not significant
5. AR shopping frequency	62127.000	33274.5	1.907	0.12	Not significant

a. Grouping variable: group

2. Manipulation Check: T-test

The key to validating the success of manipulation lies in confirming that the applied experimental treatment produced the expected effect. In this study, the criterion for a successful manipulation was that participants in the group with AR perceived a higher sense of augmented realism and technology fluidity compared to the group without AR. Therefore, to test the success of the manipulation, an independent samples t-test was conducted. The t-test was chosen because the normality test results indicated that the data of each measurement item satisfy the approximate normal distribution for the group with AR and without AR, and the sample size is large. The results of the t-test, shown in Table 4.13, indicated a significant difference in the mean scores between the independent variables. Specifically, the mean score of the group with AR was significantly higher than that without AR, indicating that participants in the AR condition did perceive a higher sense of augmented realism and technology fluidity. This finding aligns with the expected hypothesis, demonstrating that the experimental treatment effectively induced the anticipated changes, thereby validating the success of the manipulation.

Table 4.13 The results of T-test

Group Statistics						
Variables	**Group**	**N**	**Mean**	**Mean Difference**	**Sig.**	**Std. Error Mean**
Perceived Augmented Realism	0	400	4.836	0.678	0.000	0.061
	1	402	4.156		0.000	0.059

Table 4.13 (Continue)

Group Statistics						
Variables	Group	N	**Mean**	**Mean Difference**	**Sig.**	**Std. Error Mean**
Perceived Technology	0	400	4.749	0.564	0.000	0.065
Fluidity	1	402	4.185		0.000	0.058

Note: 0 stands for the group with AR, and 1 stands for the group without AR.

4.2.2.4 Correlation Analysis

In this study, correlation analysis was conducted to investigate the correlations between multiple variables using Pearson correlation analysis. The results shown in Table 4.14 and Table 4.15 indicate that the correlations between the variables in both groups with and without AR are statistically significant at the 99% confidence level. However, there are the following differences in the correlation coefficients between the two groups.

Perceived Augmented Realism:

Group with AR: Shows moderate to strong positive correlations with attitudes (r = 0.451) and moderate positive correlations with technology fluidity (r = 0.365), enjoyment (r = 0.365), and purchase intention (r = 0.374). It has weak to moderate positive correlations with perceived information quality (r = 0.322) and immersion (r = 0.312).

Group without AR: Exhibits weak to moderate positive correlations with attitudes (r = 0.275), perceived information quality (r = 0.212), enjoyment (r = 0.264), and purchase intention (r = 0.272), and weak correlations with technology fluidity (r = 0.189) and immersion (r = 0.163).

Differences: The group with AR shows generally stronger correlations for perceived augmented realism with attitudes, technology fluidity, enjoyment, and purchase intention compared to the non-AR group. This indicates that the presence of AR enhances the strength of the relationships between perceived augmented realism and these variables.

Perceived Technology Fluidity:

The group with AR: Displays moderate to strong positive correlations with attitudes (r = 0.414) and purchase intention (r = 0.391) and moderate positive correlations with perceived information quality (r = 0.397) and enjoyment (r = 0.346). The correlation with immersion is weaker but significant (r = 0.282).

The group without AR: Shows weak to moderate positive correlations with attitudes (r = 0.250), enjoyment (r = 0.346), and purchase intention (r = 0.262), a moderate positive correlation with perceived information quality (r = 0.326), and a weak correlation with immersion (r = 0.190).

Differences: Perceived technology fluidity has stronger correlations with attitudes, purchase intention, and perceived information quality in the group with AR. This suggests that AR technology may enhance the perceived fluidity of technology and its positive impact on related variables.

Attitudes:

The group with AR: Moderately positively correlated with perceived information quality (r = 0.377), immersion (r = 0.352), enjoyment (r = 0.359), and purchase intention (r = 0.396).

The group without AR: Shows weak to moderate positive correlations with perceived information quality (r = 0.264), enjoyment (r = 0.201), and purchase intention (r = 0.259), and a weak positive correlation with immersion (r = 0.201).

Differences: Attitudes have stronger correlations with other variables in the group with AR. This suggests that positive attitudes are more strongly associated with higher perceived quality, enjoyment, and purchase intentions when AR is present.

Perceived Information Quality:

The group with AR: Shows weak to moderate positive correlations with immersion (r = 0.315) and enjoyment (r = 0.319), and a moderate positive correlation with purchase intention (r = 0.348).

The group without AR: Displays moderate positive correlations with enjoyment (r = 0.281) and weak to moderate positive correlations with immersion (r = 0.235) and purchase intention (r = 0.237).

Differences: The group with AR has stronger correlations between perceived information quality and immersion and purchase intention compared to the group with AR. This indicates that AR may enhance the perceived quality and its influence on related variables.

Immersion

The group with AR: Shows weak to moderate positive correlations with enjoyment (r = 0.294) and purchase intention (r = 0.325).

The group without AR: Has weak to moderate positive correlations with enjoyment (r = 0.238) and a weak positive correlation with purchase intention (r = 0.164).

Differences: Immersion is more strongly correlated with enjoyment and purchase intention in the group with AR. This suggests that AR increases the impact of immersion on these variables.

Enjoyment:

The group with AR: Exhibits a moderate positive correlation with purchase intention (r = 0.354).

The group without AR: Shows a moderate positive correlation with purchase intention (r = 0.296).

Differences: The correlation between enjoyment and purchase intention is slightly stronger in the group with AR. This indicates that AR may enhance the positive relationship between enjoyment and purchase intention.

The results indicate that AR technology appears to amplify the positive relationships among perceived augmented realism, technology fluidity, attitudes, perceived information quality, immersion, enjoyment, and purchase intention, suggesting that AR enhances the impact and interconnections among these factors.

Table 4.14 Results of correlation analysis of the group with AR (n=400)

Label	Variable	1	2	3	4	5	6	7
1	Perceived augmented realism	1						
2	Perceived technology fluidity	.365**	1					
3	Attitudes	.451**	.414**	1				
4	Perceived information quality	.322**	.397**	.377**	1			
5	Immersion	.312**	.282**	.352**	.315**	1		
6	Enjoyment	.345**	.346**	.359**	.319**	.294**	1	
7	Purchase intention	.374**	.391**	.396**	.348**	.325**	.354**	1
	**. At the 0.01 level (double-tailed), the correlation is significant.							

Table 4.15 Results of correlation analysis of the group without AR (n=402)

Label	Variable	1	2	3	4	5	6	7
1	Perceived augmented realism	1						
2	Perceived technology fluidity	.189**	1					
3	Attitudes	.275**	.250**	1				

Table 4.15 (Continue)

Label	Variable	1	2	3	4	5	6	7
4	Perceived information quality	.212**	.326**	.264**	1			
5	Immersion	.163**	.190**	.201**	.235**	1		
6	Enjoyment	.264**	.263**	.249**	.281**	.238**	1	
7	Purchase intention	.272**	.262**	.259**	.237**	.164**	.296**	1
	**. At the 0.01 level (double-tailed), the correlation is significant.							

4.2.2.5 Reliability Analysis

In this study, the main variables were measured in the form of scales, so testing the data quality of the measurement results is an important prerequisite to ensure the significance of the subsequent analysis. This study first analyzed the content consistency of each dimension through the Cronbach coefficient reliability test method. The Cronbach coefficient ranges from 0 to 1, and the higher the coefficient value of the test result, the higher the reliability (Cronbach, 1951). It is generally believed that if the reliability coefficient is below 0.6, the reliability is not credible, and the questionnaire needs to be redesigned or the data needs to be collected and analyzed again.

In this study, the results of the reliability analysis are presented in detail in Table 4.16. The findings indicate that the overall reliability coefficients for both the experimental and control groups, as well as for each individual dimension, fall within the range of 0.80 to 1.00. This range is widely accepted in the academic literature as a benchmark for high internal consistency, suggesting that the items within each construct are strongly correlated and effectively capture the underlying theoretical concepts they are intended to measure.

Such high levels of reliability demonstrate the robustness of the measurement instruments and confirm that the scales yield consistent results across different items. This consistency reduces the influence of random error and enhances the overall precision of the data. Therefore, the reliability coefficients obtained in this study not only affirm the quality of the survey design but also provide a solid foundation for the subsequent data analysis and interpretation of findings.

Table 4.16 Reliability analysis of the group with AR and without AR

Variables	Group with AR		Group without AR	
	Cronbach's alpha	**Number of items**	**Cronbach's alpha**	**Number of items**
Perceived augmented realism	0.899	6	0.891	6
Perceived technology fluidity	0.928	8	0.915	8
Attitudes	0.889	5	0.871	5
Perceived information quality	0.900	6	0.881	6
Immersion	0.828	3	0.800	3
Enjoyment	0.876	5	0.880	5
Purchase intention	0.884	5	0.867	5
Total	0.940	38	0.916	38

4.2.2.6 Measurement Model Assessment: CFA

1. The Confirmatory Factor Analysis of the Group With AR

Measurement model fit test of the group with AR

As shown in Table 4.17, the CFA results suggest a good fit between the data and the hypothesized model structure in the group with AR, evidenced by CMIN/DF (chi-square degree of freedom ratio) =1.143, RMSEA (root mean square error) =0.019, ITI, TLI, and CFI test results all reach an excellent level above 0.9. These fit indices meet commonly accepted standards for good model fit, indicating a high level of consistency between the data and the model, with the measurement indicators effectively capturing the defined constructs (latent variables). This provides the groundwork for further structural model analysis.

Table 4.17 Results of the CFA model fit test in the group with AR.

Indicators	Reference standards	Actual measurement results	Results
CMIN/DF	1-3 is excellent，3-5 is good	1.143	excellent
RMSEA	<0.05 is excellent，<0.08 is good	0.019	excellent
IFT	>0.9 is excellent，>0.8 is good	0.989	excellent
TLI	>0.9 is excellent，>0.8 is good	0.988	excellent
CFI	>0.9 is excellent，>0.8 is good	0.989	excellent

Internal reliability and convergent validity of the group with AR

Under the premise that the CFA model of the scale of the group with AR has a good fit, the convergent validity (AVE), composite reliability (CR), and discriminant validity of each variable of the scale were further tested. The test process calculated the standardized factor loading of each measurement item in the corresponding variable through the established CFA model. Then, each variable convergent validity value and the combined reliability value were calculated through the calculation formula of AVE and CR. The calculation formula is shown in the following:

$$AVE = \left(\sum \lambda^2\right)/n$$

$$CR = \left(\sum \lambda\right)^2/(\left(\sum \lambda\right)^2 + \sum \delta)$$

Convergent validity and composite reliability: The convergent validity values and combined reliability test results for the group with AR are shown in Table 4.18, which presents the convergent validity and composite reliability values for the group with AR. The analysis reveals the following metrics: For perceived augmented realism, the AVE is 0.597 and the CR is 0.898. For perceived technology fluidity, the AVE is 0.617 and the CR is 0.928. Attitudes have an AVE of 0.616 and a CR of 0.889. The AVE for perceived information quality is 0.599, with a CR of 0.899. Immersion shows an AVE of 0.616 and a CR of 0.827. Enjoyment has an AVE of 0.587 and a CR of 0.876, while purchase intention displays an AVE of 0.604 and a CR of 0.884.

Each construct's AVE value exceeds the threshold of 0.5, indicating that a substantial proportion of variance in the observed variables is explained by the latent constructs. Furthermore, the factor loadings for all items are greater than 0.7, ensuring individual item reliability. The CR values for all constructs surpass 0.7, confirming that the scale items consistently measure their respective constructs. These results confirm that each variable demonstrates strong convergent validity and composite reliability. The results of the CFA of the group with AR are shown in Figure 4.1.

Table 4.18 Convergent validity and combined reliability of the group with AR

Variables	Items	Factor Loading	AVE	CR
Perceived augmented realism	PAR1	0.779	0.597	0.898
	PAR2	0.773		
	PAR3	0.77		
	PAR4	0.776		
	PAR5	0.775		
	PAR6	0.764		
Perceived technology fluidity	PTF1	0.815	0.617	0.928
	PTF2	0.804		
	PTF3	0.771		

Table 4.18 (Continue)

Variables	Items	Factor Loading	AVE	CR
Perceived technology fluidity	PTF4	0.767	0.617	0.928
	PTF5	0.81		
	PTF6	0.768		
	PTF7	0.783		
	PTF8	0.769		
Attitudes	A1	0.779	0.616	0.889
	A2	0.786		
	A3	0.824		
	A4	0.751		
	A5	0.783		
Perceived information quality	PIQ1	0.77	0.599	0.899
	PIQ2	0.79		
Perceived information quality	PIQ3	0.777	0.599	0.899
	PIQ4	0.792		
	PIQ5	0.756		
	PIQ6	0.759		
Immersion	I1	0.773	0.616	0.827
	I2	0.763		
	I3	0.818		
Enjoyment	E1	0.738	0.587	0.876
	E2	0.741		
	E3	0.775		
	E4	0.807		
	E5	0.769		
Purchase intention	PI1	0.757	0.604	0.884
	PI2	0.759		
	PI3	0.784		
	PI4	0.809		
	PI5	0.777		

Discriminant validity: The purpose of this assessment is to confirm that each latent construct in the model is empirically and conceptually distinct from the others, thereby ensuring the structural integrity of the model and avoiding issues of multicollinearity or construct redundancy. Following the guidelines proposed by Hair et al. (2017), discriminant validity was evaluated by comparing the square root of the AVE for each construct with the inter-construct correlation coefficients. Discriminant validity is considered to be well established when the square root of a construct's AVE exceeds the highest correlation between that construct and any other construct in the model. This criterion ensures that each construct shares more variance with its own indicators than with those of other constructs. As shown in Table 4.19, all constructs meet this criterion. For example, the square root of the AVE for perceived augmented realism (PAR) is 0.773, which exceeds its highest correlation with another construct (0.506). Similar results were observed for the other constructs: perceived technology fluidity (0.785), attitudes (0.785), perceived information quality (0.774), immersion (0.785), and enjoyment (0.766), with all corresponding inter-construct correlations remaining below these thresholds.

These findings provide strong evidence of discriminant validity, indicating that each construct is both conceptually and statistically distinct. This ensures that each latent variable is more closely associated with its own indicators than with those of other constructs, thereby supporting the measurement model's integrity.

Therefore, the measurement model demonstrates not only convergent validity, as previously discussed, but also robust discriminant validity, confirming that the theoretical dimensions represented by the constructs are empirically separable. This supports the overall validity and reliability of the measurement instrument used in this study and lays a solid foundation for subsequent structural path analysis.

Table 4.19 Fornell-Larcker

Label	Variables	1	2	3	4	5	6	7
1	Perceived augmented realism	0.597						
2	Perceived technology fluidity	0.401	0.617					
3	Attitudes	0.506	0.458	0.616				
4	Perceived information quality	0.357	0.435	0.420	0.599			
5	Immersion	0.363	0.323	0.409	0.366	0.616		
6	Enjoyment	0.387	0.384	0.405	0.357	0.346	0.587	
7	Purchase intention	0.418	0.432	0.445	0.389	0.380	0.403	0.604
	The square root of the AVE value	0.773	0.785	0.785	0.774	0.785	0.766	0.777

Note: The value of the AVE is shown in italics on the diagonal. Correlation values for the group with AR are shown below the diagonal, $p < 0.01$.

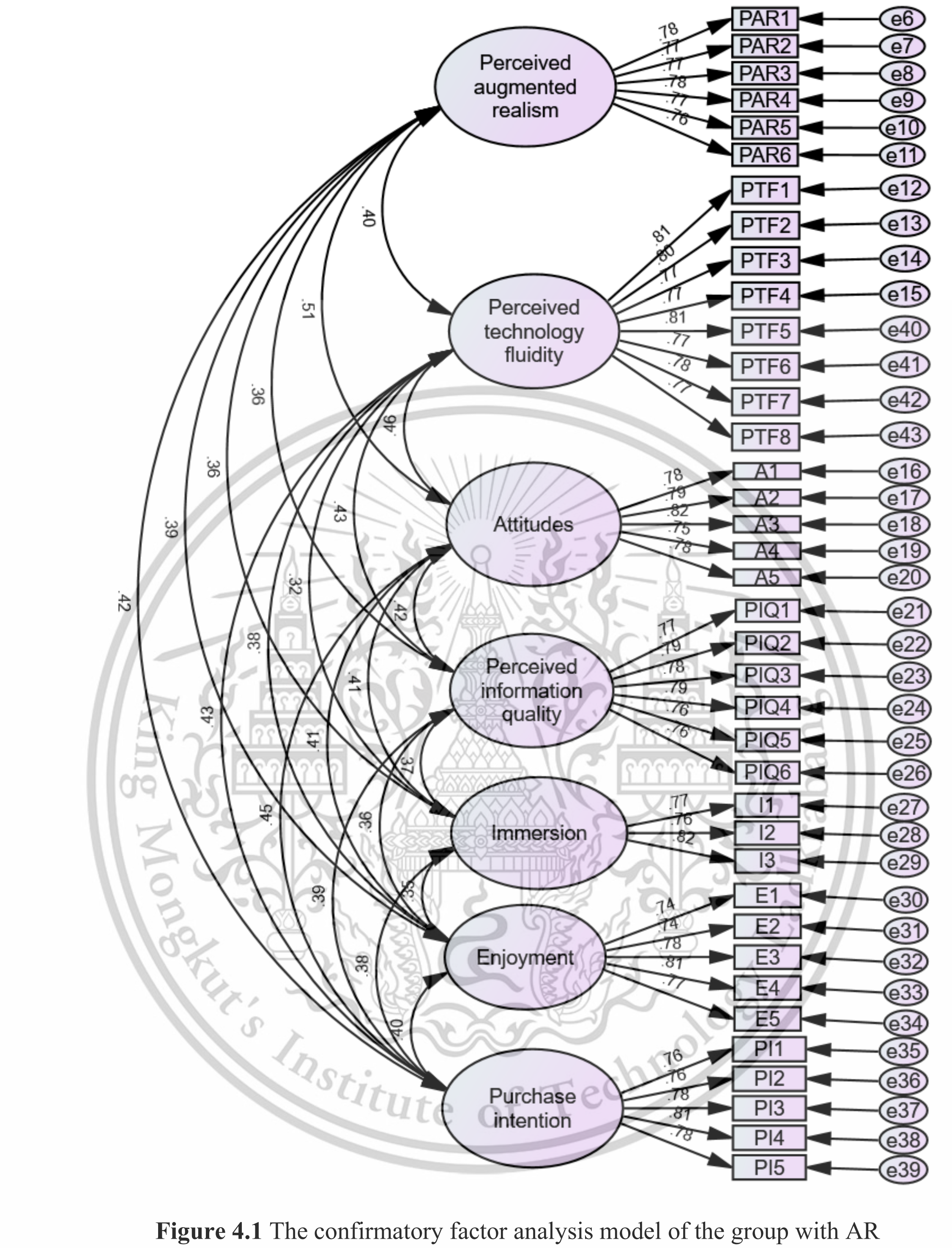


Figure 4.1 The confirmatory factor analysis model of the group with AR

2. The Confirmatory Factor Analysis Model of the Group Without AR

Measurement model fit test of the group without AR

The CFA results demonstrate an excellent fit between the data and the proposed model structure for the group without AR. This is evidenced by the CMIN/DF ratio of 1.155, an RMSEA of 0.020, and ITI, TLI, and CFI values all exceeding 0.9. These indices satisfy well-established criteria for model fit, suggesting a high degree of alignment between the data and the model, with measurement indicators effectively representing the latent variables.

Table 4.20 The CFA model fit test result of the group without AR

Indicators	Reference standards	Actual measurement results	Results
CMIN/DF	1-3 is excellent，3-5 is good	1.155	excellent
RMSEA	<0.05 is excellent，<0.08 is good	0.020	excellent
IFT	>0.9 is excellent，>0.8 is good	0.987	excellent
TLI	>0.9 is excellent，>0.8 is good	0.986	excellent
CFI	>0.9 is excellent，>0.8 is good	0.987	excellent

Internal reliability and convergent validity of the group without AR

Similarly, given that the CFA model for the non-AR group demonstrated an acceptable model fit, further evaluations were conducted to assess the convergent validity (Average Variance Extracted, AVE), composite reliability (CR), and discriminant validity of each construct. These psychometric assessments ensure that the measurement model is both internally consistent and conceptually distinct. The detailed CFA results for the non-AR group are presented in Figure 4.2.

Convergent validity and composite reliability: As showed in Table 4.21, the convergent validity and composite reliability results for the group without AR. The analysis indicates the following values: For perceived enhanced realism, the AVE is 0.576, and the CR is 0.89. Perceived technical fluency has an AVE of 0.574 and a CR of 0.915. The AVE for attitudes is 0.575, with a CR of 0.871. The AVE for perceived information quality is 0.552, and the CR is 0.88. Immersion shows an AVE of 0.573 and a CR of 0.801. Enjoyment has an AVE of 0.594 and a CR of 0.88, while purchase intention displays an AVE of 0.566 and a CR of 0.867. All AVE values are above 0.5, factor loadings exceed 0.7, and CR values are above 0.7. These findings confirm that each variable in the group without AR exhibits strong convergent validity and composite reliability.

Table 4.21 Convergent validity and combined reliability of the group without AR

Variables	Items	Factor Loading	AVE	CR
Perceived augmented realism	PAR1	0.772	0.576	0.89
	PAR2	0.717		
	PAR3	0.741		
	PAR4	0.754		
	PAR5	0.792		
	PAR6	0.778		

Table 4.21 (Continue)

Variables	**Items**	**Factor Loading**	**AVE**	**CR**
Perceived technology fluidity	PTF1	0.783	0.574	0.915
	PTF2	0.748		
	PTF3	0.747		
	PTF4	0.778		
	PTF5	0.707		
	PTF6	0.744		
	PTF7	0.756		
	PTF8	0.796		
Attitudes	A1	0.763	0.575	0.871
	A2	0.772		
	A3	0.763		
	A4	0.762		
	A5	0.732		
Perceived information quality	PIQ1	0.757	0.552	0.88
	PIQ2	0.786		
	PIQ3	0.713		
	PIQ4	0.757		
	PIQ5	0.731		
	PIQ6	0.713		
Immersion	I1	0.749	0.573	0.801
	I2	0.73		
	I3	0.792		
Enjoyment	E1	0.808	0.594	0.88
	E2	0.762		
	E3	0.799		
	E4	0.748		
	E5	0.737		
Purchase intention	PI1	0.729	0.566	0.867
	PI2	0.766		
	PI3	0.755		
	PI4	0.755		
	PI5	0.758		

Discriminant validity: In this study, discriminant validity for the non-AR group was assessed using the conventional approach recommended in SEM, following the Fornell-Larcker criterion. As illustrated in Table 4.22, this procedure serves to confirm that the latent constructs measured in the model are empirically distinct from one another. Ensuring discriminant validity is a critical step in SEM, as it reduces the risk of construct redundancy and minimizes potential estimation biases caused by overlapping conceptual domains.

According to the Fornell-Larcker criterion, discriminant validity is established when the square root of the AVE for a given construct exceeds the highest correlation between that construct and any other construct in the model. Table 4.22 reports that for each latent variable in the non-AR group, the square root of the AVE surpasses the corresponding inter-construct correlation coefficients. This indicates that each construct shares more variance with its own observed indicators than with those of other constructs, thereby satisfying the threshold for discriminant validity.

These results confirm that the measurement model for the non-AR group demonstrates a high degree of discriminant validity. In other words, the latent variables in the model are statistically distinct and conceptually non-overlapping, supporting the robustness and interpretability of subsequent structural model analysis within this group.

Table 4.22 Fornell-Larcker

Label	Variables	1	2	3	4	5	6	7
1	Perceived augmented realism	0.576						
2	Perceived technology fluidity	0.298	0.574					
3	Attitudes	0.358	0.279	0.575				
4	Perceived information quality	0.365	0.364	0.303	0.552			
5	Immersion	0.197	0.224	0.239	0.283	0.573		
6	Enjoyment	0.296	0.288	0.282	0.323	0.283	0.594	
7	Purchase intention	0.308	0.293	0.298	0.276	0.203	0.34	0.566
	The square root of the AVE value	0.759	0.758	0.758	0.743	0.757	0.771	0.752

Note: The value of the AVE is shown in italics on the diagonal. Correlation values for the group without AR are shown below the diagonal, $p < 0.01$.

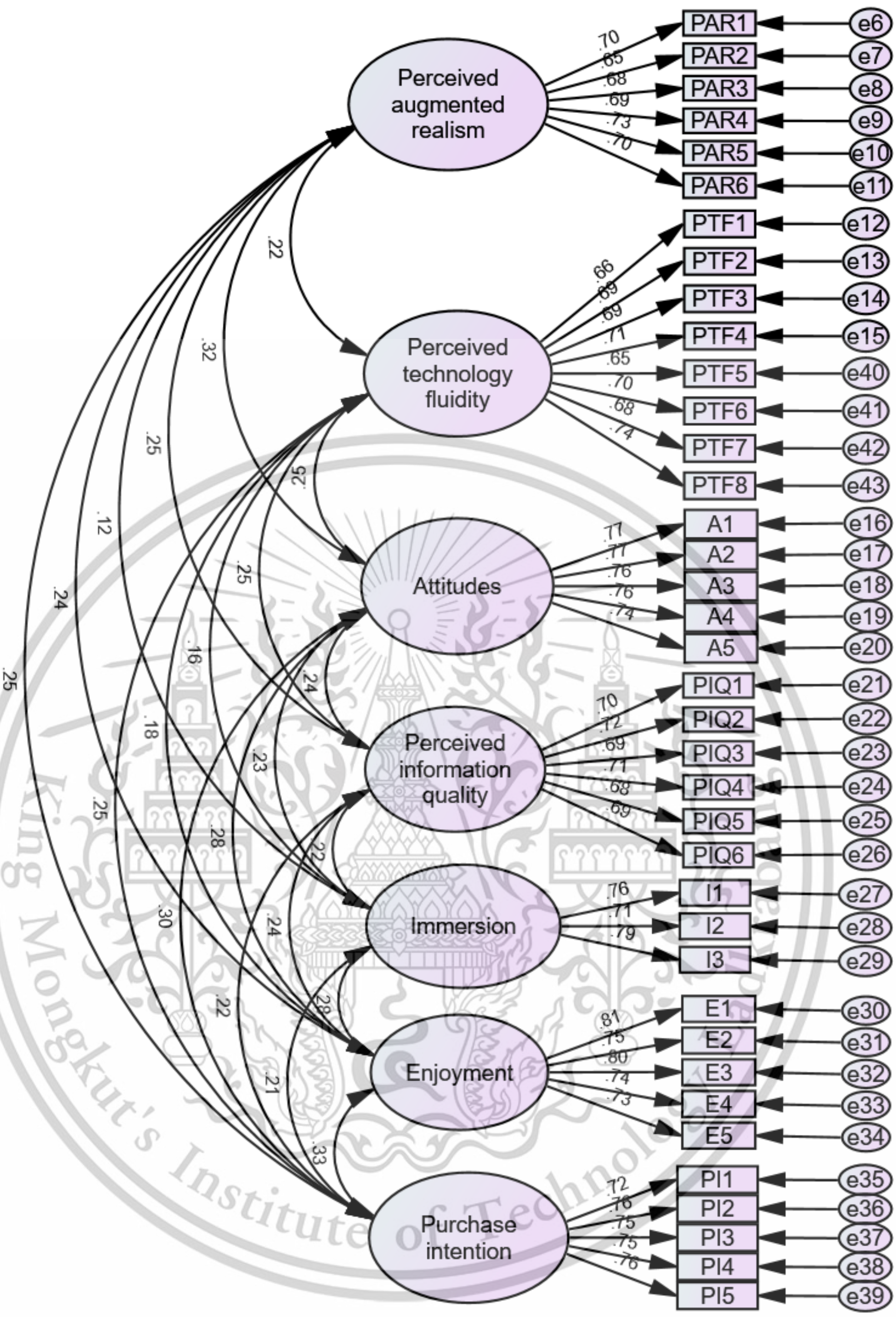


Figure 4.2 The confirmatory factor analysis model of the group without AR

4.2.2.7 Structural Model Assessment

1. Structural Model Fit Test

The structural model fit test for the group with AR

The findings in Table 4.23 indicate that the structural model for the AR group exhibits a satisfactory fit, with its structural assumptions (encompassing the relationships and pathways between variables) aligning well with the observed data. This fit is evidenced by a

CMIN/DF value of 1.295, which is within the acceptable range of 1 to 3. The RMSEA value of 0.027 is well below the threshold of 0.05, reflecting an excellent fit. Furthermore, the ITI, TLI, and CFI indices all meet or exceed the stringent benchmark of 0.9. These results affirm that the structural model for the AR group demonstrates a good fit.

Table 4.23 The results of the SEM model fit test for the group with AR

Indicators	Reference standards	Actual results	Results
CMIN/DF	1-3 is excellent，3-5 is good	1.295	excellent
RMSEA	<0.05 is excellent，<0.08 is good	0.027	excellent
IFT	>0.9 is excellent，>0.8 is good	0.978	excellent
TLI	>0.9 is excellent，>0.8 is good	0.976	excellent
CFI	>0.9 is excellent，>0.8 is good	0.978	excellent

The structural model fit test for the group without AR

The goodness-of-fit test results presented in Table 4.24 of the group without AR suggest that the structural model demonstrates a good fit as the CMIN/DF is 1.239, which is within the acceptable range of 1 to 3. The RMSEA stands at 0.024, well below the excellent threshold of 0.05. Furthermore, the value of ITI, TLI, and CFI indices all exceed the exemplary benchmark of 0.9. These results collectively indicate that the structural model for the group without AR exhibits a good fit.

Table 4.24 The results of the SEM model fit test for the group without AR

Indicators	Reference standards	Actual results	Results
CMIN/DF	1-3 is excellent，3-5 is good	1.239	excellent
RMSEA	<0.05 is excellent，<0.08 is good	0.024	excellent
IFT	>0.9 is excellent，>0.8 is good	0.979	excellent
TLI	>0.9 is excellent，>0.8 is good	0.978	excellent
CFI	>0.9 is excellent，>0.8 is good	0.979	excellent

2. Analysis of the Coefficient of Determination (R^2) of Endogenous Variables

To further assess the explanatory power of the structural model, the coefficient of determination (R^2) for each endogenous latent variable was examined. R^2 reflects the proportion of variance in an endogenous variable that is explained by its predictors in the model. According to Hair et al. (2017), R^2 values of 0.75, 0.50, and 0.25 can be classified as substantial, moderate, and weak, respectively although in behavioral research, even lower R^2 values may provide valuable insights. In this study, the R^2 values for the key endogenous variables in the group with and without AR are showed in the Table 4.25.

Table 4.25 Squared multiple correlations for the group with and without AR

Endogenous Variables	Estimate (AR)	Estimate (non-AR)	Contrastive Analysis
Immersion	0.292	0.232	The higher R^2 in the AR group indicates that AR slightly improves immersion's explanatory power, though it remains at a modest level.
Perceived information quality	0.295	0.296	The nearly identical values in both groups indicate that perceived information quality is not dependent on the AR context.
Enjoyment	0.308	0.330	The slightly higher value in the non-AR group may be due to lower expectations, resulting in greater satisfaction.
Attitudes	0.327	0.264	The higher value in the AR group suggests that augmented reality enhances the explanatory power for attitude formation.
Purchase intention	0.366	0.362	The values in both groups are similar, with the AR group being slightly stronger, indicating that the model's explanatory power for purchase intention is at a moderate level.

All R^2 values fall within the "weak" explanatory range of 0.25 to 0.50, but none drop below 0.20, which is often considered the minimum threshold for theoretical relevance in consumer behavior research (Plonsky & Ghanbar, 2018). Notably, purchase intention exhibited the highest R^2 in both groups (AR = 0.366; non-AR = 0.362), suggesting that the model captures a substantial portion of the variance in consumers' behavioral outcomes. The AR group consistently demonstrated higher R^2 values for immersion, attitudes, and purchase intention, underscoring the added value of AR in shaping user responses. However, the similarity in perceived information quality across groups implies that this cognitive factor may operate independently of AR-enhanced experiences. These findings point to the need for future research to incorporate additional predictors, such as trust or perceived risk, to further improve explanatory power.

Although most of the endogenous constructs exhibit R^2 values below the moderate level, such results are not uncommon in social science research, particularly in studies involving consumer behavior (Gupta et al., 2024). This is due to the inherently complex and multifaceted nature of consumer decision-making, which is often influenced by numerous external factors such as individual preferences, media literacy, prior experiences, and contextual elements. Plonsky and Ghanbar (2018) note that an R^2 value of 0.20 or above may still be considered meaningful in behavioral research.

Moreover, this study integrates emerging constructs—such as perceived augmented realism and perceived technology fluidity—within a relatively novel context of mobile AR shopping. The model, therefore, serves an exploratory purpose in advancing theoretical understanding in this area. The relatively low R^2 values suggest opportunities for future research to expand the model by incorporating additional moderating or control variables, such as trust, perceived risk, frequency of AR usage, or demographic characteristics, to enhance both explanatory and predictive power.

On the measurement level, most observed indicators demonstrate satisfactory levels of variance explanation, with R^2 values generally ranging from 0.55 to 0.66. For instance, items in the AR group such as PTF1 (0.666), A3 (0.657), and I3 (0.661) reflect strong indicator reliability, supporting the measurement model's adequacy, as showed in the appendix O for details.

3. Path Relationship Hypotheses Testing

Hypotheses testing for the group with AR

This study employed SEM for hypothesis testing, with the results presented in Table 4.26. According to the analysis results of the group with AR, it can be observed that the hypotheses of H1a-H9 are all supported.

H1a Perceived augmented realism significantly positively affects attitudes ($\beta=0.332$, $P<0.001$), thus supporting hypothesis H1a.

H1b Perceived augmented realism significantly positively affects perceived information quality ($\beta=0.243$, $P<0.001$), thus supporting hypothesis H1b.

H2a Perceived technology fluidity significantly positively affects attitudes ($\beta=0.236$, $P<0.001$), thus supporting hypothesis H2a.

H2b Perceived technology fluidity significantly positively affects perceived information quality ($\beta=0.369$, $P<0.001$), thus supporting hypothesis H2b.

H3a Perceived augmented realism significantly positively affects immersion ($\beta=0.297$, $P<0.001$), thus supporting hypothesis H3a.

H3b Perceived augmented realism significantly positively affects enjoyment ($\beta=0.239$, $P<0.001$), thus supporting hypothesis H3b.

H4a Perceived technology fluidity significantly positively affects immersion ($\beta=0.232$, $P<0.001$), thus supporting hypothesis H4a.

H4b Perceived technology fluidity significantly positively affects enjoyment (β=0.253, P<0.001), thus supporting hypothesis H4b.

H5a Attitudes significantly positively affect purchase intention (β=0.273, P<0.001), thus supporting hypothesis H5a.

H5b Perceived information quality significantly positively affects purchase intention (β=0.201, P<0.001), thus supporting hypothesis H5b.

H6 Immersion significantly positively affects enjoyment (β=0.191, P=0.002<0.01), thus supporting hypothesis H6.

H7 Enjoyment significantly positively affects purchase intention (β=0.228, P<0.001), thus supporting hypothesis H7.

H8 Perceived information quality significantly positively affects attitudes (β=0.162, P=0.004<0.01), thus supporting hypothesis H8.

H9 Enjoyment significantly positively affects attitudes (β=0.148, P=0.008<0.01), thus supporting hypothesis H9.

Table 4.26 The results of the Hypotheses testing for the group with AR

Hypothesis		**Estimate**	**S.E.**	**C.R.**	**P**	**Results**
H1a	Perceived augmented realism→Attitudes	0.332	0.057	5.835	***	Y
H1b	Perceived augmented realism→Perceived information quality	0.243	0.053	4.56	***	Y
H2a	Perceived technology fluidity→Attitudes	0.239	0.054	4.205	***	Y
H2b	Perceived technology fluidity→Perceived information quality	0.369	0.053	6.718	***	Y
H3a	Perceived augmented realism→Immersion	0.297	0.06	5.143	***	Y
H3b	Perceived augmented realism→Enjoyment	0.239	0.054	4.205	***	Y
H4a	Perceived technology fluidity→Immersion	0.253	0.051	4.614	***	Y
H4b	Perceived technology fluidity→Enjoyment	0.253	0.051	4.614	***	Y
H5a	Attitudes→Purchase intention	0.273	0.059	4.508	***	Y

Table 4.26 (Continue)

Hypothesis		**Estimate**	**S.E.**	**C.R.**	**P**	**Results**
H5b	Perceived information quality→Purchase intention	0.201	0.055	3.601	***	Y
H6	Immersion→Enjoyment	0.191	0.056	3.15	0.002	Y
H7	Enjoyment→Purchase intention	0.228	0.058	4.018	***	Y
H8	Perceived information quality→Attitudes	0.162	0.057	2.907	0.004	Y
H9	Enjoyment→Attitudes	0.148	0.059	2.663	0.008	Y

Note: Y represents the hypothesis that is supported, and N represents the unsupported hypothesis.

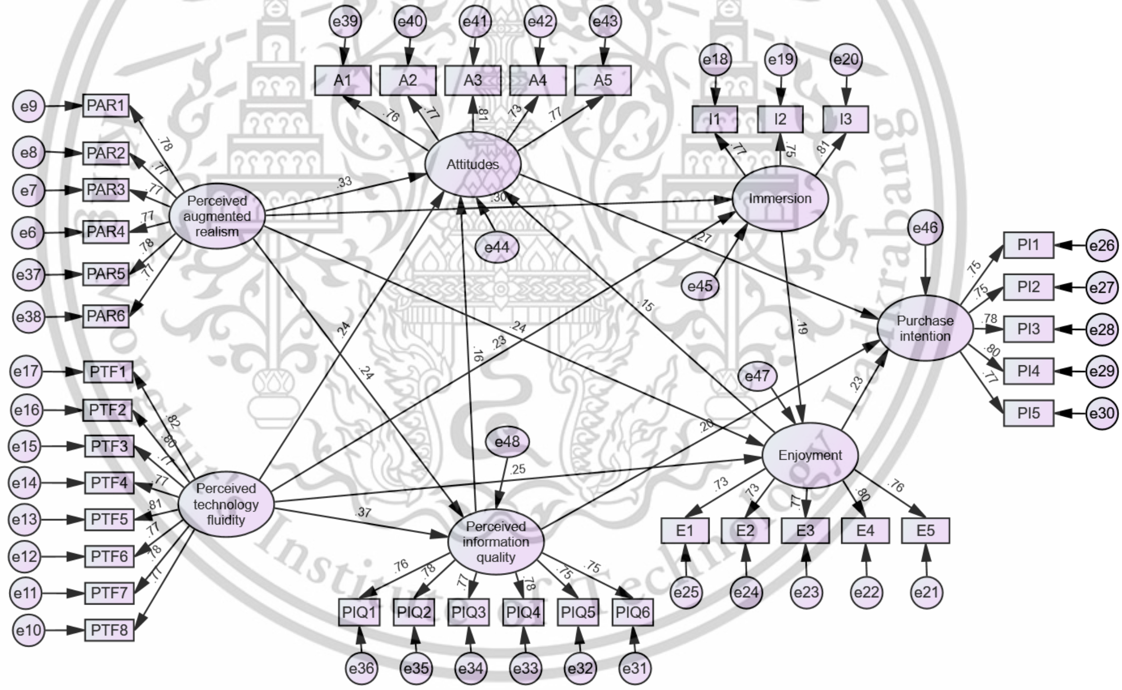


Figure 4.3 The structural model assessment of the group with AR

Hypotheses testing for the group without AR

The analysis results of the group without AR are presented in Table 4.27 and Figure 4.4, which shows the following results.

H1a Perceived augmented realism significantly positively affects attitudes (β=0.231, P<0.001), thus supporting hypothesis H1a.

H1b Perceived augmented realism significantly positively affects perceived information quality (β=0.22, P<0.001), thus supporting hypothesis H1b.

H2a Perceived technology fluidity significantly positively affects attitudes (β=0.156, P=0.006<0.01), thus supporting hypothesis H2a.

H2b Perceived technology fluidity significantly positively affects perceived information quality (β=0.219, P<0.001), thus supporting hypothesis H2b.

H3a The predictive effect of perceived augmented realism on immersion is insignificant (β=0.102, P=0.092>0.05); thus, hypothesis H3a is not supported.

H3b Perceived augmented realism significantly positively affects enjoyment (β=0.201, P<0.001), thus supporting hypothesis H3b.

H4a Perceived technology fluidity significantly positively affects immersion (β=0.147, P=0.014<0.05), thus supporting hypothesis H4a.

H4b The predictive effect of perceived technology fluidity on enjoyment is not significant (β=0.108, P=0.052>0.05); thus, hypothesis H4b is not supported.

H5a Attitudes significantly positively affect purchase intention (β=0.208, P<0.001), thus supporting hypothesis H5a.

H5b Perceived information quality positively affects purchase intention (β=0.124, P=0.029<0.05), thus supporting hypothesis H5b.

H6 Immersion significantly positively affects enjoyment (β=0.245, P<0.001), thus supporting hypothesis H6.

H7 Enjoyment significantly positively affects purchase intention (β=0.248, P<0.001), thus supporting hypothesis H7.

H8 The predictive effect of perceived information quality on attitudes is not significant (β=0.103, P=0.078>0.05), thus hypothesis H8 is not supported.

H9 Enjoyment significantly positively affects attitudes (β=0.173, P<0.002), thus supporting hypothesis H9.

Table 4.27 The results of the Hypotheses testing for the group without AR

Hypothesis		**Estimate**	**S.E.**	**C.R.**	**P**	**Results**
H1a	Perceived augmented realism→Attitudes	0.231	0.068	3.831	***	Y
H1b	Perceived augmented realism→Perceived information quality	0.22	0.061	3.725	***	Y
H2a	Perceived technology fluidity→Attitudes	0.156	0.058	2.745	0.006	Y

Table 4.27 (Continue)

Hypothesis		**Estimate**	**S.E.**	**C.R.**	**P**	**Results**
H2b	Perceived technology fluidity→Perceived information quality	0.219	0.054	3.784	***	Y
H3a	Perceived augmented realism→Immersion	0.102	0.066	1.686	0.092	N
H3b	Perceived augmented realism→Enjoyment	0.201	0.06	3.513	***	Y
H4a	Perceived technology fluidity→Immersion	0.147	0.059	2.463	0.014	Y
H4b	Perceived technology fluidity→Enjoyment	0.108	0.052	1.946	0.052	N
H5a	Attitudes→Purchase intention	0.208	0.055	3.516	***	Y
H5b	Perceived information quality→Purchase intention	0.124	0.058	2.188	0.029	Y
H6	Immersion→Enjoyment	0.245	0.057	4.054	***	Y
H7	Enjoyment→Purchase intention	0.248	0.059	4.24	***	Y
H8	Perceived information quality→Attitudes	0.103	0.064	1.762	0.078	N
H9	Enjoyment→Attitudes	0.173	0.062	3.027	0.002	Y

Note: Y represents the hypothesis that is supported, and N represents the hypothesis that is unsupported.

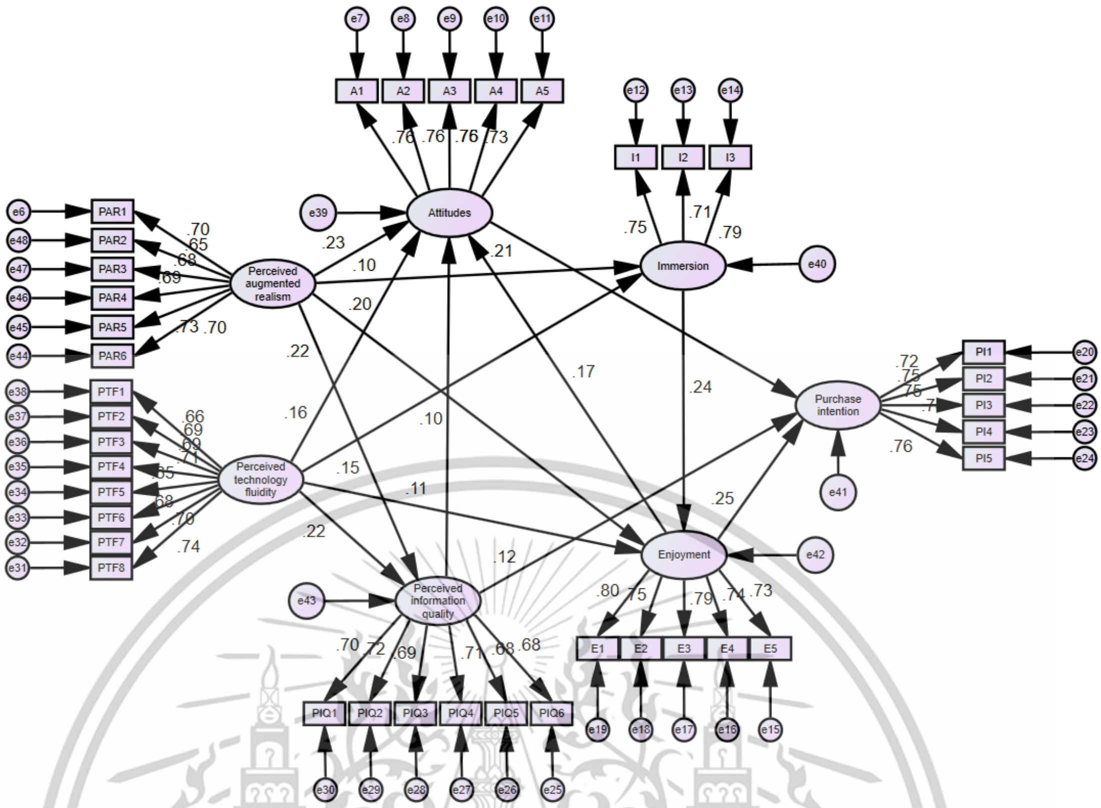


Figure 4.4 The structural model assessment of the group without AR

4.2.2.8 Mediation Effect Test

This study employed AMOS software to construct a structural equation model and conducted a mediation effect analysis using the Bootstrap method. The Bootstrap method is as follows: repeatedly random sampling (with replacement) from the original sample, generating new estimates for the independent variable, mediator variable, and dependent variable with each sample. The mediation effect value is calculated for each sample, and a confidence interval is constructed. The mediation effect is considered significant if the confidence interval does not include zero and the p-value is < 0.05. The results of the mediating effect test for the group with AR and without AR are shown in Table 4.28 and Table 4.29.

1. The mediating effects in the group with AR

As shown in Table 4.28 , in the group with AR, the total effect of the PAR→PI path is 0.252, and the total effect of the PTF→PI path is 0.223. This indicates that the independent variables in the group with AR have a significant overall impact on the dependent variable. However, the direct effects of the PAR→PI and PTF→PI paths are small (βPAR→PI $= 0.002$, βPTF→PI $= 0.001$). The indirect effects of both PAR→PI and PTF→PI paths are transmitted through multiple mediating variables, and the total indirect effects are 0.25 and 0.222. The test results of each relationship path in the group with AR are as follows.

H10a PAR→A→PI: The path effect is 0.089 ($\beta = 0.089$), the p-value is 0.045, and the 95% confidence interval does not contain 0, which means that the indirect effect of the independent variable (perceived augmented realism) on the dependent variable (purchase intention) through the mediating variable (attitudes) is significant. Thus, H10a is supported.

H10b PAR→PIQ→PI: The effect of the path is 0.046 (β= 0.046) with a p-value of 0.017 and the 95% confidence interval does not contain 0, which indicates that the indirect effect of the independent variable (perceived augmented realism) on the dependent variable (purchase intention) through the mediating variable (perceived information quality) is significant. Thus, H10b is supported.

H11a PTF→A→PI: The effect of the path is 0.07 (β= 0.07) with a p-value of 0.001 and the 95% confidence interval does not contain 0, which indicates that the indirect effect of the independent variable (perceived technology fluidity) on the dependent variable (purchase intention) through the mediating variable (attitude) is significant. Therefore, H11a is supported.

H11b PTF→PIQ→PI: The effect of the path is 0.072 (β= 0.07) with a p-value of 0.001 and the 95% confidence interval does not contain 0, which indicates that the indirect effect of the independent variable (perceived technology fluidity) on the dependent variable (purchase intention) through the mediating variable (perceived information quality) is significant. Thus, H11b is supported.

H12a PAR→E→PI: The effect of the path is 0.063 (β= 0.063) with a p-value of 0.019 and the 95% confidence interval does not contain 0, which means that the indirect effect of the independent variable (perceived augmented realism) on the dependent variable (purchase intention) through the mediating variable (enjoyment) is significant. Therefore, H12a is supported.

H12b PAR→I→E→PI: The effect of the path is 0.052 (β= 0.052) with a p-value of 0.004 and the 95% confidence interval does not include 0, indicating that the indirect effect of the independent variable (perceived augmented realism) on the dependent variable (purchase intention) through the mediating variables (immersion and enjoyment) is significant. Thus, H12b is supported.

H13a PTF→E→PI: The effect of the path is 0.055 (β= 0.055) with a p-value of 0.001 and the 95% confidence interval does not contain 0, which indicates that the indirect effect of the independent variable (perceived technology fluidity) on the dependent variable (purchase intention) through the mediating variable (enjoyment) is significant. Thus, H13a is supported.

H13b PTF→I→E→PI: The effect of the path is 0.025 (β= 0.025) with a p-value of 0.002 and a 95% confidence interval that does not contain 0, indicating that the indirect effect of the independent variable (perceived technology fluidity) on the dependent variable (purchase intention) through the mediating variables (immersion and enjoyment) is significant. In other words, when users perceive AR technology as fluid and capable of effectively delivering various communicative cues, it enhances their immersive experience, which in turn elevates their enjoyment, ultimately increasing their intention to purchase. Therefore, H13b is empirically supported.

Table 4.28 The results of mediating effects in the group with AR

Path		**Estimate**	**95%CI**		**Results**
			LB	**UB**	
Perceived augmented realism → Purchase intention	Total effect	0.252	0.0168	0.287	
	Direct effect	0.002	0.000	0.000	
	H0a: Perceived augmented realism → Attitudes → Purchase intention	0.089	0.045	0.144	Y
	H0b: Perceived augmented realism → Perceived information quality → Purchase intention	0.046	0.017	0.085	Y
	H12a: Perceived augmented realism → Enjoyment → Purchase intention	0.063	0.019	0.093	Y
	H12b: Perceived augmented realism → Immersion → Enjoyment → Purchase intention	0.052	0.004	0.076	Y
	Total indirect effect	0.25	0.000	0.000	
Perceived technology fluidity → Purchase intention	Total effect	0.223	0.162	0.287	
	Direct effect	0.001	0.000	0.000	
	H11a: Perceived technology fluidity → Attitudes → Purchase intention	0.07	0.022	0.11	Y
	H11b: Perceived technology fluidity → Perceived information quality → Purchase intention	0.072	0.029	0.122	Y

Table 4.28 (Continue)

Path		Estimate	95%CI		Results
			LB	UB	
Perceived technology fluidity → Purchase intention	H13a: Perceived technology fluidity → Enjoyment → Purchase intention	0.055	0.021	0.096	Y
	H13b: Perceived technology fluidity → Immersion → Enjoyment → Purchase intention	0.025	0.002	0.032	Y
	Total indirect effect	0.222	0.08	0.401	

Note: Y represents the hypothesis that is supported, and N represents the unsupported hypothesis

2. The mediating effects in the group without AR

As shown in Table 4.29, in the control group, the total indirect effect of the PAR→ PI path is 0.142, and the total indirect effect of the PTF→PI path is 0.100, but there is no direct effect. This indicates that the indirect effects of PAR→PI and PTF→PI paths are transmitted through multiple mediating variables, and the test results of each relationship path in the group without AR are as follows.

H10a PAR→A→PI: The path effect is 0.047 (β= 0.047), the p-value is 0.001, and the 95% confidence interval does not contain 0, which means that the indirect effect of the independent variable (perceived augmented realism) on the dependent variable (purchase intention) through the mediating variable (attitudes) is significant. Therefore, in the group without AR, H10a is supported.

H10b PAR→PIQ→PI: The path effect is 0.032(β= 0.032), the p-value is 0.032, and the 95% confidence interval does not contain 0, which means that the indirect effect of the independent variable (perceived augmented realism) on the dependent variable (purchase intention) through the mediating variable (perceived information quality) is significant. Therefore, in the group without AR, H10b is supported.

H11a PTF→A→PI: The effect of the path is 0.031 (β= 0.013) with a p-value of 0.008, and the 95% confidence interval does not contain 0, which indicates that the indirect effect of the independent variable (perceived technology fluidity) on the dependent variable (purchase intention) through the mediating variable (attitudes) is significant. Therefore, in the group without AR, H11a is supported.

H11b PTF→PIQ→PI: The effect of the path is 0.031 (β= 0.031) with a p-value of 0.029, and the 95% confidence interval does not contain 0, which indicates that the indirect effect of the independent variable (perceived technology fluidity) on the dependent variable (purchase intention) through the mediating variable (perceived information quality) is significant. Therefore, in the group without AR, H11b is supported.

H12a PAR→E→PI: The effect of the path is 0.05 (β= 0.032) with a p-value of 0.001 and the 95% confidence interval does not contain 0, which means that the indirect effect of the independent variable (perceived augmented realism) on the dependent variable (purchase intention) through the mediating variable (enjoyment) is significant. Therefore, in the group without AR, H12a is supported.

H12b PAR→I→E→PI: The effect of the path is 0.013 (β= 0.013), the P value is 0.099 > 0.05, and the 95% confidence interval contains 0. Therefore, in the group without AR, H12b is not supported.

H13a PTF→E→PI: The effect of the path is 0.025 (β= 0.025), the p-value is 0.082 > 0.05, and the 95% confidence interval contains 0. Therefore, in the group without AR, H13a is not supported.

H13b PTF→I-E→PI: The effect of the path is 0.013 (β= 0.013) with a p-value of 0.032, and the 95% confidence interval does not contain 0, indicating that the indirect effect of the independent variable (perceived technology fluidity) on the dependent variable (purchase intention) through the mediating variables (immersion and enjoyment) is significant. Therefore, in the group without AR, H13b is supported.

Table 4.29 The results of mediating effects in the group without AR

Path		**Estimate**	**95%CI**		**Results**
			LB	**UB**	
Perceived augmented realism → Purchase intention	Total effect	0.142	0.087	0.201	
	Direct effect	0.000	0.000	0.000	
	H0a: Perceived augmented realism → Attitudes → Purchase intention	0.047	0.015	0.087	Y
Perceived augmented realism → Purchase intention	H0b: Perceived augmented realism → Perceived information quality → Purchase intention	0.032	0.001	0.061	Y

Table 4.29 (Continue)

Path		Estimate	95%CI		Results
			LB	UB	
Perceived augmented realism → Purchase intention	H12a: Perceived augmented realism → Enjoyment → Purchase intention	0.05	0.018	0.089	Y
	H12b: Perceived augmented realism → Immersion → Enjoyment → Purchase intention	0.013	-0.007	0.017	N
	Total indirect effect	0.142	0.127	0.355	
Perceived technology fluidity → Purchase intention	Total effect	0.100	0.051	0.154	
	Direct effect	0.000	0.000	0.000	
	H11a: Perceived technology fluidity → Attitudes → Purchase intention	0.031	0.006	0.066	Y
	H11b: Perceived technology fluidity → Perceived information quality → Purchase intention	0.031	0.001	0.061	Y
Perceived technology fluidity → Purchase intention	H13a: Perceived technology fluidity → Enjoyment → Purchase intention	0.025	-0.003	0.06	N
	H13b: Perceived technology fluidity → Immersion → Enjoyment → Purchase intention	0.013	0.001	0.021	Y
	Total indirect effect	0.100	0.082	0.165	

Note: Y represents the hypothesis that is supported, and N represents the unsupported hypothesis.

4.2.2.9 Summary of hypotheses test results

The findings from Table 4.30 provide a detailed examination of how AR influences consumer responses and purchase intentions, highlighting both direct effects and mediating mechanisms compared between groups with and without AR. Firstly, within the group with AR, all hypotheses (H1-H13) are supported, indicating that AR enhances various facets of consumer experience as hypothesized. This includes augmented realism and technology fluidity exerting a notably stronger positive influence on cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment). These findings underscore AR's ability to enhance both cognitive and affective dimensions of user experience significantly. Moreover, in the AR group, cognitive responses (attitudes and perceived information quality) and affective responses (enjoyment) demonstrate a robust positive impact on purchase intention. This suggests that augmented realism and technology fluidity not only enhances immediate consumer perceptions and emotional experiences but also translates these into stronger intentions to purchase.

In contrast, in the group without AR, several hypotheses (H3a, H4b, H8, H12b, and H13a) are not supported, indicating that the absence of AR technology diminishes or alters the relationships between perceived augmented realism, technology fluidity, and affective responses. Therefore, the results further proved the critical role of AR in bolstering the perceived realism and technology fluidity, thereby enhancing affective responses such as immersion and enjoyment in interactive environments.

The mediating effects analysis further elucidates these dynamics. In the AR group, cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) mediate the relationship between perceived augmented realism, technology fluidity, and purchase intention. This mediation pathway suggests that AR enhances purchase intention by first influencing consumer perceptions and emotional states. Conversely, in the group without AR, the mediating effect of affective response (immersion and enjoyment) between perceived augmented realism and purchase intention is insignificant. Similarly, the mediating effect of enjoyment between perceived technology fluidity and purchase intention is also insignificant. These findings highlight that without the immersive and engaging qualities of AR, the indirect pathways linking perceived realism, technology fluidity, emotional responses, and purchase intention are weakened or nonexistent.

Furthermore, empirical analysis shows that, among AR characteristics affecting cognitive responses, perceived technology fluidity most significantly influences perceived information quality, followed by perceived augmented realism on attitudes. For affective responses, perceived augmented realism most strongly affects immersion. Attitudes have the most significant impact on purchase intention and exhibit the strongest mediating effect, followed by perceived information quality. The results indicate that in AR environments, perceived technology fluidity and augmented realism significantly impact users' cognitive and affective responses. Especially, users' attitudes and perceived information quality play a central role in the decision-making process. Additionally, augmented realism is crucial for enhancing users' immersive experience. These results underscore the transformative role of AR in marketing and consumer behavior. Augmented realism and technology fluidity not only enhance consumer perceptions and emotional experiences directly but also facilitate stronger purchase intentions through mediated pathways involving cognitive and affective responses. Understanding these mechanisms is crucial for leveraging AR effectively in marketing strategies to enhance consumer engagement and drive purchase behavior.

Table 4.30 Summary of hypotheses test result

Path relationship		Group with AR			Group without AR		
		Estimate	**P**	**Result**	**Estimate**	**P**	**Result**
H1a	Perceived augmented realism→Attitudes	0.332	***	Y	0.231	***	Y
H1b	Perceived augmented realism→Perceived information quality	0.243	***	Y	0.22	***	Y
H2a	Perceived technology fluidity→Attitudes	0.236	***	Y	0.156	0.006	Y
H2b	Perceived technology fluidity→Perceived information quality	0.369	***	Y	0.219	***	Y
H3a	Perceived augmented realism→Immersion	0.297	***	Y	0.102	0.092	N
H3b	Perceived augmented realism→Enjoyment	0.239	***	Y	0.201	***	Y
H4a	Perceived technology fluidity→Immersion	0.232	***	Y	0.147	0.014	Y
H4b	Perceived technology fluidity→Enjoyment	0.253	***	Y	0.108	0.052	N
H5a	Attitudes→Purchase intention	0.273	***	Y	0.208	***	Y
H5b	Perceived information quality→Purchase intention	0.201	***	Y	0.124	0.029	Y

Table 4.30 (Continue)

Path relationship		Group with AR			Group without AR		
		Estimate	P	Result	Estimate	P	Result
H6	Immersion→Enjoyment	0.191	0.002	Y	0.245	***	Y
H7	Enjoyment→Purchase intention	0.228	***	Y	0.248	***	Y
H8	Perceived information quality→Attitudes	0.162	0.004	Y	0.103	0.078	N
H9	Enjoyment→Attitudes	0.148	0.008	Y	0.173	0.002	Y
H10a	Perceived augmented realism→Attitudes→ Purchase intention	0.089	0.000	Y	0.047	0.032	Y
H10b	Perceived augmented realism→Perceived information quality→Purchase intention	0.046	0.028	Y	0.032	0.021	Y
H11a	Perceived technology fluidity→Attitudes→ Purchase intention	0.07	0.000	Y	0.031	0.025	Y
H11b	Perceived technology fluidity→Perceived information quality→Purchase intention	0.072	0.000	Y	0.031	0.033	Y
H12a	Perceived augmented realism→Enjoyment→ Purchase intention	0.063	0.000	Y	0.05	0.011	Y
H12b	Perceived augmented realism→Immersion→ Enjoyment→Purchase intention	0.052	0.020	Y	0.013	0.099	N
H13a	Perceived technology fluidity→Enjoyment→ Purchase intention	0.055	0.027	Y	0.025	0.082	N

Table 4.30 (Continue)

Path relationship		Group with AR			Group without AR		
		Estimate	P	Result	Estimate	P	Result
H13b	Perceived technology fluidity→Immersion→ Enjoyment→Purchase intention	0.025	0.033	Y	0.013	0.034	Y

Note: Y represents the hypothesis that is supported, and N represents the unsupported hypothesis.

4.2.2.10 Multi-Group Analysis

This study employed Multi-Group Structural Equation Modeling (SEM) to compare model fit and the structural relationships between latent variables across two groups (group with AR and without AR). Comparing a series of nested models, including measurement weights, structural weights, structural covariances, and residuals, can assess whether there are significant differences between the two groups.

1. **Multi-group model fit test**

CMIN represents the chi-square value, DF denotes the degrees of freedom, and CMIN/DF is the ratio of the chi-square value to the degrees of freedom. Ideally, CMIN/DF should be close to 1; values exceeding 2 or 3 typically suggest a poor model fit. As shown in Table 4.31, the CMIN/DF values for all models are below 1.5, indicating that the model fits are considered acceptable.

Table 4.31 The results of the multi-group model fit test (1)

Model	CMIN	DF	CMIN/DF
Unconstrained	1675.208	1302	1.287
Measurement weights	1699.169	1333	1.275
Structural weights	1715.937	1347	1.274
Structural covariances	1726.460	1349	1.280
Structural residuals	1736.422	1354	1.282
Measurement residuals	1693.009	1316	1.286

In addition, NFI, RFI, IFI, TLI, and CFI are incremental fit indices used to compare the model fit against a baseline model, typically an independent model. Generally, values of these indices greater than 0.90 are indicative of a good model fit. GFI represents the goodness-of-fit index, while AGFI is its adjusted version; values of these indices approaching 1.0 suggest that the model fits well. Furthermore, RMSEA values less than 0.05 are considered indicative of a very good model fit, values between 0.05 and 0.08 suggest a good model fit, and values greater than 0.10 indicate a poor model fit.

As shown in Table 4.32, Additionally, the RMSEA values for all tested models are below the conventional cutoff value of 0.05, which is widely recognized as indicative of an excellent model fit. This suggests that the hypothesized models provide a close approximation to the observed data, with minimal discrepancy per degree of freedom. Taken together, these results offer strong empirical support for the structural integrity and overall goodness of fit of the proposed models, reinforcing their validity in capturing the underlying relationships among the constructs.

Table 4.32 The results of the multi-group model fit test (2)

Model	NFI	RFI	IFI	TLI	CFI	GFI	AGFI	RMSEA	AIC	ECVI
Unconstrained	0.906	0.898	0.979	0.977	0.978	0.904	0.89	0.018	2009.434	2.512
Measurement weights	0.904	0.899	0.979	0.977	0.979	0.902	0.891	0.018	1975.613	2.47
Structural weights	0.904	0.899	0.979	0.978	0.979	0.901	0.891	0.018	1962.884	2.454
Structural covariances	0.903	0.899	0.979	0.978	0.979	0.901	0.891	0.018	1959.883	2.45
Structural residuals	0.903	0.899	0.979	0.978	0.978	0.9	0.891	0.018	1957.252	2.447
Measurement residuals	0.899	0.898	0.976	0.976	0.976	0.896	0.889	0.019	1957.197	2.446

2. Model invariance test

Invariance testing is performed to assess whether the model parameters (e.g., factor loadings, structural paths) are equivalent across different groups. The results of invariance testing are shown in Table 4.33.

In all model comparisons, the p-values are consistently greater than 0.05, signifying that there are no statistically significant differences between the AR and non-AR groups in terms of measurement weights, structural weights, structural covariances, or residuals. This suggests that the models are invariant across these groups, reinforcing the stability and consistency of the factor loadings, structural paths, covariances, and residuals in both groups.

Measurement Weights Model: Compared to the unconstrained model, the measurement weights model exhibits a minor increase in the chi-square statistic (CMIN =

23.961, p = 0.812). This p-value exceeds the 0.05 threshold, indicating that the differences in factor loadings between the AR and non-AR groups are not statistically significant. Therefore, the factor loadings can be considered invariant across these groups.

Structural Weights Model: The structural weights model shows a slight increase in CMIN (40.729) with a p-value of 0.653. Since this p-value is above 0.05, it suggests that there is no significant variation in the structural path coefficients between the AR and non-AR groups. Thus, the structural paths are invariant across these groups.

Structural Covariances: The comparison for structural covariances yields a CMIN value of 51.252 with 47 degrees of freedom and a p-value of 0.311. This p-value, being greater than 0.05, indicates that there are no significant differences in the covariances of latent variables between the AR and non-AR groups. Hence, the structural covariances are invariant between these groups.

Structural Residuals: For structural residuals, the CMIN is 61.214 with 52 degrees of freedom, and the p-value is 0.179. This result, with a p-value greater than 0.05, implies that the differences in residual variances between the AR and non-AR groups are not significant. Thus, the structural residuals remain invariant across the groups.

Measurement Residuals: The Delta-CMIN for measurement residuals is 17.801, with 14 degrees of freedom and a p-value of 0.216. This p-value exceeds the 0.05 threshold, indicating no significant difference in the residuals of observed variables between the AR and non-AR groups.

Table 4.33 Assuming model unconstrained to be correct

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	31	23.961	.812	.001	.002	-.001	-.001
Structural weights	45	40.729	.653	.003	.003	-.001	-.001
Structural covariances	47	51.252	.311	.003	.003	-.001	-.001
Structural residuals	52	61.214	.179	.004	.004	.000	.000
Measurement residuals	14	17.801	.216	.001	.001	.000	.000

3. **Further Nested Model Analysis**

Further analysis compared the measurement weights model, structural weights model, structural covariances model, and structural residuals model. The results of nested model comparison are shown in Table 4.34.

(1) Assuming the Measurement Weights Model is Correct:

Structural Weights: The p-value is 0.269 (p > 0.05), indicating no significant differences in structural weights between the AR and non-AR groups. This suggests that structural weights are consistent across these groups.

Structural Covariances: The p-value is 0.038 ($p < 0.05$), suggesting significant differences in structural covariances between the AR and non-AR groups. This implies that the covariances between latent variables vary significantly between the groups.

Structural Residuals: The p-value is 0.016, indicating significant differences in structural residuals between the AR and non-AR groups. This suggests that the residual variances differ significantly across the groups.

(2) Assuming the Structural Weights Model is Correct:

Structural Covariances: The p-value is 0.005, indicating significant differences in structural covariances between the AR and non-AR groups. This finding confirms that the covariances between latent variables are significantly different across the groups.

Structural Residuals: The p-value is 0.005, suggesting significant differences in structural residuals between the AR and non-AR groups. This implies that residual variances also vary significantly between the groups.

(3) Assuming the Structural Covariances Model is Correct:

Structural Residuals: The p-value is 0.076 ($p > 0.05$), indicating no significant differences in structural residuals between the AR and non-AR groups. This suggests that structural residuals are consistent across these groups.

(4) Assuming the Measurement Residuals Model is Correct:

Structural Weights and Structural Covariances: Both p-values are greater than 0.05, suggesting that these models exhibit consistency between the AR and non-AR groups. This indicates that structural weights and covariances do not differ significantly between the groups when the measurement residuals are held constant.

The analysis indicates that under different assumptions, there is consistency in measurement weights and structural weights across the AR and non-AR groups. However, significant differences are observed in structural covariances and residuals, suggesting variability in these parameters between the groups. This variability may be attributed to the introduction of AR technology, which likely introduced specific environmental factors and technological features that impact the covariances and residuals among latent variables. The AR environment may alter user perceptions and behaviors, leading to more intricate relationships between latent variables, thereby causing changes in structural covariances (Fährmann, 2024). Moreover, AR technology may influence users' interaction patterns and experiences. For example, in an AR environment, users may interact with virtual objects, and this interaction could affect the covariances and residuals among latent variables, resulting in significant differences between the AR and non-AR groups. Additionally, some scholars argue that if the indicators used to measure latent variables exhibit different validity or reliability across groups, this could lead to variations in the strength of relationships and error variances among the latent variables. Such a lack of measurement invariance may contribute to the observed group differences (Meredith, 1993).

Table 4.34 Nested model comparison

Model	**DF**	**CMIN**	**P**	**NFI Delta-1**	**IFI Delta-2**	**RFI rho-1**	**TLI rho2**
Structural weights	14	16.768	.269	.001	.001	.000	.000
Structural covariances	16	27.291	.038	.002	.002	.000	.000
Structural residuals	21	37.253	.016	.002	.002	.001	.001
Model	**DF**	**CMIN**	**P**	**NFI Delta-1**	**IFI Delta-2**	**RFI rho-1**	**TLI rho2**
Structural covariances	2	10.523	.005	.001	.001	.001	.001
Structural residuals	7	20.485	.005	.001	.001	.001	.001
Model	**DF**	**CMIN**	**P**	**NFI Delta-1**	**IFI Delta-2**	**RFI rho-1**	**TLI rho2**
Structural residuals	5	9.962	.076	.001	.001	.000	.000
Structural weights	31	22.928	.852	.001	.002	-.001	-.001
Structural covariances	33	33.451	.445	.002	.002	-.001	-.001
Structural residuals	38	43.413	.252	.003	.003	.000	.000

4.3 Qualitative Results

To complement the quantitative findings and gain a deeper understanding of participants' subjective experiences, this study incorporated a qualitative research component using semi-structured interviews. The qualitative data collection was designed to explore participants' perceptions, attitudes, and emotional responses toward AR-based and non-AR mobile shopping environments. Qualitative data were collected in the form of researcher notes and voice recordings from a total of 40 participants. Semi-structured interviews were then conducted to elicit in-depth insights into participants' experiences with the AR and non-AR mobile shopping environments. After the interviews were completed, the responses were transcribed and imported into NVivo 12 for qualitative analysis. NVivo facilitated the systematic coding of the data, allowing for the identification of key themes and meaningful patterns. Finally, the accuracy and consistency of the coding were reviewed within NVivo, and the findings were synthesized into theoretical conclusions. This process ensured the reliability of the qualitative results and their alignment with the overarching research framework.

4.3.1 Qualitative Data Collection

A total of 40 participants were purposively selected for the interviews, with 20 assigned to the AR group and 20 to the non-AR group. Participants were drawn from four major Chinese universities—Guangxi University, Sichuan University, Shanghai Jiao Tong University, and the University of Science and Technology Beijing—ensuring a diverse and representative sample. The sampling strategy aimed to achieve data saturation across both groups.

Each interview was conducted either face-to-face or via voice call, depending on logistical feasibility. With participants' informed consent, all qualitative data were collected in the form of researcher notes and voice recordings. The recordings were transcribed verbatim and subsequently organized based on the predefined semi-structured interview outline. This outline was developed in alignment with the theoretical framework of the study and covered key topics such as perceived augmented realism, technology fluidity, cognitive response, affective response and purchase intention.

The goal of this process was not only to extract meaningful insights from individual experiences but also to allow for comparison between the AR and non-AR groups. Data collection continued until theoretical saturation was reached—defined as the point at which no new themes or concepts emerged from additional interviews (Strauss & Corbin, 1998). Table 4.35 show the answers and information of the respondents. The interview details are presented in Appendix H.

Table 4.35 The information of the respondents

Part 1 Respondent number and basic information		
Respondent number	Group	University
No.1-5	With AR	Guangxi University
No.6-10	Without AR	
No.11-15	With AR	Sichuan University
No.16-20	Without AR	
No.21-25	With AR	Shanghai Jiao Tong University
No.26-30	Without AR	
No.31-35	With AR	University of Science and Technology Beijing
No.36-40	Without AR	

4.3.2 Qualitative Data Analysis

To gain an in-depth understanding of respondents' cognitive and affective responses to the AR virtual try-on experience, this study employed a qualitative thematic analysis approach. NVivo 12 Plus software was used to assist with data analysis. Interview data from 40 participants (including 20 from the AR group and 20 from the non-AR group) were organized and imported into NVivo, where coding nodes were established. A combination of inductive and theory-driven coding methods was applied. Initially, based on the S-O-R (Stimulus-Organism-Response) framework, six primary themes were constructed: "External Stimuli," "Cognitive Responses," "Affective Responses," "Cognitive Response - Behavior Response（Purchase Intention）," “Affective Response-Behavior Response (Purchase Intention)” and “The Importance of these Factors to Purchase Intention”. These were subsequently refined through iterative review and comparison of the data, leading to the development of several secondary themes and tertiary sub-nodes. The coding framework is presented in Table 4.36, Figure 4.5 and Figure 4.6.

Table 4.36 The coding framework

Primary Themes	Secondary Themes	Node Description	Answer	Times Cited
External stimuli	perceived technology fluidity	how would you rate the system fluidity and interface responsiveness	neutral	12
			quite fluidity	17
	perceived augmented realism	perceive the products to look realistic	not very realistic	14
			quite realistic	18
Cognitive responses	information quality	the realism and the fluidity affect perception of the information quality and attitude	significant affect	31
	attitude		do not significant affect	5
Affective responses	immersion	the realism and the fluidity affect perception of enjoyment and immersion	significant affect	26
	enjoyment		do not significant affect	2

Table 4.36 (Continue)

Primary Themes	Secondary Themes	Node Description	Answer	Times Cited
Cognitive response - behavior response	perceived information quality	perceived information quality affects purchase intention	significant affect	26
			do not significant affect	4
Cognitive response - behavior response	attitudes	attitudes affect purchase intention	significant affect	23
			do not significant affect	5
Affective response-behavior response	immersion	immersion affects purchase intention	significant affect	14
			do not significant affect	6
	enjoyment	enjoyment affects purchase intention	significant affect	15
			do not significant affect	2
The importance of these factors to purchase intention	perceived technology fluidity	PTF very important for purchasing intentions	very important	30
			not very important	3
	perceived augmented realism	PAR is very important for purchasing intentions	very important	32
			not very important	6
	attitudes, perceived information quality, immersion and enjoyment	attitudes, PIQ, immersion and enjoyment important for purchasing intention	very important	35
			not very important	3

Figure 4.5 The hierarchy of codes

Name	Source	Reference
⊟ The Importance of these Factors to Purchase Int	40	106
PTF very important for purchasing intention	30	30
PAR not very important to purchase intentio	6	6
PAR is very important for purchasing intenti	32	32
Attitudes,PIQ, immersion and enjoyment not	3	3
Attitudes,PIQ, immersion and enjoyment im	35	35
⊟ Stimulus - Organism (Cognitive Response)	35	36
The realism and the fluidity affect perceptio	30	31
The realism and fluency do not have a signifi	5	5
⊟ Stimulus - Organism (Affective Response)	25	26
the realism and the fluidity affect perception	25	26
⊟ Stimulus - AR perception experience	38	73
⊞ Perceived Technology Fluidity	33	34
⊞ Perceived Augmented Realism	37	39
⊟ Cognitive Response - Behavior Response (Purch	34	53
⊞ Perceived Information Quality	30	30
⊞ Attitudes	23	23
⊟ Affective Response-Behavior Response (Purchas	22	37
⊞ Immersion	20	20
⊞ Enjoyment	17	17

Figure 4.6 The coding framework in the NVivo software

4.3.2.1 Stimulus: Analysis of External Stimuli

1. Perceived Technology Fluidity (PTF)

According to Table 4.36, the majority of interviewees (n = 17) described the AR try-on system as "smooth" and "highly responsive," while 12 participants expressed a neutral stance.

For instance, respondent No.1 (AR group) noted, *"The system was quite smooth. When I switched between items or rotated the AR images, there was almost no lag,"* and respondent No.13 shared, *"I would rate the fluidity as high because everything worked perfectly, and I had a smooth experience."* These findings suggest that the system's technical performance generally met user expectations. A fluid interface facilitated real-time interaction and encouraged continued use, thereby contributing positively to the user experience.

2. Perceived Augmented Realism (PAR)

Eighteen participants perceived the virtual product presentation as "quite realistic," indicating that the AR system succeeded in simulating the appearance of real products to a satisfactory extent. Respondent No.11 (AR group) stated, *"I would rate the level of realism as high because I was able to rotate and zoom in on the products, which helped me see fine details that made them feel lifelike,"* while another mentioned, *"The products appeared very realistic through the AR feature. I would rate the level of realism as very high because it felt like I was actually seeing and interacting with the product in a physical space"* (Respondent No.12, AR group). However, 14 interviewees reported that the products did not appear realistic enough, implying potential shortcomings in model detailing and rendering techniques (e.g., lighting and shadow effects) that warrant further refinement. As Respondent No.16 (non-AR group) commented, *"The products didn't look very realistic. I would rate the realism as low because the images appeared flat, and I couldn't interact with them,"* and another noted, *"The visuals weren't realistic, and I couldn't get a good sense of how the products would actually look or feel in real life"* (Respondent No.19, non-AR group).

4.3.2.2 Organism: Analysis of Internal Responses

1. Cognitive Responses

Information Quality: A substantial number of respondents (n = 31) reported that the perceived fluidity and realism significantly enhanced the trustworthiness and completeness of product information. One participant noted, *"Realism and fluidity made the product seem more legitimate and trustworthy. It positively affected my attitude"* (Respondent No.21, AR group). Another added, "*The realistic display makes the product details clearer—it helps me understand the material and design better*" (Respondent No.32, AR group). These findings underscore the instrumental role of AR features in shaping users' cognitive appraisals during the shopping process.

Attitude: Only five participants stated that the AR experience had no significant influence on their shopping attitude. The remaining participants indicated a strengthened sense of trust and favorability toward both the products and the shopping platform. For example, respondent No.24 (AR group) remarked, *"Using AR makes me feel the brand is more reliable and professional,"* while another shared, *"This kind of technology shows they care about user experience—it makes me like the store more"* (Respondent No.13, AR group). These comments suggest that AR technology contributes to positive attitudinal shifts.

2. Affective Responses

Immersion and Enjoyment: Twenty-six respondents described a strong sense of immersion, while 24 expressed enjoyment in the AR try-on experience. Respondent No.11 (AR group) shared, *"I felt more immersed in the shopping experience because the realistic visuals and the smooth system made it feel more like a real-world shopping experience,"* and another commented, *"The AR feature did help me enjoy the experience and feel immersed in the shopping process"* (Respondent No.15, AR group). These responses highlight the technology's capacity to elicit not only rational evaluations but also affective engagement. As one user noted, *"It didn't feel like regular online shopping—it was more interactive and enjoyable,"* (Respondent No.33, AR group) enriching the overall user experience.

4.3.2.3 From Organism to Response: Pathways to Behavioral Intention

1. Cognitive Pathway → Purchase Intention

Information Quality: Twenty-six participants affirmed that the perceived quality of information strongly influenced their purchase intentions. Respondent No.31 (AR group) remarked, *"Because the product presentation was detailed and matched what I expected, I felt reassured and more likely to buy it."* Another noted, *"The realistic visuals provided by AR helped me better understand the product's quality and features"* (Respondent No.14, AR group). These reflections suggest that high perceived information quality, driven by AR features such as realism and interactivity, plays a pivotal role in consumers' cognitive evaluations leading to purchase intentions.

Attitude: Similarly, 23 participants reported that their positive attitudes derived from the AR experience contributed directly to their purchasing decisions. As Respondent No.21 (non-AR group) stated, *"A better user experience led to a more favorable view of the product."* Another shared, *"A positive attitude towards the product was fostered through the AR experience and the ease of navigation, making me more likely to buy"* (Respondent No.12, AR group). These findings underscore the importance of attitudinal shifts, shaped by AR engagement, in strengthening behavioral intention.

2. Affective Pathway → Purchase Intention

Immersion: Fourteen participants noted that their immersive experience significantly motivated their intention to purchase. Respondent No.21 (AR group) shared, *"The immersive experience kept me engaged throughout the process, which made the shopping experience more enjoyable and influenced my likelihood of purchasing."* Another added, *"The immersive experience played a key role in keeping me engaged and interested in the products"* (Respondent No.14, AR group). These remarks suggest that immersion enhanced users' emotional connection with the product, which translated into stronger behavioral intent.

Enjoyment: Similarly, fifteen participants expressed that enjoyment during the try-on experience positively influenced their purchase intention. For instance, Respondent No.4 (AR group) explained, *"The fun and engaging shopping process made me want to continue using the app and consider purchasing."* Another remarked, *"The pleasure of using the app contributed to my interest in buying"* (Respondent No.25, AR group). Such feedback indicates that enjoyment acts as a meaningful affective driver in shaping consumer intentions.

4.3.2.4 Comparative Perceived Importance of Key Factors

Participants were also asked to evaluate the perceived importance of various factors in shaping their purchase intentions, as shown in Table 4.37. The results revealed a strong consensus regarding the critical role of both technological and psychological variables. Specifically, 30 participants considered Perceived Technology Fluidity (PTF) to be "very important," while 32 participants rated Perceived Augmented Realism (PAR) at the same level of importance. Notably, the combined influence of attitude, information quality, immersion, and enjoyment received the highest endorsement, with 35 participants labeling these variables as "very important" in their decision-making processes.

The results show that while participants emphasized the importance of AR technological features (e.g., fluidity and realism), they also recognized the central role of cognitive and affective responses derived from the AR experience.

Table 4.37 The results of perceived importance of key factors

Factor	Participants who considered it "very important"
Perceived Technology Fluidity (PTF)	30
Perceived Augmented Realism (PAR)	32
Attitude, Information Quality, Immersion, Enjoyment (combined)	35

4.3.2.5 Comparative Analysis of Coding References between AR and Non-AR Groups

To further explore group differences in user responses, this study conducted a comparative coding analysis between the AR and non-AR groups across key thematic nodes. Table 4.38 presents the number of participants from each group who referenced the selected themes at least once during the interviews. The results demonstrate clear distinctions in how participants from the two groups experienced and evaluated the AR shopping environment.

Respondents in the AR group showed markedly higher engagement across affective and perceptual nodes, including Immersion (15 vs. 3), Perceived Augmented Realism (19 vs. 2), Technology Fluidity (18 vs. 3), and Enjoyment (19 vs. 4). For instance, one AR Respondent noted, *"The immersive experience played a key role in keeping me engaged and interested in the products"* (Respondent No.14, AR group). In contrast, a participant from the non-AR group remarked, *"I didn't feel much immersion, so it didn't impact my shopping experience much"* (Respondent No.6, non-AR group).

Cognitive responses also differed between groups. While both groups discussed Information Quality and Attitude, the AR group still exhibited higher engagement, with 17 and 15 references respectively, compared to 5 and 6 in the non-AR group. These results indicate that the immersive and interactive features of AR significantly enhanced users' affective engagement and cognitive appraisals, aligning with the S-O-R theoretical framework.

Table 4.38 Comparison of thematic node references between AR and Non-AR groups

Thematic Node	AR Group (n =20)	Non-AR Group (n = 20)
Immersion	15	3
Perceived Augmented Realism	19	2
Technology Fluidity	18	3
Information Quality	17	5
Attitudes	15	6
Enjoyment	19	4

4.3.2.6 Summary

The findings of the qualitative analysis underscore the pivotal role of key AR features—namely technology fluidity and augmented realism—in shaping user experience within mobile AR shopping environments. These technological affordances were found to elicit both cognitive responses (e.g., perceived information quality, attitudes) and affective responses (e.g., feelings of immersion and enjoyment), ultimately exerting a substantial influence on users' purchase intentions. Notably, cognitive mechanisms—particularly perceived information credibility and favorable attitudes toward the product—emerged as slightly more influential drivers of behavioral intention. Nonetheless, affective engagement, characterized by immersive and enjoyable try-on interactions, also contributed meaningfully, acting as a complementary factor that reinforces the overall user experience.

These insights lend empirical support to the S-O-R framework, affirming its theoretical applicability in the context of mobile AR commerce. Moreover, the qualitative findings closely mirror the results of the quantitative phase, thereby enhancing the overall robustness and validity of the integrated model.

To further elaborate on group-specific dynamics, a comparative analysis was conducted between the AR and non-AR participant groups. The results revealed that participants in the AR group generally perceived the virtual product representations as highly realistic, which facilitated their mental simulation of how the products would appear in real life. In contrast, respondents in the non-AR group tended to report that product visuals appeared less realistic, resulting in a diminished sense of presence and weaker engagement.

Despite these differences, participants from both groups consistently acknowledged that product realism and system fluidity were central to shaping their perceptions of information quality, enjoyment, immersion, and overall attitude toward both the product and the shopping platform. These intermediate perceptions were, in turn, instrumental in determining the overall evaluation of the AR shopping experience.

Finally, participants across both groups recognized the critical influence of realism, technological fluidity, perceived information quality, user attitudes, and enjoyment on their purchase intentions.

4.3.3 Qualitative Findings

4.3.3.1 Perceived augmented realism on cognitive and affective responses

The findings of this study indicate that perceived augmented realism exerts a significant positive influence on users' attitudes, perceived information quality, immersion, and enjoyment. This conclusion is supported by both the quantitative and qualitative results. Qualitative data collected from participants in the AR group further corroborate these relationships. For instance, Respondent No.11 noted, *"The realism of the products significantly improved my perception of the quality of the information provided. Seeing the product interactively made me trust the information more and increased my positive attitude toward it."* Similarly, Respondent No.13 emphasized that the realism and fluidity of the AR interface contributed to a deeper sense of immersion, making the activity feel enjoyable rather than obligatory: *"I really enjoyed interacting with the products, which made the shopping experience feel more like fun than a chore."* Furthermore, Respondent No.32 noted that the AR interface influenced his perception of product quality and suitability, suggesting an enhancement in perceived information quality.

These findings are consistent with prior research. Daassi and Debbabi (2021)argue that when AR technology is seamlessly integrated into users' environments, it enhances perceptions of authenticity and strengthens positive evaluations of both products and brands. Their study highlights that authentic AR experiences, which faithfully replicate real-world elements, foster greater customer satisfaction and brand loyalty. In a similar vein, Pessoa et al. (2022) emphasize that the perceived realism of AR environments enhances the accuracy and reliability of the information conveyed, thereby improving user trust. Kowalczuk et al. (2021) also support this view, suggesting that realistic AR settings positively influence consumers' perceptions and interactions within digital retail environments.

4.3.3.2 Perceived technology fluidity on cognitive and affective responses

The qualitative findings of this study demonstrate that perceived technology fluidity significantly enhances users' attitudes, perceived information quality, immersion, and enjoyment within AR shopping environments. This observation is supported by participant narratives. For example, Respondent No.13 (AR group) remarked, *"The app's fluidity ensured*

I stayed engaged. I had a more positive attitude toward the product because of this," highlighting the role of smooth and responsive interfaces in shaping favorable consumer attitudes. Respondent No.31 similarly noted that *"the realistic visuals and smooth performance increased my trust in the product,"* suggesting that the perceived usability and seamless functionality of the technology positively influenced perceived product quality. These participant insights align with existing literature. Menandro and Arnab (2020) emphasize the critical role of user experience and perceived technological adaptability in influencing emotional responses and consumer evaluations. They argue that the ease and efficiency of using a digital interface can directly affect consumers' assessments of product quality and their purchase intentions. Likewise, Plotkina and Saurel (2019) found that perceived usability enhances trust and perceived value by shaping users' cognitive evaluations and emotional responses. The link between technology fluidity and immersive experiences is further supported by Respondent No.35 (AR group), who stated that the seamless AR experience contributed to their purchase decision by fostering a sense of immersion.

Therrien, (2023) similarly observed that immersive digital experiences increase consumer engagement and purchase likelihood. Users who perceive high levels of technological fluidity are more likely to report engaging and enjoyable interactions. Additionally Kitsantas et al. (2019) suggest that user-friendly and reliable technological systems minimize cognitive strain, promote user engagement, and enhance enjoyment. Collectively, these findings underscore that fluid, intuitive technology not only elevates consumer experience but also strengthens behavioral outcomes such as trust, satisfaction, and purchase intention.

4.3.3.3 Cognitive response to purchase intention

The results of this study indicate that both consumer attitudes and perceived information quality positively influence purchase intention, consistent with the quantitative findings. A more favorable attitude toward AR applications is associated with a higher likelihood of purchasing the displayed products, as supported by prior research. Yim et al. (2017) found that consumer attitudes significantly shape behavioral intentions in AR contexts, while Elford et al. (2022) assert that behavioral intention is primarily determined by individual attitudes. Similarly, Plotkina and Saurel (2019) emphasize that consumers' evaluations of AR experiences directly affect their willingness to engage in purchasing behaviors.

These conclusions are reinforced by qualitative data from AR group participants. For example, Respondent No.11 stated, *"My positive attitude towards the product was reinforced by how lifelike and interactive the experience was,"* and further elaborated, *"I felt positive about the interface and the visuals; my attitude toward the product became more favorable, increasing my willingness to buy."* These statements illustrate how affective evaluations of the AR interface and content enhance purchase intention by strengthening consumer attitudes. This aligns wit Uhm et al. (2022), who highlight the impact of consumer perceptions on AR-driven purchase behaviors.

Perceived information quality also emerged as a key determinant of purchase intention. Xu et al. (2021) demonstrated that providing rich, detailed, and visual product information in online environments increases consumers' confidence and likelihood of purchase. Supporting this, Respondent No.12 noted, *"The AR feature enhanced the quality of the product information by allowing me to visualize the items better, which helped me make a more informed decision."* Additionally, Respondent No.21 emphasized that using AR while browsing significantly improved their perception of product quality and influenced their purchase decision. These findings are consistent with Anderson and Laverie (2022), who concluded that consumers' quality perceptions play a pivotal role in shaping purchase intentions.

4.3.3.4 Affective response on purchase intention

Previous research has consistently demonstrated that in AR contexts, vivid and immersive interfaces significantly enhance user enjoyment. For example, Yim et al. (2017) highlight that the more vivid and lifelike the AR environment, the more immersive the user experience becomes, which in turn elevates enjoyment. Similarly, Kowalczuk et al. (2021) found that immersion is a critical antecedent of enjoyment in AR-mediated shopping experiences. These insights are echoed in the qualitative findings of this study. Respondent No.3 (AR group) stated, *"The AR immersive experience increased their enjoyment,"* while Respondent No.11 emphasized that *"The enjoyable shopping experience, fueled by realistic product interactions, was a key factor in my purchase intention."* These responses underline the importance of immersion in fostering positive emotional reactions, such as enjoyment, that influence consumer behavior.

Moreover, AR's capacity to create engaging and entertaining experiences has been shown to increase purchase likelihood. According to Yim et al. (2017), the interactive and captivating features of AR applications enhance both enjoyment and the probability of purchase. Their study suggests that immersive AR interactions allow consumers to connect with products in novel and engaging ways, thereby increasing purchase intention. This is supported by Respondent No.31, who found the AR platform to be both enjoyable and engaging, which heightened their likelihood of making a purchase. Similarly, Respondent No.13 remarked that *"the AR platform's immersive experience improved their purchasing experience; it was fascinating and fun since it resembled trying on shoes,"* reinforcing the role of enjoyment in consumer decision-making.

Further support is found in McLean and Wilson (2019), who concluded that immersive virtual experiences significantly enhance user engagement and enjoyment, which in turn drives consumer interest in purchasing products. They emphasize the critical link between enjoyment and purchase intention, underscoring the strategic importance of designing engaging AR experiences to shape consumer behavior. Kowalczuk et al. (2021) also found that pleasurable interactions with technology positively influence consumers' purchasing decisions. Reflecting this, Respondent No.35 described the AR experience as "so immersive that it felt like reality," and noted that the high level of involvement not only enriched the experience but also increased their confidence in making a purchase.

CHAPTER 5
DISCUSSION AND CONCLUSION

5.1 Overview

This study employed a mixed-method approach, integrating both quantitative and qualitative methods to comprehensively investigate the impact of perceived augmented realism and technology fluidity on Chinese consumers' online purchase intentions within an AR environment based on the S-O-R theory. The choice of a mixed-method design was driven by the need to capture both the breadth and depth of relevance to AR and mobile shopping. The quantitative component facilitated the measurement and analysis of relationships among key variables, utilizing descriptive statistics, confirmatory factor analysis (CFA), and structural equation modeling (SEM) to assess model fit and validate the hypotheses developed in Chapter Two. The qualitative component, on the other hand, provided richer insights into the underlying reasons and contextual factors that influence these relationships.

This chapter primarily focuses on the results and discusses the implications and significance of the study's findings based on the S-O-R framework and the behavioral characteristics of young Chinese consumers. Initially, the results of the hypothesis testing are analyzed and summarized, with a detailed discussion of why certain hypotheses were supported while others were rejected. This analysis is grounded in a thorough review of the literature and empirical evidence. Subsequently, the research questions posed in Chapter One are addressed, with a discussion of their alignment with the study's objectives. The key research objectives were: (1) to investigate how perceived augmented realism and technology fluidity influence consumer cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) within an AR shopping context; (2) to examine the impact of these cognitive and affective responses on purchase intention; and (3) to explore the mediating roles of cognitive and affective responses in the relationships between perceived augmented realism, technology fluidity, and purchase intention.

Finally, this chapter provides an in-depth exploration of the implications of the study's findings for both academia and practice. It also addresses the challenges encountered during the research process and discusses the study's limitations. Additionally, the chapter proposes future research directions aimed at laying a foundation for subsequent studies and offering valuable insights and guidance for future researchers.

5.2 Discussion of Quantitative Results: Based On S-O-R Framework and Young Chinese Consumer Behavior

5.2.1 Discussion of Hypotheses Test Results

This study compares the mean values of the AR characteristics and consumer response to the mobile e-commerce app with and without AR conditions. The results of the mean comparisons shown in Table 4.13 in Chapter Four indicate that the group with AR has significantly higher average scores in perceived augmented realism and technology fluidity than those without AR, indicating that participants in the AR condition perceived a higher sense of augmented realism and technology fluidity. This finding aligns with the expected hypothesis, demonstrating that the experimental treatment effectively induced the anticipated changes and verified the success of the manipulation.

Furthermore, SEM reveals how consumers cognitively, affectively, and behaviorally respond to different AR characteristics. From the hypotheses test result shown in Table 4.30 in Chapter Four, the comparison of β values shows that perceived augmented realism and technology fluidity have a stronger positive impact on consumer cognitive response (attitudes and perceived information quality) and affective response (immersion and enjoyment) within the group with AR. Besides, the positive effects of cognitive response (attitudes and perceived information quality) and affective response (immersion and enjoyment) on purchase intention are significantly higher in the group with AR.

Based on the S-O-R theory the behavioral characteristics of young Chinese consumers, this study comprehensively discussed the consistency between the research results and the relevant literature. The discussion was presented according to the hypothesis test results as follows.

5.2.1.1 Perceived augmented realism positively influences the consumer's cognitive responses (attitudes and perceived information quality) in an AR environment

The hypothesis test results confirmed that perceived augmented realism exerts a significant positive influence on consumers' cognitive responses, specifically their attitudes and perceived information quality, within AR environments. This empirical finding aligns well with the theoretical underpinnings of the S-O-R framework, which posits that environmental stimuli (S)—in this case, the realism conveyed through AR—affect the organism's internal state (O), namely cognitive and affective responses, which in turn drive behavioral outcomes (R) such as purchase intentions.

In the AR context, augmented realism functions as a potent external stimulus, enhancing the sensory, visual, and experiential dimensions of virtual try-on or immersive product exploration. Among Chinese young consumers, who are typically digital natives and frequent users of mobile e-commerce platforms, such stimuli play a pivotal role in shaping cognitive appraisals. When AR content is perceived as lifelike and contextually embedded, users tend to regard the experience as more credible, informative, and trustworthy. This leads to more favorable attitudes toward the product and elevated assessments of information quality.

This interpretation is substantiated by prior research. Daassi and Debbabi (2021) demonstrated that higher levels of perceived realism in AR significantly enhance consumer engagement and brand evaluation. Similarly, Pessoa et al. (2022) found that realistic AR interfaces improve consumers' perceptions of accuracy and dependability, encouraging greater reliance on the information presented. In line with these findings, Kowalczuk et al. (2021) noted that immersive and context-aware AR experiences contribute to more positive product evaluations and enhanced purchase confidence.

This is further corroborated by qualitative data from the present study. One participant remarked, *"The detailed and life-like visualization of the product enhanced my confidence in my purchasing decision."* Such narratives highlight the psychological mechanisms by which realism facilitates cognitive elaboration, promoting deeper processing of product-related information and reducing perceived risk. For young Chinese consumers—especially those in urban centers who are accustomed to visually rich and interactive mobile shopping experiences—such immersive stimuli are not only expected but are often interpreted as indicators of technological sophistication and brand credibility.

Furthermore, multi-group comparison analysis revealed that the positive influence of perceived augmented realism on cognitive responses was significantly stronger among AR users compared to non-AR users. This result underscores the intensified perceptual and cognitive engagement triggered by AR technologies. For Chinese youth, who typically demonstrate a high level of comfort with mobile interfaces, the sensory richness offered by AR—such as 3D rendering, spatial integration, and real-time interaction—stimulates more active attention allocation and promotes more elaborate cognitive processing. These factors may explain the enhanced attitudes and perceived informational value observed in the AR group.

From a practical standpoint, these findings have important implications for AR developers and digital marketers targeting Chinese young consumers. To maximize cognitive engagement and persuasive impact, designers should prioritize enhancing the perceived realism of AR content (Hilken et al., 2017). This can be achieved through the incorporation of high-resolution graphics, responsive interactivity, real-time adaptation to environmental context, and cultural customization aligned with local consumer aesthetics and expectations (Gatter et al., 2022). For example, incorporating AR features that resonate with traditional Chinese design elements or localized consumer trends may further reinforce perceived authenticity and trust.

5.2.1.2 Perceived technology fluidity positively influences the consumer's cognitive responses (attitudes and perceived information quality) in an AR environment

The empirical findings of this study demonstrate that in AR environments, perceived technology fluidity exerts a significant positive influence on consumers' attitudes and their perceptions of information quality. Grounded in the S-O-R theoretical framework, technology fluidity serves as an external stimulus (S) that, by enhancing the seamless integration and operational smoothness of AR applications, directly affects the cognitive processing of consumers (Organism, O), subsequently shaping their behavioral responses (Response, R), such as purchase intentions and willingness to engage with AR applications.

Specifically, the fluidity of AR technology is reflected in seamless user interface transitions, responsive functionality, and a natural interactive experience. When consumers perceive high levels of technological fluidity during AR use, their acceptance of the technology increases significantly. This enables them to focus more on the content and information being presented rather than overcoming technical barriers. Such a smooth user experience reduces cognitive load and enhances information processing efficiency, which in turn fosters more positive attitudes and higher evaluations of the credibility and professionalism of the presented information (Van Kerrebroeck et al., 2017; Xu et al., 2020).

This phenomenon is particularly pronounced among young Chinese consumers. As digital natives, they have been exposed to mobile internet technologies from an early age and possess high expectations for interface usability, response speed, and interaction fluidity (Zhang et al., 2022). Within the competitive mobile e-commerce landscape, any technical lag or disruption is likely to be quickly amplified and interpreted as a negative brand experience (Saura, 2024). Consequently, technology fluidity is not merely a matter of user experience but is intrinsically linked to perceptions of information credibility and the formation of consumer attitudes.

Moreover, a comparison of regression coefficients reveals that the positive effects of perceived technology fluidity on consumer attitudes and information quality perception are significantly stronger in the AR group. This finding indicates that the immersive and interactive nature of AR technology enhances the role of technology fluidity as a determinant of cognitive responses. In contrast, non-AR technologies may be limited by greater operational complexity and less enriched user experiences, which reduce their capacity to elicit similarly positive cognitive outcomes.

In sum, the results underscore the pivotal role of perceived technology fluidity in shaping consumer cognitive responses within AR environments (Javornik, 2016). For developers and marketers, this highlights the necessity of prioritizing technological smoothness and user-friendly interface design in AR application development. Optimizing system performance, improving response speed, and minimizing latency and bugs can effectively enhance consumer trust in the content, thereby increasing the persuasive power of the information and consumers' purchase intentions (Poushneh, 2018).

Particularly in the context of digital marketing strategies targeting young Chinese consumers, technology fluidity should not be regarded merely as a technical specification, but rather as a core variable influencing user attitudes, information appraisal, and behavioral intentions (Brakus et al., 2014; Zhang et al., 2022). Therefore, it is recommended that platform providers and developers place strong emphasis on user experience design throughout the AR product development process, focusing on cross-device compatibility, loading efficiency, and interactive feedback mechanisms. Such efforts will help construct smooth, natural, and immersive AR usage scenarios, thereby maximizing the likelihood of eliciting positive cognitive and behavioral responses from consumers (Yim et al., 2017).

5.2.1.3 Perceived augmented realism positively influences the consumer's affective responses (immersion and enjoyment) in an AR environment.

The empirical results of this study reveal that perceived augmented realism exerts a significant positive impact on consumer immersion and enjoyment AR environments. Among Chinese young consumers—who are typically categorized as digital natives—this relationship is particularly salient. Their long-standing familiarity with digital media has fostered high expectations for technological experiences that are not only functional but also visually authentic and emotionally engaging (Yu & Fan, 2023). When AR experiences are perceived as highly realistic, users tend to report deeper immersion and greater hedonic value, aligning with prior findings that technological realism serves as a key driver of affective engagement (Plotkina & Saurel, 2019; Tsepapadakis & Gavalas, 2023).

This phenomenon can be effectively interpreted using the S-O-R framework. Within this theoretical lens, perceived augmented realism functions as the stimulus (S)—an external environmental cue that activates internal psychological mechanisms. For young Chinese consumers, who often seek aesthetically pleasing and contextually localized digital experiences, a highly realistic AR interface can serve as a powerful stimulus that intensifies emotional and cognitive involvement (Javornik, 2016). As the organism (O) component, users' internal emotional states—namely immersion and enjoyment—are directly influenced by this stimulus. Enhanced realism makes the virtual environment feel more natural, allowing users to suspend disbelief and experience the augmented content as an extension of their real world (Gatter et al., 2022).

Moreover, enjoyment can be interpreted as the result of positive emotional appraisal of the AR experience. In line with prior research, highly realistic AR content contributes to a more immersive user journey, which in turn fosters satisfaction and behavioral intention (Goncalves et al., 2021). Importantly, comparative analysis in this study also demonstrates that the effects of perceived augmented realism on immersion and enjoyment are only significant within AR-enabled environments. In non-AR conditions, the absence of interactive virtual elements fails to generate sufficient stimulus intensity, thus weakening the emotional and experiential response.

Accordingly, developers and marketers aiming to engage this demographic should prioritize high-fidelity visual design, cultural customization, and real-time responsiveness in AR applications to amplify perceived realism and, consequently, enhance consumer affective responses and behavioral outcomes.

5.2.1.4 Perceived technology fluidity positively influences the consumer's affective responses (immersion and enjoyment) in an AR environment

The hypothesis testing results of this study demonstrate that perceived technology fluidity exerts a significant positive influence on consumers' immersion and enjoyment in AR environments. This finding underscores the pivotal role of technology fluidity in shaping user experiences within AR contexts. Specifically, when consumers perceive AR technology as highly fluid and user-friendly, they are more likely to become immersed in virtual elements and derive greater enjoyment from the overall interaction.

Within the framework of the S-O-R theory, perceived technology fluidity functions as the stimulus (S), representing the seamlessness, responsiveness, and intuitiveness of the AR technology. This stimulus impacts the organism (O)—the internal emotional and cognitive states of the user. When the technology is easy to operate and the interface is well-designed, the cognitive burden experienced by users is substantially reduced, thereby allowing them to become more deeply immersed in the virtual environment and emotionally engaged (Sears, 2023). This finding aligns with user-centered design principles, which emphasize that technology should reduce learning costs and operational barriers to facilitate immersive and enjoyable experiences (Oyman et al., 2022).

This mechanism is particularly relevant to young Chinese consumers, who generally exhibit a high level of technology acceptance and sensitivity to digital experiences. This demographic is open to innovative digital products and values immersive interactions (Wang & Jiang, 2024). For them, the fluidity of technology not only enhances operational efficiency but also significantly affects emotional engagement. When AR technology presents content in a fluid and natural manner, users are more likely to enter a state of flow, enhancing immersion and eliciting more positive emotional responses (Ridge, 2021).

The findings of this study are also consistent with previous literature. Sears (2023) emphasized that fluid and intuitive technological interactions reduce cognitive load, thereby enhancing immersion. Daassi and Debbabi (2021) found that ease of operation and fluidity significantly improve user engagement and enjoyment in digital environments.

Similarly, Van Kerrebroeck et al. (2017) demonstrated that enhanced immersion and enjoyment not only increase user satisfaction but also strengthen positive attitudes toward the technology, highlighting the role of technology fluidity in shaping optimal user experiences.

Moreover, the comparison of regression coefficients between groups revealed that the positive impact of perceived technology fluidity on immersion and enjoyment is more pronounced in the AR group. In contrast, in the non-AR group, the effect of technology fluidity on enjoyment was not significant. This may be due to the fact that, in an AR environment, fluid technological interfaces reduce operational barriers and simultaneously offer immersive, three-dimensional content. These characteristics evoke stronger emotional responses by enhancing realism and interactivity (Sears, 2023). Conversely, non-AR environments lack sufficient external stimuli to elicit deep psychological responses. Even with a fluid interface, the absence of immersive interaction and three-dimensional engagement restricts the ability of technology fluidity to significantly affect enjoyment (Van Kerrebroeck et al., 2017).

These findings further confirm that perceived technology fluidity, as a stimulus, directly shapes the organism's emotional and cognitive responses, ultimately influencing behavioral outcomes (R), such as satisfaction, continued usage, and purchase intention. In AR contexts, ensuring that technology is fluid and user-friendly is critical not only for enhancing immersion and enjoyment but also for increasing overall satisfaction and platform engagement. This is especially relevant in the Chinese market, where young consumers are increasingly influenced by technology-driven consumption experiences (Zhang et al., 2022).

In conclusion, enhancing the fluidity of AR technologies plays a pivotal role in improving consumer immersion and enjoyment, and thus contributes to delivering superior user experiences. For young Chinese consumers, only when digital systems offer "seamless switching," "real-time responsiveness," and "intuitive manipulation" can deep emotional engagement and brand resonance be achieved. Therefore, AR developers and mobile commerce platforms should prioritize fluid user interface design, immediate system feedback, and clear user pathways to maximize emotional outcomes and behavioral engagement.

5.2.1.5 Cognitive responses (attitudes and perceived information quality) positively influence purchase intention in an AR environment

The results demonstrate that attitudes and perceived information quality exert a significant positive influence on consumers' purchase intentions within AR environments. These findings offer empirical support for the applicability of the S-O-R framework in emerging technology contexts, particularly by revealing how AR experiences shape consumer cognition and behavioral outcomes—effects that are especially pronounced among young Chinese consumers.

Within the S-O-R model, the "stimulus" (S)—in this case, immersive and interactive AR experiences—triggers an "organism" (O) reaction, typically manifested as positive evaluations such as consumer attitudes and perceived information quality, which in turn generate a behavioral response (R), namely, an increased intention to purchase. Specifically, consumer attitude refers to the overall evaluation and emotional response toward the AR experience, which is influenced by the system's realism, smoothness, and ease of use (Yim et al., 2017). In the Chinese context, Wang et al. (2023) found that the entertainment and interactivity of AR technology significantly enhance users' emotional engagement and technological acceptance, thus promoting stronger purchase intentions.

Among Chinese Millennials and Generation Z consumers, who are typically digital natives with a high propensity for technological adoption and information sensitivity (Liu et al., 2018), AR systems that provide enjoyable and immersive experiences are more likely to evoke favorable emotional responses, which translate into increased purchase intentions. This process aligns with the S-O-R theory, where positive organismic states derived from external stimuli lead to favorable behavioral outcomes.

Perceived information quality, another core organismic construct, reflects consumers' subjective evaluations of the credibility, relevance, and usefulness of the content presented through AR (Poushneh, 2018). High-quality AR content not only enhances trust but also reduces uncertainty in decision-making, ultimately leading to stronger purchase intentions (Anderson & Laverie, 2022; Pfeifer et al., 2023). In the Chinese AR marketing context, Wang et al. (2023) emphasized that AR's three-dimensional and visual presentation significantly improves the comprehensibility and persuasiveness of product information, fostering consumer trust. Similarly, Sun et al. (2022) found that in AR-assisted shopping scenarios, information integrity and contextual presentation have a significant positive effect on purchase intention.

Furthermore, regression coefficient comparisons indicate that the effects of attitude and perceived information quality on purchase intention are significantly stronger in the AR user group than in the non-AR group. This may be attributed to AR's ability to increase user immersion and engagement, which in turn elicits more favorable evaluations of products or services. According to Li and Zhou (2024), AR-enhanced interactivity notably increases user engagement in e-commerce platforms, where features such as 3D try-ons and virtual placement improve users' contextual understanding of products and strengthen their motivation to purchase.

In contrast, the non-AR group lacks the level of interactivity and immersion necessary to stimulate strong organismic responses. As a result, the impacts of attitude and information quality on purchase intentions are attenuated. This underscores the critical role of AR in enhancing the stimulus, thereby intensifying internal evaluations (O) and generating a stronger behavioral outcome (R). As Daassi and Debbabi (2021) also observed, credible and contextually relevant AR-generated information enhances consumer confidence in decision-making and promotes purchase intention.

In conclusion, AR environments, through their immersive and multi-sensory stimuli, significantly shape consumers' cognitive and emotional evaluations—particularly among Chinese young consumers who are more technologically engaged. Attitude and perceived information quality function as key organismic variables, mediating the relationship between AR stimuli and behavioral responses. Future AR marketing strategies in China should place greater emphasis on designing emotionally engaging and informationally effective AR experiences to guide consumer behavior more effectively.

5.2.1.6 Affective responses (enjoyment) positively influence purchase intention in an AR environment

The hypothesis testing results indicate that immersion significantly enhances enjoyment in AR environments, which in turn positively influences consumers' purchase intentions. These findings align well with the S-O-R theoretical framework, which provides a robust lens for understanding consumer behavior in technologically mediated environments.

Within the S-O-R framework, the AR environment functions as the stimulus (S), presenting users with immersive and interactive features through the overlay of virtual elements onto physical surroundings. These features are especially appealing to Chinese young consumers, particularly those from Generation Z and Millennials, who have been identified as digital natives with a strong affinity for novel and entertaining technologies (Liu et al., 2018; Yu & Fan, 2023). The interactivity and realism of AR systems increase users' cognitive involvement and emotional engagement, thus triggering organismic responses (O) such as immersion and enjoyment.

Immersion, as an organismic construct, represents the degree of psychological involvement and attentional focus users experience when interacting with AR content. As users become more absorbed in the AR experience, their emotional arousal and satisfaction intensify, resulting in greater enjoyment. Enjoyment, in this context, is not only an affective response but also a critical predictor of positive behavioral outcomes. Prior research supports this pathway. For instance, Degli Innocenti et al. (2019) emphasized that the ability to manipulate virtual products and explore augmented spaces fosters higher user satisfaction. Similarly, Kowalczuk et al. (2021) found that greater immersion in AR environments enhances enjoyment due to the vividness and novelty of the interface.

In China's mobile commerce landscape, AR applications such as virtual try-ons or 3D product previews are becoming increasingly popular among younger consumers, who prioritize entertainment and interactive experience in their shopping journey. Domestic scholars have also observed similar trends. Zeng et al. (2023) highlighted that AR experiences offer high hedonic value, which significantly boosts perceived enjoyment and emotional attachment to digital products. Wang et al. (2023) further suggested that the entertainment function of AR plays a central role in shaping emotional responses, which are crucial for marketing effectiveness among Chinese digital consumers.

Enjoyment, as an emotional state derived from immersion, directly contributes to the response (R) in the S-O-R model, manifested in the form of increased purchase intention. Positive emotional experiences reinforce consumers' perceptions of product value and credibility, thereby increasing their likelihood of purchasing. Oyman et al. (2022), confirmed that enjoyment not only enhances the consumption experience but also builds emotional resonance, motivating consumers to act. Likewise, Yim et al. (2017) demonstrated that interactive AR features, such as virtual object manipulation and real-time customization, increase both enjoyment and purchase probability by offering a novel and engaging shopping experience.

In the Chinese context, this affective mechanism may be even more pronounced. According to Wang and Jiang (2024), young Chinese consumers exhibit higher levels of technological curiosity and experiential consumption preferences, making them more responsive to emotionally engaging AR stimuli. AR-induced enjoyment fosters emotional connection and trust, which are key drivers of purchasing decisions in China's increasingly experience-driven retail environment.

In conclusion, these findings highlight the critical role of immersion and enjoyment as organismic responses in the AR-mediated S-O-R process. The immersive qualities of AR environments (S) activate deep cognitive and affective reactions (O), particularly immersion and enjoyment, which significantly reinforce consumers' purchase intentions (R). For marketers targeting Chinese youth, designing AR applications that enhance user immersion and stimulate enjoyment is essential for fostering effective consumer engagement and driving sales outcomes.

5.2.1.7 Perceived information quality and enjoyment positively influence attitudes

According to the hypothesis testing results, perceived information quality and enjoyment exert a significant positive influence on consumer attitudes in AR environments. This finding indicates that when consumers perceive the information presented within an AR setting as high in quality and relevance, their cognitive engagement and satisfaction are enhanced. Simultaneously, an enjoyable AR experience fosters a favorable attitude toward the AR application or associated brand. These results are consistent with the S-O-R framework, in which perceived information quality and enjoyment function as external stimuli (S) that influence consumers' internal psychological states (O), ultimately shaping their attitudinal and behavioral responses (R).

Specifically, perceived information quality represents a cognitive stimulus variable, and its influence becomes more prominent in AR contexts. By offering immersive visualizations, real-time interactivity, and spatial augmentation, AR technology significantly improves the clarity, vividness, and credibility of information presentation, thereby strengthening consumer trust and comprehension (Liu et al., 2018). This is particularly relevant for young Chinese consumers, such as members of Generation Z and the millennial cohort, who have grown up in mobile digital environments and exhibit strong information-processing capabilities and aesthetic expectations. These consumers are highly sensitive to the credibility and visual appeal of content, relying on high-quality, intuitively presented information to support their decision-making (Wang et al., 2023).

Enjoyment, as an affective organism variable, also plays a critical role in shaping consumer attitudes. A pleasurable AR experience fosters emotional bonding and enhances consumers' perceived emotional value, which contributes to a more favorable brand evaluation (Kowalczuk et al., 2021). Prior research confirms that the interactivity and entertainment value of AR applications significantly improve users' emotional responses, increasing their likelihood of forming positive attitudes (Ridge, 2021). In the Chinese context, recent studies have shown that enjoyment is a core experiential value sought by young consumers in digital consumption environments (Wang et al., 2023).

However, in the non-AR group, perceived information quality did not exert a significant impact on consumer attitudes. This may be attributed to the limitations of traditional digital interfaces, which often fail to generate sufficient cognitive engagement or attention, thereby limiting the perceived value of the information presented. In contrast, AR environments amplify the influence of information quality by enhancing the sensory and interactive experience, making content more impactful and memorable. These differences suggest that AR can strengthen the pathways through which consumers cognitively and affectively evaluate brand or product offerings (Degli Innocenti et al., 2019)

In summary, the results underscore the dual importance of cognitive and affective factors in attitude formation within AR environments. For companies targeting young Chinese consumers, optimizing the structure and clarity of information within AR experiences, while incorporating engaging and entertaining elements, is a key strategy for enhancing consumer attitudes and behavioral intentions. These insights offer valuable implications for the design of AR-based marketing strategies, highlighting the need for an integrated approach that emphasizes both informational quality and experiential value to create competitive advantages in the digital marketplace.

5.2.1.8 Cognitive responses (attitudes and perceived information quality) mediate the relationship between perceived augmented realism, technology fluidity, and purchase intention in an AR environment

Based on the hypothesis testing results, it was found that consumer attitude and perceived information quality play significant mediating roles in the influence paths of perceived augmented realism and technology fluidity on purchase intention. This finding indicates that in an AR shopping environment, both the realism of virtual elements and the fluency of system interaction positively influence consumers' cognitive evaluations, which in turn stimulate their purchase intentions. As core cognitive mechanisms, consumer attitude and perceived information quality serve as critical bridges in transforming technological features into behavioral intentions.

Within the framework of the S-O-R theory, stimuli refer to perceived characteristics derived from the external environment. In this study, perceived augmented realism captures users' subjective evaluations of the authenticity, spatial integration, and interactive realism of virtual elements in the AR context (Wang & Jiang, 2024). Technology fluidity, on the other hand, refers to users' perceptions of the ease, seamlessness, and smoothness of interacting with AR interfaces (Lin, 2008). These two stimulus variables are particularly salient for younger Chinese consumers. Members of Generation Z, born during the rapid advancement of digital technologies, exhibit a natural affinity for new technologies and a high level of technological receptiveness. They tend to seek interactivity, immersion, and instant feedback during their shopping experiences (Zhang et al., 2019). AR technology aligns well with these expectations by providing multi-dimensional sensory stimulation across visual, tactile, and situational domains. Therefore, when AR applications are characterized by high realism and smooth interaction, they are more likely to capture young consumers' attention and interest.

Triggered by these stimuli, consumers undergo internal psychological changes—the organism component in the S-O-R model—which manifest as their attitudes toward the AR experience and their cognitive evaluations of the quality of information presented. Prior studies have highlighted that young Chinese consumers place particular importance on the timeliness, visualization, and credibility of information in e-commerce settings (Liu et al., 2022). The three-dimensional visualization and simulated trial features enabled by AR effectively reduce perceived information asymmetry and uncertainty, thereby enhancing evaluations of information quality. Moreover, contemporary Chinese youth demonstrate consumption patterns characterized by self-pleasing consumption and experience-driven preferences. Shopping is not only a means of acquiring goods, but also an avenue for emotional expression and identity construction (Lao, 2023). Therefore, when AR technologies offer immersive and enjoyable experiences, they are more likely to foster favorable consumer attitudes toward brands and products.

Ultimately, these internal cognitive and affective responses shape the consumer's behavioral outcome, i.e., purchase intention. In AR environments, when consumers perceive the interface as intuitive, information as transparent, and the experience as enjoyable, they are more inclined to proceed with purchasing decisions. For instance, research by Pessoa et al. (2022) has demonstrated that high-quality AR visual content not only increases user engagement but also enhances trust in the brand. Within the Chinese context, young consumers are particularly influenced by social media recommendations, short-form video promotions, and visual trial experiences. The "what-you-see-is-what-you-get" feature of AR technology resonates with their shopping psychology, thereby improving conversion rates. Additionally, shaped by mobile internet and social platform usage, young Chinese consumers tend to exhibit impulsive, sharing-oriented, and personalized consumption behaviors. This suggests that novel, realistic, and engaging AR experiences are likely to trigger immediate purchase decisions (Sun et al., 2022).

In summary, perceived augmented realism and technology fluidity in AR environments function as external stimuli that influence consumers' attitudes and perceived information quality—two key cognitive variables—which in turn drive the formation of purchase intentions. The mediating roles of these cognitive responses underscore the centrality of user experience quality in AR-based shopping contexts. These findings offer valuable theoretical guidance for platforms and developers seeking to optimize interface and interaction design in AR applications.

5.2.1.9 Affective responses (enjoyment, immersion and enjoyment) mediate the relationship between perceived augmented realism, technology fluidity, and purchase intention in an AR environment

The findings of this study reveal that immersion and enjoyment play significant mediating roles in the relationships between perceived augmented realism, technology fluidity, and purchase intention within AR environments. Drawing on the S-O-R, this study provides a theoretical explanation for how key perceptual elements of AR applications indirectly influence consumer behavior via affective responses. The results contribute to a deeper understanding of the psychological mechanisms underlying digital consumption, particularly among young Chinese consumers.

Within the S-O-R framework, perceived augmented realism and technology fluidity function as external stimuli (S) that trigger internal affective states (O) such as immersion and enjoyment, which in turn influence behavioral responses (R), notably purchase intention. This pathway appears especially salient for Generation Z consumers in China, who have grown up in a digitalized environment and demonstrate high receptivity to interactive, visually rich shopping experiences (Wang & Jiang, 2024)

On the one hand, when AR experiences are perceived as highly realistic, users tend to experience enhanced immersion and enjoyment. The sense of augmented realism strengthens the vividness and authenticity of the virtual environment, leading to a heightened sense of presence and deeper psychological connection with the product. For instance, in AR try-on or virtual fitting scenarios, consumers receive a more persuasive product perception through simulation, thereby increasing purchase intention. This aligns with Expectation Disconfirmation Theory (Oliver, 1980), which posits that when user experiences exceed prior expectations, satisfaction and behavioral intentions are elevated.

Moreover, enjoyment emerges as a core emotional construct in the AR context. It stems not only from the novelty and playfulness of the technology but also from the sense of control and ease experienced during its use. Prior research (Yim et al., 2017) has demonstrated that immersion serves as a mediator between interactivity, vividness, and enjoyment, which ultimately drives purchase intention in AR-based commerce. This study confirms such interrelations and further supports the Interactive Media Experience Model (Hassenzahl & Tractinsky, 2006), which emphasizes immersion and enjoyment as critical to creating positive user experiences in digital environments.

On the other hand, technology fluidity contributes to immersive and enjoyable experiences by facilitating seamless and intuitive interactions. In the Chinese context, where mobile e-commerce applications continue to evolve rapidly, younger consumers increasingly expect frictionless technological interfaces (Song et al., 2019). A smooth and adaptive system enhances users' perceived control and comfort, which reinforces affective responses and, subsequently, purchase intentions. Studies by Sears (2023) and Oyman et al. (2022) underscore the importance of technology usability and adaptability in enhancing immersion, enjoyment, and user engagement.

However, among non-AR users, the mediating effects of perceived augmented realism and technology fluidity on immersion and enjoyment were not significant. This may be attributed to the relatively low sensory stimulation offered by traditional mobile shopping interfaces, which lack the immersive and interactive features of AR. For Chinese digital-native consumers, conventional image-text formats may fail to meet growing demands for engaging and personalized experiences. In such low-stimulation environments, emotional responses tend to be weaker, diminishing the indirect effects of perception-based stimuli on purchase intention.

In sum, the results underscore that within AR shopping environments, the purchasing decisions of young Chinese consumers are shaped not only by perceptual stimuli but also, and more importantly, by their affective experiences. These findings extend the application of the S-O-R theory in the context of AR technology and offer empirical insight into the behavior of China's digitally native consumers.

5.2.2 Discussion of Research Questions and Objectives

This study, grounded in the S-O-R framework, systematically investigates the underlying mechanisms through which AR virtual try-on technology influences Chinese consumers' purchase intentions. Through empirical analysis, it reveals how perceived augmented realism and technology fluidity—serving as external stimulus variables—affect consumers' cognitive and affective responses, which in turn shape their purchasing behavior. Taking into account the behavioral characteristics of young Chinese consumers, particularly their heightened sensitivity to immersion, technological experience, and information credibility in mobile AR environments, this section provides an in-depth discussion of the research questions and objectives.

5.2.2.1 How do perceived augmented realism and technology fluidity affect the cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) of Chinese consumers?

The first research question and objective examined how perceived augmented realism and perceived technology fluidity influence cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) of Chinese consumers.

The results reveal that perceived augmented realism plays a crucial role in enhancing both cognitive and affective responses, especially within the AR group. In the Chinese market, where consumers—particularly digital-native youth—demonstrate a high degree of receptivity toward technological innovations, the realism and vividness of AR experiences significantly influence their cognitive evaluation processes (Yu & Fan, 2023). Specifically, perceived augmented realism has a strong positive effect on attitudes and perceived information quality ($p < 0.001$), underscoring the importance of lifelike visual and interactive cues in shaping perceptions of product credibility and informativeness.

Similarly, technology fluidity—defined as the smoothness and intuitiveness of interaction with AR interfaces—also significantly impacts cognitive responses in both groups, with a more substantial effect observed in the AR group (Lin, 2008). This aligns with the preferences of Chinese consumers, who typically demand efficient, responsive, and frictionless digital experiences (Wang & Jiang, 2024). A fluid AR system minimizes cognitive load and enables users to better focus on product features, thereby enhancing information processing and fostering positive attitudes. In contrast, in the non-AR group, the influence of fluidity is less pronounced, possibly due to the absence of immersive visual stimuli that synergize with fluid interactions to create deeper engagement.

In terms of affective responses, both perceived augmented realism and technology fluidity are found to significantly enhance immersion and enjoyment, particularly within the AR group. For Chinese consumers, who often seek hedonic value and emotional stimulation in online shopping, the immersive qualities of AR environments evoke stronger emotional responses (Shi, 2024). The study finds that perceived augmented realism significantly increases immersion in the AR group, but not in the non-AR group, highlighting AR's distinctive advantage in emotional engagement. Furthermore, technology fluidity enhances both immersion and enjoyment in the AR group, while its effect is diminished in the non-AR context. These results suggest that the affective benefits of technological fluency are amplified when accompanied by visually enriched and interactive experiences.

5.2.2.2 How do the cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) of Chinese consumers affect their purchase intention?

The second research question and objective explored how cognitive and affective responses influence Chinese consumers' purchase intentions.

Consistent with the S-O-R model, attitudes emerge as a significant predictor of purchase intention in both AR and non-AR conditions. However, the stronger effect in the AR group suggests that the enhanced realism and immersive quality of AR technology amplify the positive attitudes toward the product, thereby strengthening the intention to purchase. This finding aligns with the S-O-R model, where attitudes, as a cognitive response (organism-level), serve as a crucial intermediary that translates the stimulus (AR environment) into consumer actions (purchase intention). The heightened sense of realism in AR environments leads to more favorable evaluations of the shopping experience, which directly translates into stronger purchase intentions. This finding reflects Chinese consumers' increasing emphasis on experience-driven consumption and brand engagement in mobile commerce platforms.

Perceived information quality also demonstrates a positive impact on purchase intention, again more significantly in the AR group. This result is particularly relevant in the Chinese digital economy, where consumers often face information overload and rely on enhanced visual and interactive tools to make more informed decisions (Zeng et al., 2023). The realistic product simulations in AR environments improve the perceived accuracy and credibility of information, reducing uncertainty and bolstering purchase confidence.

In terms of affective responses, immersion contributes significantly to enjoyment in both AR and non-AR groups, indicating that consumers value engagement and experiential involvement in the shopping process, regardless of the medium. However, the AR group benefits from a heightened immersive experience, which further amplifies enjoyment. Importantly, enjoyment exerts a strong positive influence on purchase intention in both groups, with a stronger effect in the AR condition. This underscores the hedonic motivation of Chinese consumers, who increasingly favor technologies that offer entertainment and pleasure during shopping.

5.2.2.3 How do Chinese consumers' cognitive responses (attitudes and perceived information quality) and affective responses (immersion and enjoyment) mediate the relationship between perceived augmented realism, perceived technology fluidity, and purchase intention?

The third research question and objective focused on the mediating effects of cognitive and affective responses between technological stimuli (perceived augmented realism and technology fluidity) and purchase intention.

The findings demonstrate that both attitudes and perceived information quality mediate the relationship between perceived augmented realism and purchase intention, as well as between technology fluidity and purchase intention. This suggests that Chinese consumers form purchase intentions not solely based on technological novelty but through enhanced cognitive evaluations facilitated by realistic and fluid AR experiences. These insights resonate with the behavioral tendencies of Chinese digital consumers, who often integrate cognitive deliberation with affective gratification in their decision-making processes (Goncalves et al., 2021; Yu & Fan, 2023).

Furthermore, affective responses—particularly in AR contexts—serve as important mediators. The study finds a sequential mediation pathway whereby perceived augmented realism enhances immersion, which then increases enjoyment, ultimately leading to stronger purchase intentions. This highlights the emotional value that AR environments deliver, which is especially appealing to Chinese consumers who seek novelty, entertainment, and emotional fulfillment in digital commerce (Liu et al., 2018). However, in the non-AR group, the mediation effect of immersion through enjoyment is not significant ($p = 0.099$), suggesting that traditional interfaces may lack the emotional stimuli necessary to trigger deep affective engagement.

Additionally, technology fluidity indirectly influences purchase intention through enjoyment and the immersion–enjoyment sequence, particularly in the AR group. In contrast, in non-AR settings, this pathway is not significant ($p = 0.082$), reinforcing the view that technological fluidity alone is insufficient to drive emotional responses in the absence of immersive, visually enriched experiences. These findings reinforce the importance of designing integrated and engaging AR shopping experiences that combine both cognitive clarity and emotional satisfaction.

5.3 Discussion of Qualitative Results: Based On S-O-R Framework and Young Chinese Consumer Behavior

5.3.1 Discussion on the Perceived Augmented Realism and Its Impact on Consumer Cognitive and Affective Responses

In the context of the Chinese market, perceived AR significantly influences consumer behavior, particularly in enhancing attitudes, perceived information quality, immersion, and enjoyment. According to the S-O-R theory, perceived augmented reality acts as an external stimulus that affects the organism (i.e., the consumer's cognitive and affective responses), ultimately triggering behavioral outcomes such as purchase decisions or other responses. This study explores how AR technology impacts Chinese consumers' cognitive and emotional reactions by enhancing perceived realism and the reliability of product information, thereby influencing their purchasing decisions.

In the context of Chinese consumer behavior, the primary effect of AR technology on consumer attitudes and purchase intentions is manifested through its ability to enhance the immersive shopping experience and the realism of product information. Quantitative data reveals a significant positive correlation between perceived augmented reality and improvements in consumer attitudes, perceived information quality, immersion, and enjoyment. Qualitative insights further enrich this relationship, particularly with regard to the interactive nature of Chinese consumers, especially younger generations, who demonstrate a strong preference for technological innovations and are increasingly influenced by interactive and immersive shopping experiences (Zhang et al., 2022). This demographic is particularly inclined to seek shopping experiences that incorporate high levels of technological engagement and entertainment, and AR technology offers these capabilities by making the shopping process more participatory and authentic, which in turn enhances purchase intentions.

For instance, Respondents No.1 and No.3 highlighted that AR technology allowed them to feel a stronger connection with the products, which significantly influenced their purchasing decisions. As the S-O-R theory suggests, AR technology functions as an external stimulus, which enhances the emotional connection to the products through visual and interactive elements, thereby improving consumer attitudes and increasing purchase intentions (Saura, 2024). In the Chinese market, consumers highly value product authenticity and transparency, and AR's ability to accurately present product details helps mitigate the uncertainty and risk associated with online shopping, which is particularly important for Chinese consumers (Fan et al., 2020).

Additionally, Respondent No.14 emphasized that the realism of the AR experience enhanced their perception of information quality regarding shoes and increased overall enjoyment. This emotional response aligns with the "organism" component of the S-O-

R model, where consumers' cognitive and emotional reactions to external stimuli (such as AR experiences) play a crucial role in shaping their purchasing behavior. Chinese consumers place high importance on the "entertainment" and "interactivity" aspects of shopping, and AR technology transforms traditional shopping into a more engaging and interactive activity, thereby increasing satisfaction and driving future purchase decisions (Yu & Fan, 2023). This pleasurable experience not only enhances consumer satisfaction but also encourages brand loyalty and repeat purchasing behavior.

Interestingly, Respondent 12's feedback emphasized the importance of accurate information provided by AR platforms, which positively influenced their perceptions of product quality and suitability. This phenomenon is particularly pronounced in the Chinese market, where consumers, especially the younger generation, expect high levels of information authenticity and transparency. AR technology, by accurately replicating real-world objects, enhances trust in product quality and reliability. This observation aligns with the findings of Daassi and Debbabi (2021) and Pessoa et al. (2022), who noted that realistic AR experiences improve consumer trust by offering precise representations of products. This accuracy not only increases consumer confidence in the information provided but also strengthens their loyalty to the brand.

According to the S-O-R framework, AR technology, as an external stimulus, influences consumers' cognitive and emotional responses, resulting in enhanced engagement and purchase intentions. In the Chinese market, where younger consumers tend to emphasize social interaction and technological engagement, AR provides a high level of interactivity and personalization, which enhances the overall shopping experience. This dynamic is particularly evident on e-commerce platforms, where AR technology has been widely adopted to meet the demand for innovative shopping experiences (Wang et al., 2023).

5.3.2 Discussion on the Perceived Technology Fluidity and Its Impact on Consumer Cognitive and Affective Responses

The qualitative findings from this study suggest that perceived technology fluidity plays a pivotal role in shaping Chinese consumers' cognitive and affective responses, particularly in enhancing their attitudes, perceived information quality, immersion, and overall enjoyment. These effects are notably significant in the context of AR platforms, where seamless and engaging technology interactions serve as critical stimuli that influence consumer behavior. According to the S-O-R framework, perceived technology fluidity functions as an external stimulus that triggers positive emotional and cognitive responses from consumers, ultimately affecting their purchase intentions.

Respondents consistently emphasized the positive influence of seamless, intuitive, and engaging AR platforms on their product perceptions and purchasing intentions.

For example, Respondents No.21 and No.24 noted that the smooth navigation and engaging features of AR platforms significantly increased their intent to purchase and positively impacted their perceptions of the products. These observations align with Menandro and Arnab (2020), who emphasized the importance of user experience and technological adaptability in shaping consumer emotions. In the case of Chinese consumers, particularly the younger demographic, the usability and convenience of technology are key factors in shaping their attitudes towards products. As such, when technology interactions are perceived as fluid and effortless, they enhance the perceived quality of the product and increase the likelihood of purchase (Zeng et al., 2023).

The impact of perceived technology fluidity on consumer attitudes is further reinforced by Respondent 31, who highlighted that the seamless integration of AR technology allowed for a better assessment of product quality, thereby enhancing their propensity to purchase. This finding echoes the conclusions of Plotkina and Saurel (2019), who demonstrated that the usability of technology positively influences customer perceptions of product quality. For Chinese consumers, where trust and clarity in product details are essential, the fluid operation of AR platforms facilitates informed and confident purchasing decisions, making the overall shopping experience more reliable and satisfying (Xue, 2022).

Moreover, the factor of immersion emerged as another critical aspect in shaping the cognitive and emotional responses of consumers. Respondent No.35 described the immersive nature of the AR experience as deeply engaging, which ultimately led to a purchase decision. This insight is consistent with the research of (Enyejo et al., 2024), which found that immersive experiences significantly enhance user engagement and purchase behavior. In the Chinese context, where younger consumers are highly attuned to digital experiences that are both entertaining and informative, the seamless operation of AR technology can create a more enjoyable and interactive shopping experience (Shi et al., 2025). Such immersive experiences, characterized by smooth and intuitive technology interactions, significantly contribute to heightened consumer engagement, thus validating the crucial role of technological fluidity in fostering positive consumer emotions and behaviors (Plotkina & Saurel, 2019).

Further, the qualitative data from this study underscores the significant role of perceived technology fluidity in improving consumer experiences. Seamless and intuitive AR platforms not only enhance consumers' attitudes and their perceived quality of information but also deepen their immersion in the shopping experience. As a result, this ultimately leads to higher purchase intentions. These findings suggest that Chinese consumers, particularly younger generations who place a high value on technological innovation and user experience, are more likely to engage with AR platforms that are both user-friendly and technologically fluid. This aligns with the broader trend in China’s consumer market, where the integration of cutting-edge technology plays a central role in shaping purchasing behaviors (Yanbin, 2016).

In light of these findings, retailers and marketers are advised to prioritize the development of seamless, engaging, and user-friendly AR technologies. Focusing on technological fluidity can substantially improve consumer perceptions of product quality, enhance engagement, and drive sales. Given the increasingly competitive nature of the Chinese retail market, where consumer expectations for digital and immersive shopping experiences are high, investing in high-quality, fluid technological solutions is crucial for businesses aiming to stay ahead. This aligns with the perspectives of Menandro and Arnab (2020), who argue that the convenience and ease of technology interactions are fundamental in shaping consumer emotions and behaviors, particularly in the context of AR-driven retail experiences.

In conclusion, perceived technology fluidity, particularly within the context of AR technology, is a significant factor influencing Chinese consumers' cognitive and affective responses. By acting as an external stimulus that promotes positive emotional engagement, enhances perceived information quality, and facilitates a more immersive shopping experience, technology fluidity directly impacts consumers' attitudes and purchase intentions. This is particularly true for young Chinese consumers, who exhibit strong preferences for seamless and enjoyable technological experiences. Retailers and marketers seeking to capitalize on this trend must focus on creating smooth, intuitive, and engaging AR platforms to meet the evolving expectations of this demographic. In doing so, they can enhance consumer satisfaction, increase engagement, and drive sales, thereby strengthening their competitive position in the fast-evolving Chinese retail landscape.

5.3.3 Discussion on the Impact of Cognitive Responses on Purchase Intention

According to the S-O-R theory, external stimuli (in this case, the AR technology) affect the consumer organism (attitudes and perceived information quality), which in turn influences their behavioral responses, such as purchase intention. As suggested by Elford et al. (2022), individual attitudes, which form an integral part of the organism stage in the S-O-R framework, play a key role in shaping behavioral intentions. Thus, it is clear that consumer attitudes toward AR technology are pivotal in influencing their purchase intentions (Plotkina & Saurel, 2019). This is particularly relevant to the Chinese market, where young consumers, known for their high engagement with digital and immersive technologies, are more likely to exhibit positive attitudes toward AR and be influenced by it in their purchasing decisions.

The qualitative data from this study further substantiate these findings. Several respondents highlighted how their positive attitudes toward the AR experience directly enhanced their perceptions of the products and, in turn, increased their likelihood of purchasing. For instance, Respondent No. 33 emphasized the educational and engaging nature of the AR experience, which led to an improved perception of the product and ultimately facilitated their purchase decision. This highlights the crucial role of positive technological experiences in shaping consumer attitudes, a finding consistent with the work of Lavoye et al. (2021), who also argued that consumer perceptions significantly impact purchasing decisions in AR environments. Similarly, Respondent No. 22 noted that the combination of high proficiency in using the AR platform and positive interactions with the technology led to a more favorable opinion of the product. In the context of Chinese consumers, this suggests that the more immersive and engaging the AR experience is, the more it fosters positive consumer attitudes and increases purchase intentions. These qualitative insights emphasize the importance of AR platforms in shaping consumer perceptions, which aligns with the general argument in the literature that AR's engaging nature serves to enhance product appeal and purchase likelihood (Yim et al., 2017).

Furthermore, perceived information quality emerged as a critical factor in shaping purchase intentions, particularly in online shopping contexts. Consistent with Fan et al. (2020), who found that comprehensive and high-quality product information enhances consumer perceptions, the respondents in this study reported that detailed product information provided by AR platforms significantly influenced their purchase decisions. For example, Respondents No. 14 and No. 23 highlighted that the wealth of information available through the AR platform helped them assess product quality more effectively, thus increasing the likelihood of purchasing. Respondent No. 21 also echoed this sentiment, stating that the use of AR during product browsing heightened their perceptions of product quality, which in turn positively influenced their purchase intention. This finding resonates with Anderson and Laverie (2022), who reported that perceived quality is a key determinant of consumer purchase intentions. In the context of Chinese consumers, particularly the younger demographic, the provision of detailed and easily accessible product information through AR can significantly enhance the credibility and trustworthiness of the product, leading to higher purchase intentions (Wang et al., 2022). Respondent No. 12 also emphasized the vast amount of information provided on the AR platform, which increased their acceptance of the product, further highlighting the role of information quality in shaping consumer attitudes and behaviors.

These findings underscore the importance of AR technology in influencing consumer behavior, especially among Chinese youth. By offering immersive and engaging experiences that are supplemented with comprehensive product information, AR platforms can effectively enhance consumer attitudes and perceptions of product quality. In line with the S-O-R theory, AR technology acts as a stimulus that positively influences consumer cognition and emotions, which in turn leads to a more favorable purchase intention. For businesses aiming to target the Chinese youth market, investing in high-quality AR platforms that offer both an engaging experience and detailed, trustworthy product information is crucial. Such investments can foster positive consumer attitudes, enhance the perceived quality of the product, and ultimately increase sales.

In conclusion, the interplay between consumer attitudes and perceived information quality plays a significant role in shaping purchase intentions, particularly in the context of AR technology. The findings of this study indicate that positive attitudes toward AR are key determinants of consumer purchase behavior. This is particularly relevant to Chinese young consumers, who exhibit a high level of engagement with digital technologies and are influenced by the interactive and informative nature of AR platforms. By enhancing consumer perceptions of product quality and fostering positive attitudes, AR technology has the potential to significantly impact purchase intentions and drive sales. Therefore, retailers and marketers should prioritize the development of high-quality, immersive AR platforms that provide rich, reliable product information to cater to the needs and preferences of this increasingly tech-savvy demographic.

5.3.4 Discussion on the Impact of Affective Responses on Purchase Intention

Previous research has established a strong link between AR immersion and increased user enjoyment, highlighting that more vivid and engaging AR interfaces significantly enhance the immersive experience (Yim et al., 2017). This enhanced immersion, in turn, plays a critical role in boosting consumer enjoyment, a finding further corroborated by Kowalczuk et al. (2021). In the context of Chinese young consumers, known for their high digital engagement and openness to immersive technologies, AR platforms' ability to provide compelling and interactive experiences is particularly impactful (Fang et al., 2021). According to the S-O-R model, external stimuli, such as the immersive features of AR, act as powerful triggers for shaping consumer perceptions (organism), which then lead to behavioral outcomes such as increased purchase intention (Mehrabian & Russell, 1974). The findings of this study align with these theoretical assertions, with respondents indicating that AR immersion significantly increased their enjoyment of the shopping experience, thereby enhancing their likelihood of making a purchase.

For example, Respondent No. 3 emphasized that their enjoyment of the AR experience increased with greater immersion, while Respondent No. 14 echoed this sentiment, noting that the more immersive the AR experience, the more enjoyable it became. Respondent No. 21 succinctly articulated this relationship, stating, *"The more I immerse myself in it, the more enjoyable I experience it; immersion increases enjoyment, which increases the possibility of buying."* This qualitative insight directly aligns with Yim et al. (2017), who suggest that AR's ability to provide an interactive, engaging environment increases enjoyment and, by extension, purchase intention. This finding resonates with Chinese consumers, who, as highlighted by Wang et al. (2022), exhibit a higher level of engagement with immersive technologies, such as AR, which in turn positively influences their consumer behaviors.

Moreover, Yim et al. (2017) argue that the interactivity and entertainment aspects of AR not only enhance user enjoyment but also increase the probability of making a purchase. Respondent No. 31's account further supports this notion, describing the AR shopping platform as both engaging and enjoyable, which, in turn, increased their purchase likelihood. Similarly, Respondent No. 13 described the AR experience as fascinating and fun, akin to trying on shoes in a store. These observations align with the work of McLean and Wilson (2019), who demonstrated that immersive virtual experiences significantly enhance user engagement and enjoyment, with this heightened enjoyment leading to increased purchase intentions. This link between enjoyment and purchase intention highlights the necessity of creating immersive AR experiences that stimulate consumer engagement, a perspective that is especially relevant to young Chinese consumers, who place a high value on entertainment and novelty in their shopping experiences (Fan et al., 2022).

Respondent No. 31's experience vividly illustrates this connection: "I was completely engrossed in the augmented reality shopping experience; I liked it more as I got more involved, which influenced my decision to buy the shoes." This reflects the S-O-R theory, where the immersive nature of the AR stimulus (external factor) triggers an emotional and cognitive response in the consumer (organism), which then leads to an observable behavior—purchasing the product. Kowalczuk et al. (2021) similarly found that pleasurable technological experiences positively affect customer purchase decisions, which is consistent with the findings from this study.

Additional qualitative data from this study further reinforce the impact of AR immersion on consumer behavior. Respondent 35 described the AR experience as so realistic that it felt like reality, which enhanced their involvement and boosted their purchasing confidence. These experiences align with the S-O-R model, in which the immersive and realistic AR stimuli lead to heightened emotional involvement (organism), which subsequently drives purchase behavior (response). This finding is particularly important for Chinese young consumers, who increasingly value immersive and interactive shopping experiences (Li & Zhou, 2024).

The findings from this study underscore the pivotal role of AR immersion in enhancing consumer enjoyment and driving purchase intention. By offering vivid, immersive AR experiences, businesses can effectively influence consumer attitudes, leading to increased engagement, enjoyment, and ultimately, higher sales. For Chinese young consumers, who are highly receptive to digital and immersive technologies, the ability of AR to deliver engaging and entertaining shopping experiences presents a significant opportunity for marketers to boost consumer satisfaction and drive purchasing behavior. The S-O-R framework provides a useful lens to understand how AR immersion (as a stimulus) affects consumer emotions and behaviors, underscoring the importance of creating high-quality, interactive AR experiences to influence purchase intentions.

5.4 Conclusion

This study comprehensively examines the multifaceted influences of perceived augmented realism and perceived technology fluidity on consumer responses and purchase intentions in mobile e-commerce within an AR environment. The findings illuminate several key relationships, providing deeper insights into the behavior of young Chinese consumers in the context of AR-driven mobile e-commerce. By applying the S-O-R framework, this study demonstrates how perceived realism and technology fluidity influence consumer purchase intentions through cognitive and affective responses, particularly within the young Chinese consumer segment, known for its strong digital engagement and high acceptance of new technologies.

First, perceived augmented realism significantly enhances consumers' cognitive responses, such as attitudes and perceived information quality. This indicates that when consumers perceive AR as highly realistic, they are more likely to develop positive attitudes and trust the quality of the information presented. This finding aligns with the work of Yim et al. (2017), which emphasizes the importance of realism in AR experiences in fostering consumer trust and attitudes, which ultimately drive purchase intentions. In the context of young Chinese consumers, this group exhibits a growing preference for immersive and high-quality virtual content, thus making AR realism a key factor in shaping their cognitive evaluations (Li & Zhou, 2024). Given the digital inclinations and high technology adoption rate of young consumers in China, AR realism aligns with their heightened expectations for new technologies and virtual experiences.

Similarly, perceived technology fluidity, which refers to the seamless integration and usability of AR technology, also positively impacts cognitive responses. This further supports the S-O-R framework, suggesting that external stimuli such as technological fluidity influence consumer behavior through cognitive and affective responses (Mehrabian & Russell, 1974). Among young Chinese consumers, convenience and efficiency are critical drivers of consumption, and the smoothness and usability of AR technology meet these demands (Li & Zhou, 2024). As young consumers in China increasingly embrace mobile payments and smart shopping experiences, their expectations for seamless technological experiences are high, and any disruptions or technical issues can significantly reduce their shopping satisfaction and purchase intentions.

Additionally, the study finds that perceived augmented realism positively influences consumers' affective responses, including immersion and enjoyment. When AR experiences are perceived as realistic, consumers tend to become more immersed and derive greater enjoyment from the interaction. For young Chinese consumers, immersion and enjoyment are particularly important, as they have a strong desire for interactive and entertaining shopping experiences

(Wang & Jiang, 2024). For this group, AR is not only a tool for shopping but also an avenue for entertainment and social interaction. Therefore, the immersive and enjoyable nature of AR experiences is crucial in driving affective responses and purchase intentions.

Moreover, perceived technology fluidity also fosters positive affective responses, further emphasizing the importance of smooth and intuitive AR experiences in enhancing user engagement and satisfaction. Among younger Chinese consumers, the convenience and fluidity of technological experiences not only enhance their emotional responses but also increase their satisfaction with the shopping process (Chen & Lin, 2022). This level of immersion and enjoyment plays a key role in keeping young consumers engaged and ultimately influencing their purchasing behavior.

Cognitive responses, particularly attitudes and perceived information quality, play a pivotal role in driving purchase intentions in an AR environment. This finding highlights the crucial role of consumers' cognitive evaluations in their subsequent purchasing decisions. According to the S-O-R framework, cognitive responses mediate the relationship between perceived augmented realism and purchase intention, as well as between perceived technology fluidity and purchase intention. Furthermore, affective responses, especially enjoyment, are shown to significantly influence purchase intention, indicating that the emotional satisfaction derived from AR experiences is a strong predictor of consumers' willingness to buy.

Importantly, the study underscores the mediating effects of both cognitive and affective responses. Cognitive responses mediate the relationship between perceived augmented realism and purchase intention, as well as between perceived technology fluidity and purchase intention. This mediation suggests that the impact of perceived realism and fluidity on purchase intentions operates through consumers' attitudes and perceptions of information quality. Similarly, affective responses, such as immersion and enjoyment, mediate the relationship between perceived augmented realism and purchase intention, and between perceived technology fluidity and purchase intention. These findings highlight the crucial role of emotional experiences elicited by AR in translating the perceived quality of AR features into actual purchase intentions.

In conclusion, this study provides robust evidence that both cognitive and affective responses play integral roles in linking perceived augmented realism and technology fluidity to purchase intentions in an AR environment. By highlighting the mediating roles of attitudes, perceived information quality, immersion, and enjoyment, this research underscores the importance of designing AR experiences that are both realistic and user-friendly in effectively influencing consumer behavior and driving sales. Specifically, for young Chinese consumers, who demonstrate a high level of mobile e-commerce engagement and technological adoption, AR experiences must meet their expectations for immersion, interactivity, and entertainment to effectively enhance their shopping experience and purchase intentions.

5.5 Implications

This study clarifies the significance and implications of the research work for the target audience, including academics and practitioners, both in terms of theoretical and practical application. The study establishes a foundational framework for adopting AR in retail contexts by emphasizing the importance of AR's fluidity, realism, and cognitive and affective impacts. E-commerce retailers and application developers are encouraged to focus on enhancing realism, technological fluidity, and the overall engagement of AR experiences. Such enhancements will likely positively influence consumer attitudes, perceived information quality, immersion, enjoyment, and purchase intentions. This can help stores use augmented reality to engage customers and compete in the digital economy. According to the research report, the following academic and practical implications are summarized.

5.5.1 Academic Implications

5.5.1.1 Research Model Improvement

Within the AR shopping environment, few articles consider perceived information quality as a variable in cognitive responses. Notably, many scholars have predominantly focused on investigating the mediating effects of organism factors, primarily within the realms of cognitive (e.g., perceived value, presence) or affective aspects (e.g., immersion, enjoyment, playfulness) (Daassi & Debbabi, 2021; Gäthke, 2020; Han et al., 2021; Qin et al., 2021; Watson et al., 2018). However, there is a notable gap in the literature, with only a few scholars considering perceived information quality as a mediating variable of affective response in the S-O-R framework. In contrast, information quality affects perceived usefulness, which in turn affects consumers' behavioral intentions (Pantano et al., 2017).

Based on the S-O-R theory, this study incorporates perceived information quality as a cognitive response variable to explore the influence of perceived augmented realism and technology fluidity on consumer cognitive responses and highlight the significant mediating role of perceived information quality. The inclusion of perceived information quality as a mediating variable underscores the complexity of consumer reactions within AR environments. It suggests that consumers' cognitive interpretations and evaluations are influenced not only by the realism and fluidity of AR technology but also by the perceived reliability and relevance of the information presented through these technologies. This nuanced understanding enriches our theoretical grasp of how technological affordances shape consumer perceptions and behaviors.

Moreover, these findings provide a reference for future research efforts and provide a basis for exploring other variables and mechanisms within the S-O-R framework. Researchers can further investigate the interplay between different stimuli, consumer psychological responses, and behavioral outcomes in AR settings. This holistic approach not only advances academic understanding but also offers practical implications for marketers and developers seeking to optimize consumer experiences in AR-based contexts.

5.5.1.2 Research Scope Extension

The preceding literature review revealed a scarcity of scholarly investigations into the impact of perceived augmented realism and technology fluidity on consumer cognitive, affective, and behavioral dimensions within the AR shopping environment. Nonetheless, there is a widespread acknowledgment of the crucial role that perceived augmented realism and technology fluidity play in enhancing the consumer experience within AR systems. This study confirms that perceived augmented realism and technology fluidity positively affect consumers' cognitive response (attitudes, perceived information quality) and affective response (immersion, enjoyment), thus positively affecting purchase intention, and elucidates how perceived augmented realism and technology fluidity shape a spectrum of cognitive, affective, and behavioral responses in the AR environment. By providing empirical evidence of these effects, the study enriches the existing body of knowledge on AR applications in marketing.

The findings from this study hold significant implications for both academia and industry. Academically, it deepens our understanding of how technological aspects like augmented realism and fluidity influence consumer behavior, thereby contributing to theoretical advancements in marketing and consumer psychology. Practically, the insights gained can inform marketers and developers about optimizing AR experiences to enhance consumer engagement and drive purchase decisions effectively.

In conclusion, by addressing gaps in the literature and substantiating the effects of perceived augmented realism and technology fluidity on consumer responses, this study not only advances knowledge within the field of AR marketing but also provides a platform for further exploration and innovation in understanding consumer behavior in digital environments.

5.5.2 Practical Implications

The findings of this study yield important practical implications for both retailers and application developers operating within mobile AR environments. In particular, the results highlight the necessity of prioritizing the enhancement of both visual realism and technological fluidity in AR applications. Improvements in image clarity, spatial coherence, and the naturalness of user-object interactions are fundamental to strengthening users’ cognitive appraisals—namely, their attitudinal responses and perceptions of information quality. These cognitive responses are instrumental in cultivating user trust and promoting the broader acceptance of AR technologies in digital commerce settings. Accordingly, retailers and developers are advised to invest in advanced rendering technologies and interaction design strategies that support seamless, realistic, and user-centered AR experiences.

5.5.2.1 Strategic Implications for Mobile E-commerce Retailers

Engaging Young Chinese Consumers

This study underscores the significant role of AR in enhancing consumers' perceived experience, cognitive evaluation, and purchase intentions. Against the backdrop of the rapid development of mobile e-commerce in China, young Chinese consumers—those born after 1995—have emerged as a dominant force in online consumption. This demographic is characterized by a high level of digital literacy, strong preferences for interactive and immersive technologies, an emphasis on self-expression and social identity, and high expectations for brand authenticity and product transparency (Wang, 2023). Accordingly, mobile e-commerce retailers should consider the following AR strategies to meet the needs of this target group:

1. **Prioritizing Realism and Fluidity to Meet the Experience Expectations of Technologically Sensitive Consumers**

The empirical findings underscore the pivotal role of visual realism and technological fluidity in shaping user attitudes and perceptions of information quality within AR environments. For digitally native consumers such as China's Gen Z cohort—who have been socialized in high-fidelity digital ecosystems characterized by seamless interaction, high-resolution graphics, and low-latency performance—any perceptible technological deficiency (e.g., lag, image distortion, or unrealistic object behavior) is likely to result in immediate dissatisfaction, reduced credibility, and diminished trust toward the platform (Wang et al., 2023).

In response to these user expectations, mobile e-commerce retailers must prioritize the deployment of AR solutions that support high-definition 3D modeling, dynamic environmental sensing, and real-time rendering capabilities. These technical enhancements are essential not only for ensuring perceptual authenticity and interaction smoothness but also for strengthening users' cognitive evaluations of product information. Enhancing visual realism and ensuring the fluid integration of virtual elements with users' real-world environments can positively influence consumer attitudes and elevate the perceived informativeness and professionalism of the platform.

Moreover, sustained collaboration between retailers and AR technology providers is imperative to align performance benchmarks with user expectations. By engaging in iterative feedback loops and performance monitoring, retailers can ensure that AR applications remain responsive, visually coherent, and experientially compelling. Such efforts are critical for building consumer trust, enhancing platform engagement, and ultimately translating immersive experiences into higher purchase intentions and improved sales performance in mobile commerce contexts.

2. **Designing Immersive and Emotionally Engaging Scenarios to Stimulate Affective Involvement**

Young Chinese consumers, characterized by their digital fluency and emotional expressiveness, tend to be highly responsive to consumption experiences that are emotionally engaging, entertaining, and immersive. Their purchasing behavior is often driven not solely by utilitarian considerations but also by the emotional gratification and symbolic value associated with the consumption experience, including elements of self-expression and identity construction (Song et al., 2019). In light of this, AR shopping environments should be conceptualized not merely as informational platforms, but as affective and experiential spaces. Specifically, the integration of narrative-driven content, interactive animations, and multisensory cues such as background music and sound effects can significantly enhance users' perceived immersion and enjoyment.

Previous research has established that perceived immersion and enjoyment serve as critical mediating variables between AR usage and consumer behavioral outcomes such as purchase intentions (Huang et al., 2023). Therefore, mobile e-commerce retailers are advised to shift from viewing AR solely as a technical enhancement to recognizing it as a strategic tool for consumer experience design. To this end, investment in creating seamless, responsive, and intuitively navigable AR interfaces is essential. Smooth interaction with virtual objects not only augments user satisfaction but also contributes to more accurate perceptions of product quality. Furthermore, consistent upgrades and iterative innovations in AR technologies are necessary to meet the evolving expectations of digitally native consumers and to sustain engagement over time. Such efforts will be instrumental in fostering emotional attachment, enhancing brand experience, and ultimately improving conversion rates in AR-based retail environments.

3. Providing Structured and Reliable Information to Build Trust and Support Decision-Making

Gen Z consumers, having grown up in a digitally saturated media environment, display a heightened skepticism toward traditional advertising and exhibit a strong preference for information transparency and authenticity. They typically engage in extensive cross-platform comparisons and demonstrate reliance on data-driven decision-making processes prior to making purchase decisions (Wang et al., 2025). In this context, it is imperative that mobile e-commerce retailers and AR platform designers provide comprehensive, accurate, and easily interpretable product information embedded within the AR experience.

Such information should extend beyond basic product descriptions to include detailed functional specifications, user-generated reviews, usage guides, and comparative product data. Integrating these elements within the AR interface not only supports informed consumer decision-making but also enhances the perceived professionalism and trustworthiness of the platform. Structured and accessible information presentation contributes to the reduction of perceived uncertainty, thereby reinforcing consumer confidence and increasing purchase intentions. Furthermore, transparency and credibility in content delivery serve as critical determinants of trust, which is particularly essential when engaging with digitally literate and information-sensitive consumers such as those in China's Gen Z cohort.

4. Enhancing Multi-dimensional Product Visualization to Reduce Perceived Risk

Chinese young consumers, particularly those from Generation Z, exhibit a strong preference for interactive, experiential shopping modalities that enable a “try-before-you-buy” approach. Traditional modalities of product presentation—such as static images and textual descriptions—are increasingly perceived as insufficient to meet their expectations for detailed, realistic, and context-rich information. Instead, these consumers demand immersive and information-rich experiences that allow them to assess product quality, fit, and utility prior to purchase (Wang et al., 2023).

Augmented reality technology offers a strategic solution to this demand by enabling high-fidelity product visualization through features such as 360-degree product views, virtual try-on functionalities, and spatial placement simulations. These affordances reduce the cognitive load associated with abstract product evaluation and enhance the consumer’s ability to mentally simulate product use in realistic contexts, thereby lowering perceived risk and uncertainty (Poushneh, 2017).

In visually intensive product categories—such as fashion, beauty, and home furnishings—AR facilitates more informed decision-making by bridging the gap between online browsing and offline sensory experience. By showcasing products from multiple angles and in realistic scenarios, AR enhances perceived diagnosticity and fosters trust in product quality. This, in turn, strengthens user engagement and drives purchase intentions. For mobile e-commerce retailers, investing in sophisticated AR presentation strategies not only improves the experiential dimension of online shopping but also contributes to higher conversion rates and customer satisfaction in a competitive digital marketplace.

5. Implementing Personalization Strategies to Satisfy the Demand for Individual Expression

The younger generation places considerable emphasis on individuality and customized experiences, often rejecting standardized, one-size-fits-all solutions. This cohort values personalized interactions, as they seek products and services that align with their unique preferences and identities. In the context of mobile e-commerce, leveraging advanced technologies such as artificial intelligence (AI) and big data analytics provides an opportunity to tailor AR experiences to individual users' characteristics, behaviors, and past interactions. By personalizing content delivery—whether through customized product showcases, context-sensitive styling recommendations, or adaptive interface designs—e-commerce platforms can significantly enhance emotional engagement, increase user loyalty, and strengthen consumer attachment to the platform.

Empirical evidence supports the assertion that personalized experiences lead to higher consumer satisfaction and improved purchase intentions (Fan et al., 2020). By offering AR interactions that resonate with the consumer's preferences and usage history, retailers can cultivate stronger emotional connections and increase user satisfaction. Personalization techniques such as dynamic content delivery, adaptive recommendations, and tailored browsing experiences can substantially elevate the relevance and appeal of AR interactions, ultimately fostering higher levels of engagement and purchase likelihood. Retailers should collaborate closely with technology providers to develop and refine these personalization features, ensuring they meet the diverse needs and preferences of their user base, thereby enhancing the overall effectiveness and impact of AR as a tool for driving sales.

6. Enhancing Social Interaction Features to Activate Word-of-Mouth Effects

Young Chinese consumers are deeply influenced by social media and peer recommendations, often viewing online shopping as an opportunity to express their social identities. This demographic actively shares their shopping experiences and opinions online, which is an integral part of their self-presentation and community-building efforts. As such, e-commerce platforms have a significant opportunity to incorporate social features within AR experiences, such as friend-based try-on suggestions, social filters, and interactive voting options. These features not only enhance user engagement but also encourage content creation and sharing, leading to the development of user-generated content (UGC).

Socially-driven AR applications foster a sense of community, as users are able to interact with their peers, share experiences, and contribute to the collective shopping narrative. Such designs have been shown to increase emotional involvement with the platform, enhancing user satisfaction and boosting purchase intentions (Chin et al., 2025). Furthermore, these social functionalities help to cultivate brand communities, which in turn can significantly improve brand exposure and foster consumer loyalty. By integrating collaborative elements into the AR experience, retailers can increase user engagement, enhance positive sentiment toward the brand, and ultimately drive higher conversion rates and long-term customer retention.

5.5.2.2 Strategic Recommendations for AR Application Developers Targeting Young Chinese Consumers

In China's rapidly evolving mobile e-commerce ecosystem, young consumers—particularly members of young Chinese consumers—have emerged as the primary adopters of AR applications. This demographic demonstrates high digital literacy, prefers mobile-first shopping experiences, and is driven by experience-based consumption. They also value social interactivity, immersive engagement, personalization, and operational efficiency in digital contexts (Wang, 2023). Therefore, AR application developers must gain a deep understanding of the behavioral characteristics of Chinese young consumers to enhance user retention and conversion rates.

1. Enhancing Perceived Realism and Technological Fluency to Support Immersion-Driven Experiences

In the context of online retail, Chinese young consumers exhibit heightened sensitivity to the visual and functional quality of AR applications, particularly valuing high levels of realism and technological fluency. Prior research has underscored that perceived realism and smooth user-system interaction are critical determinants of immersive engagement and purchase intention (Javornik, 2016). Consequently, AR developers should give precedence to enhancing the fidelity of visual rendering, ensuring seamless integration between virtual and physical elements, and optimizing system responsiveness to minimize latency-related disruptions.

To this end, continuous improvement in image resolution, interaction naturalness, and system fluidity is essential for delivering a coherent and engaging user experience. With the ongoing evolution of artificial intelligence, edge computing, and real-time rendering technologies, it is imperative that developers actively incorporate state-of-the-art tools and frameworks to elevate experiential quality. Maintaining technological currency not only enhances the perceived value of AR applications but also reinforces user satisfaction and sustained engagement, thereby contributing to the long-term success of AR-based retail strategies.

2. Enabling Natural Interaction and Cognitive Intuitiveness to Enhance Perceived Informativeness

In contrast to traditional click-based input methods, Chinese young consumers demonstrate a strong preference for intuitive gesture-based interactions—such as swiping, rotating, and zooming—that align with their mobile-native behavioral patterns (Wang et al., 2025). These users typically expect interaction systems to require minimal learning effort and to support rapid onboarding, reflecting their broader preference for convenience and immediacy in digital environments. Therefore, AR application developers must prioritize the design of interfaces that minimize cognitive load while maximizing functional clarity and ease of use.

To achieve this, adherence to principles of intuitive user interface (UI) and user experience (UX) design is essential. Developers should optimize interface layouts, ensure interaction predictability, and implement timely system feedback mechanisms to support user confidence during AR engagement. In particular, the integration of accurate gesture recognition and real-time responsiveness plays a pivotal role in enabling consumers to assess product quality and contextual appropriateness. These enhancements not only contribute to increased user satisfaction but also facilitate trust formation and drive purchase intentions by improving the overall usability and perceived reliability of the AR application.

3. Simplifying Interfaces and Ensuring Structural Transparency to Meet Efficiency-Oriented Expectations

Given the ubiquity of mobile internet use and the accelerated tempo of digital consumption among Chinese youth, this demographic increasingly values applications characterized by simplicity, efficiency, and operational clarity (Wang, 2023). Young Chinese consumers, often referred to as "digital natives," demonstrate a low tolerance for cognitive friction and are more likely to disengage from systems that present overly complex navigational structures or delayed feedback mechanisms. In the context of AR applications, this behavioral tendency underscores the necessity of streamlined interface design.

Developers should thus adopt user-centered design principles that emphasize simplicity and functionality. Specifically, AR interfaces should eliminate unnecessary hierarchical menus and instead implement "task-on-one-screen" solutions that allow users to seamlessly conduct key functions such as virtual try-ons, product inspection, and purchasing within a single, cohesive interface. Immediate and contextually relevant feedback should also be integrated into the interface logic to reinforce user control and reduce uncertainty during interaction. These optimizations contribute to higher levels of user satisfaction and sustained engagement, ultimately enhancing the perceived usability and commercial effectiveness of AR applications in mobile e-commerce environments.

4. Enhancing Information Transparency and Credibility to Support Rational Evaluation

In contrast to earlier consumer cohorts characterized by more impulsive purchasing patterns, members of young Chinese consumers increasingly demonstrate rational and information-driven decision-making AR shopping contexts. Rather than relying solely on visual appeal, this cohort actively seeks comprehensive, credible, and verifiable product information when engaging with virtual interfaces (Liu et al., 2024). Their heightened sensitivity to product authenticity and performance necessitates the development of AR applications that not only simulate realistic appearances but also facilitate informed judgments regarding product attributes such as dimensions, texture, materials, and functional specifications.

To address these evolving consumer expectations, AR developers should implement advanced visualization technologies that enable detailed inspection of key product characteristics. Additionally, embedding mechanisms for information transparency—such as digital certifications, real-time data disclosures, and integrations with third-party verification systems—can substantially reduce perceived uncertainty and enhance consumer trust. Optimizing the presentation of such information in a clear, structured, and context-sensitive manner is critical for supporting users' evaluative processes and fostering a sense of confidence and credibility within the AR shopping environment. These design strategies are instrumental in increasing user satisfaction and facilitating rational, trust-based purchase decisions.

5. Constructing Immersive Scenes to Stimulate Emotionally-Driven Engagement

Emotional stimuli constitute a crucial driver of consumer engagement in AR contexts, serving to deepen user immersion and influence purchase-related behaviors (Poushneh, 2017). In particular, immersive narratives, spatial contextualization, and multisensory feedback—such as auditory cues, haptic responses, and interactive voice prompts—have been shown to enhance users' emotional experiences and stimulate proactive participation in AR-based shopping environments. These design elements not only elevate hedonic value but also contribute to more favorable consumer attitudes toward both the technology and the associated brand.

Within the Chinese consumer landscape, the strategic incorporation of culturally resonant content further amplifies emotional engagement. Elements rooted in traditional culture—such as motifs associated with lunar festivals, regional aesthetics, or the rising "Guochao" (national fashion) movement that emphasizes domestic cultural pride—can serve as effective narrative and visual anchors in AR scenarios. By embedding such localized themes, developers can enhance emotional resonance and reinforce cultural identity, thereby strengthening brand attachment and user loyalty. Consequently, AR developers are encouraged to design emotionally rich and culturally attuned immersive experiences that not only engage users on a sensory level but also align with their cultural expectations and identity expressions in digital commerce environments.

6. Offering Personalized Recommendations to Satisfy Identity Expression Needs

Personalization has emerged as a critical design priority in AR environments, particularly among Chinese young consumers who place considerable value on identity expression and digital self-presentation (Wang, 2023). In an era marked by increasing individualization and digital social visibility, users expect AR applications to deliver experiences that reflect their unique preferences, lifestyles, and consumption patterns. As such, the integration of algorithm-driven recommendation systems—capable of analyzing prior behavioral data, style inclinations, and interactive histories—is essential for delivering tailored content that resonates with users on a personal level.

In fashion-related AR applications, for example, intelligent outfit curation, real-time customization tools, and adjustable aesthetic filters not only enhance perceived utility but also foster an emotional connection between users and the virtual products they explore. These features support users' desire for expressive autonomy while reinforcing the perceived relevance of the AR system. Therefore, developers are advised to incorporate adaptive content delivery mechanisms and interactive customization options that support meaningful personalization. Such efforts not only contribute to greater user satisfaction and engagement but also play a pivotal role in elevating purchase intention by aligning the AR experience with individual user identities and aspirations.

7. Integrating Social Interaction Features to Amplify Shared Experience and Viral Potential

Social connectivity constitutes a fundamental dimension of digital consumption among young Chinese consumers, a cohort characterized by high levels of online engagement and peer-driven influence. According to recent market research, more than 70% of young Chinese consumers express a willingness to share their shopping experiences via social media platforms (Comendulli, 2020). This behavioral tendency underscores the importance of integrating socially oriented functionalities into AR applications to enhance experiential value and expand organic reach through user networks.

To capitalize on these social behaviors, developers are encouraged to embed features such as virtual try-on sharing, live-streaming capabilities, and user-generated content (UGC) tools. These elements not only foster active user participation but also contribute to viral content dissemination and peer-based persuasion, which are central to shaping contemporary consumer behavior. Furthermore, incorporating multiplayer interactions and co-creative platforms can enrich the immersive quality of AR environments, cultivating a sense of community and social presence. By prioritizing social and collaborative design, developers can deepen user engagement, reinforce emotional ties to brands, and stimulate sustained usage of AR applications.

5.5.2.3 Summary

In conclusion, the strategic deployment of AR technology within the context of mobile e-commerce offers substantial advantages for both retailers and developers. For retailers, enhancing the realism and fluidity of AR applications is pivotal in improving user experiences and driving sales performance. Investments in key areas, such as seamless interactions, comprehensive and transparent product information, immersive experiences, personalization, and integrated social features, are essential. These elements collectively foster positive consumer attitudes, enhance perceived product information quality, amplify immersion and enjoyment, and increase purchase intentions, thereby contributing to the overall success of mobile e-commerce strategies.

For developers, it is critical to prioritize the optimization of realism, intuitive interaction designs, and user-friendly interfaces to ensure a seamless and effective AR experience. Furthermore, the integration of immersive elements, personalization capabilities, and social functionalities will significantly enrich the user experience, reinforcing engagement and fostering a sense of community within the digital environment. By addressing these core aspects, developers can create AR applications that not only meet user expectations but also align with commercial objectives. Aligning development efforts with these priorities will maximize the potential impact of AR technology on mobile e-commerce, enhancing consumer satisfaction and facilitating sustained sales growth.

5.6 Limitations and Future Research Directions

Although this study provides valuable insights into the impact of AR on consumer behavior, there are several limitations that offer potential directions for future research. These limitations also imply several promising research areas that can help deepen our understanding of the role AR plays in consumer decision-making.

5.6.1 Ensuring Sample Representativeness and Accounting for Cultural Specificity

The sample in this study primarily consists of university students from China. While this group demonstrates a high level of technology adoption willingness and proficiency with mobile devices, particularly in the early stages of AR usage and market trials, the homogeneity of this sample poses a significant limitation. Specifically, the sample is predominantly composed of young adults aged 18 to 25 with higher educational backgrounds, and their consumption experiences, professional roles, and family responsibilities are relatively limited. The findings from this homogeneous group are not easily generalizable to a broader consumer population, especially middle-aged and older individuals, those with lower education levels, rural residents, or consumers from various professional backgrounds. Therefore, the external validity of this study is somewhat constrained, and it cannot fully capture the acceptance patterns and behavioral responses to AR technology across different demographic groups.

To improve the generalizability, applicability, and theoretical boundary conditions of future studies, it is essential to expand and optimize sampling strategies. On one hand, employing scientific sampling methods such as stratified random sampling, quota sampling, or multi-stage sampling can ensure that the sample is representative of key demographic variables like age, gender, educational level, income, and rural-urban distribution. This would not only enhance the applicability of the study across different consumer segments but also help explore the moderating effects of demographic characteristics on AR usage outcomes.

On the other hand, future studies should extend the research into cross-cultural and international contexts to conduct comparative empirical studies, exploring how cultural background influences consumers' perceptions, attitudes, and behavioral transformations regarding AR technology. Specifically, cultural dimensions (such as power distance, uncertainty avoidance, individualism vs. collectivism, etc.) may have profound effects on key variables in technology acceptance models, such as perceived ease of use, perceived usefulness, immersion, and trust. Future research may consider employing Hofstede's (1980) cultural dimensions theory or Schwartz's (1992) value framework to systematically examine the moderating role of cultural differences in consumer responses to AR. Such an approach would facilitate the development of a more comprehensive and culturally sensitive model of AR technology acceptance.

Moreover, considering the differences in social norms, technological development levels, and user expectations in various cultures, cross-cultural research would not only deepen the academic understanding of AR consumer behavior but also provide scientific insights for companies to design localized and personalized AR marketing strategies and product designs. For example, consumers in some cultures may prioritize practicality and efficiency, while others may place more emphasis on interactivity and entertainment, which directly impacts the design of AR interfaces, interaction modes, and product presentation logic.

In the context of globalization and the ongoing development of the digital economy, conducting cross-cultural and cross-demographic research is crucial for the sustainable growth and widespread application of AR technology in the global market. Only through empirical validation in diverse cultures, demographics, and consumer environments can AR-related theoretical models and practical applications gain greater explanatory power, predictive capacity, and real-world relevance.

5.6.2 Advancing Research Design through Longitudinal and Multi-Method Approaches

This study adopted a post-test only experimental design, which, while controlling external confounding variables to some extent and avoiding pre-test sensitization effects, has inherent limitations. Notably, it fails to capture potential baseline differences between the groups before the experimental treatment. Although random assignment theoretically balances the initial characteristics between the experimental and control groups, in practice, due to factors such as sample size, individual differences, and experimental conditions, perfect equivalence is often difficult to achieve. Thus, there is a degree of uncertainty in causal inference when interpreting the results.

To improve internal validity and causal inference, future studies should consider adopting a pretest-posttest control group design. By measuring participants both before and after the experimental intervention, researchers can directly compare individual changes before and after the intervention, controlling for natural trends in the control group, and thus more accurately assess the actual impact of AR technology on consumer attitudes, cognition, and behavior. Such a design could also be used to explore the dynamic changes in mediating and moderating variables, thereby extending the theoretical understanding of AR's influence mechanisms.

At the same time, this study utilized a cross-sectional design, which, while suitable for initial exploration of correlations between variables, is limited in its ability to reveal the temporal evolution of consumer behavior. This design restricts the analysis of the sustainability and stability of AR's effects. Given that the experience of using AR technology often has a cumulative and sustained impact, its effects on consumer behavior (such as brand loyalty, repurchase intention, and user stickiness) may show progressive or delayed changes. Therefore, future studies should prioritize longitudinal research designs or panel data analysis, which would track the same group of participants over multiple time points to systematically examine the long-term trajectories of AR's effects on consumer psychology and behavior. Specifically, longitudinal studies could explore immediate reactions after the first use of AR and how attitudes, satisfaction, and behavioral habits evolve with continued exposure or repeated use. For example, whether the immersive experience of AR diminishes as users become more familiar with it, or whether it strengthens as content richness increases; whether AR shopping truly enhances the consumer's Customer Lifetime Value (CLV), etc. These issues have not been fully addressed in current studies primarily based on cross-sectional designs.

From a methodological perspective, future research should expand both the experimental design and time dimension control: on one hand, by introducing pretest-posttest control group designs to enhance causal inference, and on the other hand, by incorporating longitudinal tracking or multiple time-point measurements to reveal the dynamic evolution of AR's effects on consumer behavior. This dual expansion will not only help comprehensively understand the short-term and long-term effects of AR technology but also provide stronger empirical evidence for brands to design AR-based marketing strategies and user relationship management plans.

5.6.3 Examining AR Applications Across Diverse Product Categories

This study focuses on the application of AR technology in the context of online footwear shopping. While this scenario helps control experimental variables and enhances internal validity, making hypothesis testing more specific and precise, it inevitably limits the generalizability of the findings to other product categories or retail contexts. Footwear products in AR environments often emphasize 3D visualization and virtual try-on features, and the decision-making paths, purchase motivations, and perceived needs in this context differ significantly from those in other product categories, such as furniture, cosmetics, apparel, or luxury goods. Therefore, the study finds that the external validity may be constrained by situational limitations.

To expand the applicability of AR research and enhance the generalizability of conclusions, future research should consider extending the application of AR technology to a variety of retail product categories. Different product types involve varying sensory demands, cognitive load, and emotional investment during the purchase process. These differences may moderate the perceived value, usability, and impact of AR on consumer behavior. For instance, AR in furniture products may primarily focus on spatial matching and size visualization, whereas in product categories like cosmetics and apparel, which emphasize personalized experiences and aesthetic appeal, AR may prioritize color reproduction, skin texture simulation, or dynamic outfit suggestions. Future research can systematically analyze the interactive relationship between AR features (such as 3D modeling, virtual try-ons, real-time interactive demonstrations) and consumer psychological responses based on product characteristics, such as sensory variety, information complexity, experiential qualities, and price sensitivity, in order to identify the moderating role of product type and develop more targeted AR feature configuration strategies.

Moreover, although this study focuses on online shopping environments, the current retail industry is increasingly embracing omnichannel integration. The role of AR in physical retail settings should not be overlooked. Future research could further explore the application scenarios of AR in brick-and-mortar stores, particularly how consumers form perceived value, enhance immersive experiences, and increase purchase intentions when interacting with both physical products and virtual information. For example, AR technologies such as mirror makeup try-ons, in-store navigation, and interactive information overlays have been preliminarily tested in some retail environments, but the specific mechanisms through which they influence user experience and behavioral outcomes remain to be systematically validated.

Building on this, future research could also adopt the perspective of omnichannel consumer behavior to explore how AR can facilitate seamless integration between online and offline experiences, ultimately driving higher levels of customer engagement and brand loyalty. This will not only deepen the theoretical understanding of the adaptability of AR applications to various scenarios but also provide practical insights for retail businesses to develop contextualized and customized AR strategies.

5.6.4 Addressing Limitations and Biases in Self-Reported Consumer Data

This study primarily relies on self-reported questionnaire data to assess consumers' attitudes, emotional responses, and behavioral intentions during the use of AR shopping technologies. Although self-report methods are widely used in consumer behavior and human-computer interaction research and offer advantages in terms of simplicity and quantifiability, their inherent subjectivity cannot be ignored. In the cognitive and emotional response measurements related to virtual try-ons and information perception, participants may exhibit social desirability bias, tending to choose answers that align with mainstream values or the expectations of the experimenters. Additionally, due to the complexity and novelty of AR interactions, some participants may experience recall bias when reflecting on their experiences or misunderstand the intentions of the scales, thus affecting the reliability and validity of the data.

To address these issues, future research could attempt to incorporate objective behavioral measures and physiological response techniques to achieve more precise observation of consumers' actual behaviors and emotional states. First, on the digital behavior level, embedded data collection tools could track consumers' actions within the AR application, such as click frequency, browsing time, screen dwell time, zooming, and rotation actions. This data could be modeled through clickstream analysis or log data analysis to reveal consumers' interaction preferences and underlying decision-making logic.

On the psychological and emotional level, researchers could introduce physiological response indicators to supplement subjective evaluations. For example, eye-tracking technology can accurately capture consumers' gaze points, fixation duration, and visual scanning paths while observing AR content, indirectly reflecting attention distribution and areas of interest. Electrodermal activity (EDA) and heart rate variability (HRV) could reveal arousal states and emotional fluctuations during the experience. Furthermore, combining facial expression recognition systems to identify emotions could dynamically code emotions like joy, surprise, and disgust, offering a comprehensive depiction of AR experience's impact on users' emotional engagement.

In addition to objective measurement techniques, future research is also encouraged to adopt a mixed-methods approach, combining quantitative experiments with qualitative interviews to gain deeper insights into consumers' subjective experiences, psychological constructs, and value judgments during AR interactions. This approach can help address the limitations of quantitative research in explaining psychological motivations and provide more profound theoretical support for understanding individual differences, cultural backgrounds, and situational dependencies. For instance, qualitative interviews can uncover why users experience higher immersion in certain AR features or why certain interface designs cause discomfort, offering practice-oriented suggestions for optimizing AR systems.

Furthermore, to enhance the ecological validity of research in real-world commercial settings, future studies are advised to conduct field experiments or A/B testing on actual shopping platforms or AR e-commerce environments to capture consumers' real behavioral responses in natural contexts. Such experimental designs not only enhance external validity but also provide valuable conversion optimization strategies for platform operators.

In conclusion, by combining subjective measurements with objective behavioral data, introducing physiological response indicators, and employing qualitative research methods, future research can provide a more comprehensive understanding of the deep impact of augmented reality technology on consumers' perceptions, emotions, and behaviors. This will advance AR consumer behavior research from the "perceptual level" to the "mechanistic level" and contribute to building more robust, scalable empirical models, offering scientific support for AR product design and commercial applications.

5.6.5 Investigating the Dual Impact of AR: Opportunities and Risks

This study primarily focuses on the positive effects of AR, such as its impact on perceived realism, immersion, and user enjoyment. However, it overlooks potential negative consequences. For instance, some consumers may experience discomfort, frustration, or even emotional distress when interacting with AR applications, particularly when the technology does not perform as expected or when the integration of virtual elements with the real world is not seamless. Future research should explore both the positive and negative effects of AR on consumer behavior.

While this study emphasizes the positive effects of AR, such as perceived realism and technological fluidity on user attitudes, perceived information quality, immersion, and enjoyment, it neglects the potential negative impacts. For example, users may experience frustration, technological anxiety, or emotional fatigue due to issues like lagging technology, complex interfaces, or cognitive dissonance caused by virtual interactions. Thus, future research should adopt a dual perspective to identify the risks and discomforts that may arise from AR experiences, aiming to strike a balance between maximizing benefits and minimizing costs in design. Constructing a "risk-reward" framework will help more accurately reveal consumers' overall evaluation and adoption decisions regarding AR technology.

Understanding the boundaries of AR technology—such as whether excessive realism or immersion could lead to negative experiences like cognitive overload or technology fatigue—is crucial for the development of balanced AR applications. Future research could investigate whether user familiarity with AR technology or individual differences (e.g., technological anxiety) affect sensitivity to negative reactions.

5.6.6 Integrating Additional Mediating and Moderating Variables in AR Research

Although this study identifies the mediating role of consumers' cognitive responses and emotional experiences in the relationship between AR technology features and purchase intention in AR shopping contexts, it is important to note that this mechanism does not fully capture all the key pathways influencing consumer behavior. In the complex process of consumer decision-making, factors such as trust, perceived value, and social influence may also play mediating or moderating roles between AR technology application and purchase behavior. Future research should incorporate these variables to build a more comprehensive theoretical framework.

Trust: trust is one of the core variables in online shopping behavior research, particularly in high-uncertainty or high-risk online shopping scenarios, where consumer trust often plays a decisive role. AR technology, by enhancing product presentation realism and interactivity, may help build consumer trust in platforms or brands. For instance, a reliable AR try-on function might enhance users' confidence in product quality or size accuracy. Future research should explore multiple mediating pathways, such as "AR presentation quality → perceived credibility → trust → purchase intention," especially when consumers are encountering a brand or new platform for the first time, where trust plays a buffering role.

Perceived Value: perceived value, as a psychological outcome of consumers' evaluation of the utility and cost of AR interaction, could play a significant role in explaining why consumers choose to engage with AR. This variable includes multiple dimensions, such as functional value (e.g., efficiency of product information acquisition), emotional value (e.g., immersion and enjoyment), and social value (e.g., self-presentation or enhancing social interaction). It is also highly correlated with technology acceptance. Therefore, future research could break down perceived value into functional, emotional, and social dimensions and examine its mediating role in the relationship between AR interaction features and user behavioral responses.

Social Influence: social influence, including attitudes from family members, friends, KOLs/influencers, and other social reference groups, may affect consumers' acceptance and trust in AR shopping experiences, especially in highly socialized mobile e-commerce or social media shopping environments. This variable could not only moderate the path to attitude formation but also directly influence behavioral intentions. Consumer behavior frequently occurs within social networks and group references, particularly among Generation Z and millennial consumers. Embedded AR experiences on social platforms (e.g., Instagram filter try-ons, WeChat mini-program AR furniture displays) not only affect individual judgment but may also be reinforced by others' opinions, likes, or recommendation mechanisms. Future research could investigate social identity, conformity, and the influence of opinion leaders, exploring the chain mediation structure of "AR use → social influence → purchase motivation."

Regarding moderator variables, future research should also explore moderating effects within AR experience paths, particularly focusing on individual differences and usage contexts:

Consumer Innovativeness: Highly innovative individuals have a stronger desire to try new technologies and a higher willingness to accept them, making them more likely to have positive experiences with AR. This variable could serve as a moderator in structural equation models or multi-group analyses, examining path differences between high and low innovativeness user groups.

Digital Literacy & AR Familiarity: The cognitive foundation and operational ability to understand AR features will directly affect users' comprehension and experience of its complex functions. Users with lower technological literacy may encounter difficulties with 3D interactions, virtual matching, and other functions, which could hinder immersion or trust development. Future research should further investigate how this variable moderates the path from "AR functionality recognition → experience quality" and provide recommendations for technology adaptation.

Product Involvement & Context Type: The degree of involvement in different product categories significantly affects consumers' expectations and goals in using AR. For example, when purchasing high-involvement products (such as furniture or luxury goods), users may rely more on AR's realism, while for low-involvement products (such as accessories or fast-moving consumer goods), they may focus more on fun or social sharing aspects. Future research could conduct segmented comparative studies based on product type, exploring the interaction between AR features and involvement.

Based on the analysis of the above mediating and moderating paths, it is recommended that future research integrates multi-layered variables to construct a more complex mediating-moderating model, based on theories such as Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and Trust Transfer Model. This model could include:

Stimulus Layer: AR features (visibility, interactivity, immersion)

Individual Differences Layer: Digital literacy, innovativeness, prior experience

Psychological Mechanism Layer: Cognitive responses (information quality, trust), emotional responses (enjoyment, immersion), perceived value

Behavioral Outcome Layer: Purchase intention, repurchase intention, brand loyalty

Furthermore, to enhance the empirical testing strength of the model, it is recommended to use structural equation modeling (SEM), moderated mediation analysis, multi-group comparisons, and other methods, combining longitudinal data and mixed research methods to further verify the applicability and boundary conditions of AR across different contexts and user groups.

In summary, future research should expand the dimensionality of variables when constructing theoretical models, comprehensively considering the multiple roles of cognitive, emotional, social, and technological factors. By introducing richer mediating and moderating variables, this research will not only help uncover more complex psychological and behavioral mechanisms in AR contexts but also provide more actionable theoretical support for AR technology design, consumer education, and brand strategies.

5.6.7 Staying Current with Emerging AR Technologies and Their Implications

Given the rapid pace of technological innovation, the AR applications used in this study may soon be surpassed by emerging technologies. Due to the fast-evolving nature of AR—particularly in terms of hardware and software iterations—the interfaces and functions employed in this research may quickly become obsolete. To maintain both the relevance and contemporaneity of future research, it is essential to continuously evaluate and explore the development of emerging AR technologies, including but not limited to advancements in machine learning, real-time rendering, wearable AR devices (e.g., smart glasses and AR headsets), and AI-driven personalized recommendation systems.

Emerging AR technologies may offer more sophisticated functionalities and provide users with even more immersive experiences. For instance, AI-powered personalized AR experiences could dynamically tailor visual content based on users' historical data, preferences, and emotional responses. These innovations may influence consumer behavior in ways not captured by current research, potentially transforming cognitive and affective responses as well as purchase intentions. Therefore, future studies should examine how these new technologies enhance interactivity and immersion within AR environments and investigate their potential behavioral implications.

To ensure the long-term relevance and applicability of research findings, scholars should closely monitor ongoing advancements in AR-related hardware—such as smart glasses and head-mounted displays—and software, including Web-AR platforms and spatial computing technologies. In particular, the development of wearable AR devices could enable highly personalized and real-time consumer experiences, presenting new directions for empirical investigation. Future research would benefit from collaborations with technology companies to assess the practical applications of these innovations in real-world commercial settings, thereby enhancing ecological validity and practical significance.

Furthermore, as AR technologies become increasingly integrated into commercial practices, ethical, security, and privacy concerns are gaining prominence. AR applications often involve the collection of extensive personal data, including shopping habits, individual preferences, and even physiological responses. These practices raise critical issues concerning consumer privacy and data protection. Consequently, future research should also address the safeguarding of personal data in AR environments and propose appropriate policy recommendations and industry standards.

To this end, researchers may adopt real-time experimental designs or pilot studies to capture consumers' responses to newly developed AR technologies, ensuring that research outcomes reflect authentic needs and behavioral shifts. Such an approach not only strengthens the real-world relevance of scholarly work but also offers valuable guidance for businesses in the design and implementation of AR technologies.

5.6.8 Summary

In summary, although this study provides important insights into the role of augmented reality in shaping consumer behavior, future research should adopt more diversified, longitudinal, and multi-method research designs to deepen and broaden the understanding of AR's impact. By investigating both the positive and negative effects of AR and integrating a wider array of potential mediating and moderating variables, future studies can contribute to the refinement of theoretical frameworks related to AR adoption and application. Such efforts will not only produce a more holistic and accurate depiction of AR's influence but also offer businesses and developers more precise and actionable guidance, ultimately facilitating the creation of more effective and user-centric AR applications. Accordingly, it is imperative that future research expands theoretical models and emphasizes practical technological applications to better meet the evolving demands of consumers and dynamic market conditions.

REFERENCE

Abou-Shouk, Zouair, Abdelhakim, Roshdy, & Abdel-Jalil. (2024). The effect of immersive technologies on tourist satisfaction and loyalty: the mediating role of customer engagement and customer perceived value. *International Journal of Contemporary Hospitality Management*, *36*(11), 3587-3606. https://doi.org/10.1108/IJCHM-09-2023-1496

Acharya, Singh, Pereira, & Singh. (2018). Big data, knowledge co-creation and decision making in fashion industry. *International Journal of Information Management*, *42*, 90-101. https://doi.org/10.1016/j.ijinfomgt.2018.06.008

Adam, & Pecorelli. (2018). Recommendations in Augmented Reality Applications - the Effect of Customer Reviews and Seller Recommendations on Purchase Intention and Product Selection. *Publications of Darmstadt Technical University, Institute for Business Studies (BWL)*. https://aisel.aisnet.org/ecis2018_rp/6

Aggarwal, & Rahul. (2017). Impact of perceived usability and perceived information quality on Indian consumer purchase intentions in online shopping: implication of TAM and SOR theory. *International Journal of Technology Transfer and Commercialisation*, *15*(2), 160-183. https://doi.org/10.1504/IJTTC.2017.087683

Ahn, Ryu, & Han. (2004). The impact of the online and offline features on the user acceptance of Internet shopping malls. *Electronic Commerce Research and Applications*, *3*(4), 405-420. https://doi.org/10.1016/j.elerap.2004.05.001

Ajzen. (1991). Prediction of leisure participation from behavioral, normative, and control beliefs: An application of the theory of planned behavior: Leisure Sciences: Vol 13, No 3. *Leisure Sciences*. https://doi.org/10.1080/01490409109513137

Ajzen, & Fishbein. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological bulletin*, *84*(5), 888. https://doi.org/10.1037/0033-2909.84.5.888

Alcañiz, Bigné, & Guixeres. (2019). Virtual reality in marketing: a framework, review, and research agenda. *Frontiers in Psychology*, *10*, 1530. https://doi.org/10.3389/fpsyg.2019.01530

Alha, Koskinen, Paavilainen, & Hamari. (2019). Why do people play location-based augmented reality games: a study on Pokémon GO. *Computers in Human Behavior*, *93*, 114-122.

Alqahtani, & AlNajdi. (2024). Potential obstacles to adopting augmented reality (AR) technologies as pedagogical tools to support students learning in higher education. *Interactive Learning Environments*, *32*(7), 3136-3145.

Amakawa, & Westin. (2018). New Philadelphia: using augmented reality to interpret slavery and reconstruction era historical sites. *International Journal of Heritage Studies*, *24*(3), 315-331. https://doi.org/10.1080/13527258.2017.1378909

An, Che, Guo, Zhu, Ye, Zhou, Zhu, Wei, Liu, & Zhang. (2021). ARShoe: Real-time augmented reality shoe try-on system on smartphones. Proceedings of the 29th ACM International Conference on Multimedia,

Anderson, & Gerbing. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological bulletin*, *103*(3), 411. https://doi.org/10.1037/0033-2909.103.3.411

Anderson, & Laverie. (2022). In the consumers' eye: A mixed-method approach to understanding how VR-Content influences unbranded product quality perceptions. *Journal of Retailing and Consumer Services*, *67*, 102977. https://doi.org/10.1016/j.jretconser.2022.102977

Andri, Kurniawan, Dewi, Alqudah, Alqudah, Zakaria, & binti Hisham. (2025). Deep Learning Incorporated with Augmented Reality Application for Watch Try-On. *Journal of Applied Data Sciences*, *6*(1), 259-271.

Angella, & Kim. (2016). Power of consumers using social media: Examining the influences of brand-related user-generated content on Facebook. *Computers in Human Behavior*, *58*, 98-108. https://doi.org/10.1016/j.chb.2015.12.047

Arceneaux. (2010). The benefits of experimental methods for the study of campaign effects. *Political Communication*, *27*(2), 199-215. https://doi.org/10.1080/10584601003709407

Attri, Roy, & Choudhary. (2024). In-store augmented reality experiences and its effect on consumer perceptions and behaviour. *Journal of Services Marketing*, *38*(7), 892-910. https://doi.org/10.1108/JSM-01-2024-0005

Azuma, Baillot, Behringer, Feiner, Julier, & MacIntyre. (2001). Recent advances in augmented reality. *IEEE computer graphics and applications*, *21*(6), 34-47. https://doi.org/10.1109/38.963459

Babić Rosario, Sotgiu, De Valck, & Bijmolt. (2016). The effect of electronic word of mouth on sales: A meta-analytic review of platform, product, and metric factors. *Journal of Marketing Research*, *53*(3), 297-318. https://doi.org/10.1509/jmr.14.0380

Bagozzi. (1983). A holistic methodology for modeling consumer response to innovation. *Operations Research*, *31*(1), 128-176. https://doi.org/10.1287/opre.31.1.128

Baños, Botella, Garcia-Palacios, Villa, Perpiñá, & Alcaniz. (2000). Presence and reality judgment in virtual environments: a unitary construct? *CyberPsychology & Behavior*, *3*(3), 327-335. https://doi.org/10.1089/10949310050078760

Barhorst, McLean, Shah, & Mack. (2021). Blending the real world and the virtual world: Exploring the role of flow in augmented reality experiences. *Journal of Business Research*, *122*, 423-436. https://doi.org/10.1016/j.jbusres.2020.08.041

Beck, & Crié. (2018). I virtually try it… I want it! Virtual Fitting Room: A tool to increase on-line and off-line exploratory behavior, patronage and purchase intentions. *Journal of Retailing and Consumer Services*, *40*, 279-286. https://doi.org/10.1016/j.jretconser.2016.08.006

Bell, Feiner, & Höllerer. (2001). View management for virtual and augmented reality. Proceedings of the 14th annual ACM symposium on User interface software and technology,

Bitner, & Jo. (1992). Servicescapes: The impact of physical surroundings on customers and employees. *Journal of Marketing*, *56*(2), 57-71. https://doi.org/10.1177/002224299205600205

Bonetti, Warnaby, & Quinn. (2018). Augmented reality and virtual reality in physical and online retailing: A review, synthesis and research agenda. *Augmented reality and virtual reality: Empowering human, place and business*, 119-132.

Bougie, & Sekaran. (2019). *Research methods for business: A skill building approach*. John Wiley & Sons. http://repository.vnu.edu.vn/handle/VNU_123/82688

Brakus, Schmitt, & Zhang. (2014). Experiential product attributes and preferences for new products: The role of processing fluency. *Journal of Business Research*, *67*(11), 2291-2298. https://doi.org/10.1016/j.jbusres.2014.06.017

Braun, & Clarke. (2012). *Thematic analysis*. American Psychological Association.
Brislin. (1980). Translation and content analysis of oral and written materials. *Methodology*, 389-444.
Burger, & Silima. (2006). Sampling and sampling design. *Journal of public administration*, *41*(3), 656-668. https://hdl.handle.net/10520/EJC51475
Buyukaslan, Baytar, & Kalaoglu. (2019). The impact of virtual body satisfaction on purchase intentions of a skirt during virtual try-on. International Textile and Apparel Association Annual Conference Proceedings,
Byrne. (2013). *Structural equation modeling with Mplus: Basic concepts, applications, and programming*. routledge.
Cabanac. (2002). What is emotion? *Behavioural processes*, *60*(2), 69-83. https://doi.org/10.1016/S0376-6357(02)00078-5
Cabero-Almenara, Barroso-Osuna, Llorente-Cejudo, & Fernández Martínez. (2019). Educational uses of augmented reality (AR): Experiences in educational science. *Sustainability*, *11*(18), 4990. https://doi.org/10.3390/su11184990
Caboni, & Hagberg. (2019). Augmented reality in retailing: a review of features, applications and value. *International Journal of Retail & Distribution Management*, *47*(11), 1125-1140. https://doi.org/10.1108/IJRDM-12-2018-0263
Carmigniani. (2011). *Augmented reality methods and algorithms for hearing augmentation*. Florida Atlantic University. https://doi.org/10.1108/IJRDM-12-2018-0263
Carmigniani, Furht, Anisetti, Ceravolo, Damiani, & Ivkovic. (2011). Augmented reality technologies, systems and applications. *Multimedia tools and applications*, *51*, 341-377.
Cassidy. (2017). Exploring the Garment Fit paradigm from a Sustainability Perspective and its Meaning for FirstCycle and Second-Cycle Fashion Retailers. *Current Trends in Fashion Technology & Textile Engineering*, *1*(3). https://doi.org/10.19080/CTFTTE.2017.01.555564
Castenetto. (2022). Redefining fashion ecommerce: a comprehensive study on the transformative impact of technologies on user experience.
Champabhoti, & Sae-Joo. (2019). *The Development of Project-Based Learning on Web to Enhance Creative Thinking for Design and Technology Subject of Grade 10 Students* Proceedings of the 3rd International Conference on Education and Multimedia Technology, Nagoya, Japan. https://doi.org/10.1145/3345120.3345153
Chen. (2017). Research on user adoption behavior of augmented reality products. *Journal of Hangzhou Dianzi University: Social Science Edition*, *13*(4), 7. (in Chinese)
Chen. (2022). *Design and Implementation of an AR-Based Home Display Platform in E-commerce Systems* Chongqing University].
Chen, He, & Wu. (2021). VR/AR and intelligent manufacturing: application field, core technology. *Electromechanical engineering technology*, *50*(2), 5. (in Chinese)
Chen, & Lin. (2022). Consumer behavior in an augmented reality environment: Exploring the effects of flow via augmented realism and technology fluidity. *Telematics and Informatics*, *71*, 101833. https://doi.org/10.1016/j.tele.2022.101833
Chen, Wu, Hu, Lin, & Gong. (2022). Research on the influence mechanism of AR display on consumers' purchase intention: a sequential mediation model. *Chinese business theory*(1), 5. (in Chinese)

Cheung, & Lau. (2008). Testing mediation and suppression effects of latent variables: Bootstrapping with structural equation models. *Organizational research methods*, *11*(2), 296-325. https://doi.org/10.1177/1094428107300343

Chevalier. (2021). *Leading global online marketplaces 2020, by GMV.*

Childers, Carr, Peck, & Carson. (2001). Hedonic and utilitarian motivations for online retail shopping behavior. *Journal of Retailing*, *77*(4), 511-535.

Chin, Cham, Ling, Jasmine Bao-Tze, & Chan. (2025). Exploring the interplay of enjoyment and practicality's dimensions: youths' purchase intention in augmented reality shopping platforms. *Young Consumers*. https://doi.org/10.1108/YC-07-2024-2148

China. (2023). *E-COMMERCE IN CHINA*.

Chiu, Ho, Yu, Liu, & Mo. (2021). Exploring information technology success of Augmented Reality Retail Applications in retail food chain. *Journal of Retailing and Consumer Services*, *61*, 102561. https://doi.org/10.1016/j.jretconser.2021.102561

Cho, Shen, & Wilson. (2014). Perceived realism: Dimensions and roles in narrative persuasion. *Communication research*, *41*(6), 828-851. https://doi.org/10.1177/0093650212450585

Choi. (2019). Applying Tangible Augmented Reality for Product Usability Assessment. *Journal of Usability Studies*, *14*(4).

Chuah, Rauschnabel, Krey, Nguyen, Ramayah, & Lade. (2016). Wearable technologies: The role of usefulness and visibility in smartwatch adoption. *Computers in Human Behavior*, *65*, 276-284. https://doi.org/10.1016/j.chb.2016.07.047

Churchill Jr. (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, *16*(1), 64-73. https://doi.org/10.1177/002224377901600110

Cipresso, Giglioli, Raya, & Riva. (2018). The past, present, and future of virtual and augmented reality research: a network and cluster analysis of the literature. *Frontiers in Psychology*, 2086. https://doi.org/10.3389/fpsyg.2018.02086

CNNIC. (2023). *The 51st Statistical Report on China's Internet Development*.

Çöltekin, Lochhead, Madden, Christophe, Devaux, Pettit, Lock, Shukla, Herman, & Stachoň. (2020). Extended reality in spatial sciences: A review of research challenges and future directions. *ISPRS International Journal of Geo-Information*, *9*(7), 439. https://doi.org/10.3390/ijgi9070439

Comendulli. (2020). Generation Z in China: Their importance in Chinese market and how to reach them through social media.

Cowan, Javornik, & Jiang. (2021). Privacy concerns when using augmented reality face filters? Explaining why and when use avoidance occurs. *Psychology & marketing*, *38*(10), 1799-1813. https://doi.org/10.1002/mar.21576

Cowan, & Ketron. (2019). A dual model of product involvement for effective virtual reality: The roles of imagination, co-creation, telepresence, and interactivity. *Journal of Business Research*, *100*, 483-492. https://doi.org/10.1016/j.jbusres.2018.10.063

Cranmer, tom Dieck, & Fountoulaki. (2020). Exploring the value of augmented reality for tourism. *Tourism Management Perspectives*, *35*, 100672. https://doi.org/10.1016/j.tmp.2020.100672

Cronbach. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297-334. https://doi.org/10.1007/BF02310555

Cronbach, & Warrington. (1951). Time-limit tests: estimating their reliability and degree of speeding. *Psychometrika*, *16*(2), 167-188. https://doi.org/10.1007/BF02289113

Csikzentimihalyi. (1975). Beyond boredom and anxiety: Experiencing flow in work and play. *San Francisco/Washington/London*.

Daassi, & Debbabi. (2021). Intention to reuse AR-based apps: The combined role of the sense of immersion, product presence and perceived realism. *Information & Management*, *58*(4), 103453. https://doi.org/10.1016/j.im.2021.103453

Daily. (2022). Digital New Life, Fashion Cloud Consumption. *China Economic Net*. http://m.jinbaonet.com/dzb/yaowen/2022/0319/100060856.html

Daily. (2024). The rapid penetration of new technologies has stimulated the vitality of market consumption. *Economic Information Daily*. http://m.zhoukan.cc/zghuanqiuzkw/zghuanqiuzkw/2024/1129/325528.html

Dargan, Bansal, Kumar, Mittal, & Kumar. (2023). Augmented Reality: A Comprehensive Review. *Archives of Computational Methods in Engineering*, *30*(2), 1057-1080. https://doi.org/10.1007/s11831-022-09831-7

Davis, Bagozzi, & Warshaw. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of applied social psychology*, *22*(14), 1111-1132. https://doi.org/10.1111/j.1559-1816.1992.tb00945.x

Degli Innocenti, Geronazzo, Vescovi, Nordahl, Serafin, Ludovico, & Avanzini. (2019). Mobile virtual reality for musical genre learning in primary education. *Computers & education*, *139*, 102-117. https://doi.org/10.1016/j.compedu.2019.04.010

Deng, & Ye. (2022). Research on the influence of VR/AR technology on continuous viewing intention in artistic programs. *Science and technology communication*, *14*(13), 82-87. (in Chinese)

Department. (2024). *The "90s-born" and "00s-born" generations have become the main force of digital consumption in China*. https://baijiahao.baidu.com/s?id=1803100257531866588&wfr=spider&for=pc

Domina, Lee, & MacGillivray. (2012). Understanding factors affecting consumer intention to shop in a virtual world. *Journal of Retailing and Consumer Services*, *19*(6), 613-620. https://doi.org/10.1016/j.jretconser.2012.08.001

Dong, Xu, Fang, & Zhang. (2018). Construction of a model of the influence of online experiential interaction between consumers and merchants on their purchase intention. *Chinese Journal of Management*, *15*(11), 9.

Donovan, Rossiter, Marcoolyn, & Nesdale. (1994). Store atmosphere and purchasing behavior. *Journal of Retailing*, *70*(3), 283-294. https://doi.org/10.1016/0022-4359(94)90037-X

Doolani, Wessels, Kanal, Sevastopoulos, Jaiswal, Nambiappan, & Makedon. (2020). A review of extended reality (xr) technologies for manufacturing training. *Technologies*, *8*(4), 77. https://doi.org/10.3390/technologies804007

Drengner, Jahn, & Furchheim. (2018). Flow revisited: process conceptualization and a novel application to service contexts. *Journal of Service Management*, *29*(4), 703-734. https://doi.org/10.1108/JOSM-12-2016-0318

Du. (2022). *Research on continuous use intention of brand mobile apps: from the perspective of existence* [Doctor Thesis, Sichuan Agricultural University]. (in Chinese)

Du, Liu, & Wang. (2022). Augmented reality marketing: A systematic literature review and an agenda for future inquiry. *Frontiers in Psychology*, *13*, 925963. https://doi.org/10.3389/fpsyg.2022.925963

Ducoffe. (1996). Advertising value and advertising on the web. *Journal of advertising research*, *36*(5), 21-21. http://www.journalofadvertisingresearch.com/

Dufour, Khalaf, & Beaulieu. (2003). Exact Skewness–Kurtosis tests for multivariate normality and goodness-of-fit in multivariate regressions with application to asset pricing models. *Oxford Bulletin of Economics and Statistics*, *65*, 891-906. https://doi.org/10.1046/j.0305-9049.2003.00085.x

Eagly, Chen, Chaiken, & Shaw-Barnes. (1999). The impact of attitudes on memory: An affair to remember. *Psychological bulletin*, *125*(1), 64. https://doi.org/10.1037/0033-2909.125.1.64

Edhlund, & McDougall. (2018). *NVivo 12 essentials*. Lulu. com.

Elford, Lancaster, & Jones. (2022). Exploring the effect of augmented reality on cognitive load, attitude, spatial ability, and stereochemical perception. *Journal of Science Education and Technology*, *31*(3), 322-339. https://doi.org/10.1007/s10956-022-09957-0

Ellen, & Zhang. (2014). Measuring the effect of company restaurant servicescape on patrons' emotional states and behavioral intentions. *Journal of Foodservice Business Research*, *17*(2), 85-102. https://doi.org/10.1080/15378020.2014.902642

Elmqvist, Moere, Jetter, Cernea, Reiterer, & Jankun-Kelly. (2011). Fluid interaction for information visualization. *Information Visualization*, *10*(4), 327-340. https://doi.org/10.1080/15378020.2014.902642

Enyejo, Obani, Afolabi, Igba, & Ibokette. (2024). Effect of Augmented Reality (AR) and Virtual Reality (VR) experiences on customer engagement and purchase behavior in retail stores. *Magna Scientia Advanced Research and Reviews*, *11*(2), 132-150. https://doi.org/10.30574/msarr.2024.11.2.0116

Erensoy, Mathrani, Schnack, Elms, & Baghaei. (2024). Consumer behavior in immersive virtual reality retail environments: A systematic literature review using the stimuli-organisms-responses (S-O-r) model. *Journal of Consumer Behaviour*, *23*(6), 2781-2811. https://doi.org/10.1002/cb.2296

Eroglu, Machleit, & Davis. (2001). Atmospheric qualities of online retailing: A conceptual model and implications. *Journal of Business Research*, *54*(2), 177-184. https://doi.org/10.1016/S0148-2963(99)00087-9

Eroglu, Machleit, & Davis. (2003). Empirical testing of a model of online store atmospherics and shopper responses. *Psychology & marketing*, *20*(2), 139-150. https://doi.org/10.1002/mar.10064

Esbensen, Guyot, Westad, & Houmoller. (2002). *Multivariate data analysis: in practice: an introduction to multivariate data analysis and experimental design*. Multivariate Data Analysis.

Ezeh, & Harris. (2007). Servicescape research: a review and a research agenda. *The Marketing Review*, *7*(1), 59-78. https://doi.org/10.1362/146934707X180677

Fährmann. (2024). Anomaly Detection in Smart Environments: A Comprehensive Survey. IEEE Access,

Fan, Chai, Deng, & Dong. (2020). Adoption of augmented reality in online retailing and consumers' product attitude: A cognitive perspective. *Journal of Retailing and Consumer Services*, *53*, 101986. https://doi.org/10.1016/j.jretconser.2019.101986

Fan, Jiang, & Deng. (2022). Immersive technology: A meta-analysis of augmented/virtual reality applications and their impact on tourism experience. *Tourism management*, *91*, 104534. https://doi.org/10.1108/IJCHM-09-2023-1496

Fang, Jian, & Wei. (2021). Application practice of VR/AR technology in college teaching. *Computer Knowledge and Technology: Academic Edition*, *17*(25), 5. (in Chinese)

Farshid, Paschen, Eriksson, & Kietzmann. (2018). Go boldly!: Explore augmented reality (AR), virtual reality (VR), and mixed reality (MR) for business. *Business horizons*, *61*(5), 657-663. https://doi.org/10.1016/j.bushor.2018.05.009

Fiore, Kim, & Lee. (2005). Effect of image interactivity technology on consumer responses toward the online retailer. *Journal of Interactive Marketing*, *19*(3), 38-53. https://doi.org/10.1002/dir.20042

Fishbein, & Ajzen. (1977). Belief, attitude, intention, and behavior: An introduction to theory and research. https://doi.org/10.2307/2065853

Fornell, & Larcker. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*. https://doi.org/10.1177/002224378101800313

Fukuda, Nada, Adachi, Shimizu, Takei, Sato, Yabuki, & Motamedi. (2017). Integration of a structure from motion into virtual and augmented reality for architectural and urban simulation: demonstrated in real architectural and urban projects. Computer-Aided Architectural Design. Future Trajectories: 17th International Conference, CAAD Futures 2017, Istanbul, Turkey, July 12-14, 2017, Selected Papers 17, Turkey.

Gao. (2017). *Research on influencing factors and mechanism of user stickiness of employment platform under the background of big data* (Publication Number CNKI:CDMD:2.1017.841436) [Master Thesis, Guangdong University of Technology]. (in Chinese)

Gäthke. (2020). The impact of augmented reality on overall service satisfaction in elaborate servicescapes. *Journal of Service Management*, *31*(2), 227-246. https://doi.org/10.1108/JOSM-05-2019-0151

Gatter, Hüttl‐Maack, & Rauschnabel. (2022). Can augmented reality satisfy consumers' need for touch? *Psychology & marketing*, *39*(3), 508-523. https://doi.org/10.1002/mar.21618

Germak, Di Salvo, & Abbate. (2021). Augmented Reality Experience for Inaccessible Areas in Museums. *Proceedings of EVA London 2021*, 39-45. https://doi.org/10.14236/ewic/EVA2021.7

Ghafoor, Hussain, & Ahmad. (2023). Changing Online Shopping Experiences: Investigating Quality of Augmented Reality (AR) Experience on Behavioral Intentions using SOR Theory. *International Journal of Business and Economic Affairs*, *8*(1), 1-17. https://doi.org/10.24088/IJBEA-2023-81001

Gliem, & Gliem. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. Columbus, Ohio : Ohio State University.

Goi, Kalidas, & Zeeshan. (2014). Comparison of stimulus-organism-response framework between international and local retailer. *Procedia-Social and Behavioral Sciences*, *130*, 461-468. https://doi.org/10.1016/j.sbspro.2014.04.054

Goncalves, Monteiro, Coelho, Melo, & Bessa. (2021). Systematic review on realism research methodologies on immersive virtual, augmented and mixed realities. *IEEE Access*, *9*, 89150-89161. https://doi.org/10.1109/ACCESS.2021.3089946

Greene. (2008). *The econometric approach to efficiency analysis* (Vol. 1).

Gu. (2022). The influence of VR and AR technology in the clothing industry. *Western leather*(044-015).

Guest, Bunce, & Johnson. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field methods*, *18*(1), 59-82. https://doi.org/10.1177/1525822X05279903

Guha, Grewal, Kopalle, Haenlein, Schneider, Jung, Moustafa, Hegde, & Hawkins. (2021). How artificial intelligence will affect the future of retailing. *Journal of Retailing*, *97*(1), 28-41. https://doi.org/10.1016/j.jretai.2021.01.005

Gui. (2021). Ideas on construction and development of augmented reality teaching resources in higher vocational schools. *Education Informatization in China*(17), 6. (in Chinese)

Guo, & Barnes. (2011). Purchase behavior in virtual worlds: An empirical investigation in Second Life. *Information & Management*, *48*(7), 303-312. https://doi.org/10.1016/j.im.2011.07.004

Guo, & Guo. (2019). 5G Dongfeng catalyzes the rapid development and implementation of VR/AR industry applications. *Telecommunications industry in China*(4), 4. (in Chinese)

Gupta, Stead, & Ganti. (2024). Determining a meaningful R-squared value in clinical medicine. *Academic Medicine & Surgery*.

Guttentag. (2010). Virtual reality: Applications and implications for tourism. *Tourism management*, *31*(5), 637-651. https://doi.org/10.1016/j.tourman.2009.07.003

Haile, & Kang. (2020). Mobile augmented reality in electronic commerce: investigating user perception and purchase intent amongst educated young adults. *Sustainability*, *12*(21), 9185. https://doi.org/10.3390/su12219185

Hair, Black, Babin, & Anderson. (2010). *Multivariate data analysis*.

Hair, Sarstedt, Ringle, & Gudergan. (2017). Advanced Issues in Partial Least Squares Structural Equation Modeling.

Hammersley. (2002). The relationship between qualitative and quantitative research: paradigm loyalty versus methodological eclecticism. http://eu.wiley.com/WileyCDA/WileyTitle/productCd

Han, Kim, & An. (2023). The Role of VR Shopping in Digitalization of SCM for Sustainable Management: Application of SOR Model and Experience Economy. *Sustainability*, *15*(2), 1277. https://doi.org/10.3390/su15021277

Han, Wang, Sheng, & Han. (2021). Mechanism linking AR-based presentation mode and consumers' responses: a moderated serial mediation model. *Journal of Theoretical and Applied Electronic Commerce Research*, *16*(7), 2694-2707. https://doi.org/10.3390/jtaer16070148

Hanna, Yingjiao, & Anne. (2021). Consumers' adoption of AR-based virtual fitting rooms: from the perspective of theory of interactive media effects. *Journal of Fashion Marketing and Management: An International Journal*, *25*(1), 45-62. https://doi.org/10.1108/JFMM-05-2019-0092

Hans. (2004). User acceptance of hedonic information systems. *MIS Quarterly*, 695-704. https://doi.org/10.2307/25148660

Harris, & Dennis. (2011). Engaging customers on Facebook: Challenges for e-retailers. *Journal of Consumer Behaviour*, *10*(6), 338-346. https://doi.org/10.1002/cb.375

Hassenzahl, & Tractinsky. (2006). User experience-a research agenda. *Behaviour & information technology*, *25*(2), 91-97.

He, & CHen. Personal Data Protection in China: Progress, Challenges and Prospects In the Age of Big Data And Ai. *Challenges and Prospects In the Age of Big Data And Ai*.

He, & Li. (2016). Study on the effect of green product categories in retail stores on consumer patronage intention. *Journal of Business Economics*(2), 13. (in Chinese)

Hertzog. (2008). Considerations in determining sample size for pilot studies. *Research in nursing & health*, *31*(2), 180-191. https://doi.org/10.1002/nur.20247

Hilken, de Ruyter, Chylinski, Mahr, & Keeling. (2017). Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences. *Journal of the Academy of Marketing Science*, *45*, 884-905. https://doi.org/10.1007/s11747-017-0541-x

Hill, Fishbein, & Ajzen. (1977). Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research. www.jstor.org/stable/40237022

Hinsch, Felix, & Rauschnabel. (2020). Nostalgia beats the wow-effect: Inspiration, awe and meaningful associations in augmented reality marketing. *Journal of Retailing and Consumer Services*, *53*, 101987. https://doi.org/10.1016/j.jretconser.2019.101987

Ho, & So. (2016). Issues in measuring generic skills using self-administered questionnaire in a Community College in Hong Kong. *Open Access Library Journal*, *3*(7), 1-8. https://doi.org/10.4236/oalib.1102796

Holbrook, & Hirschman. (1982). The experiential aspects of consumption: Consumer fantasies, feelings, and fun. *Journal of Consumer Research*, *9*(2), 132-140.

Hong, Yaobin, Sumeet, & Ling. (2014). What motivates customers to participate in social commerce? The impact of technological environments and virtual customer experiences. *Information & Management*, *51*(8), 1017-1030. https://doi.org/10.1016/j.im.2014.07.005

Hou. (2018). Characteristics and trends of investment and financing in China's VR/AR industry in 2018. *The World of Electronics*, *25*(7), 3-6. (in Chinese)

Hsu, Chen, Kikuchi, & Machida. (2016). Elucidating the determinants of purchase intention toward social shopping sites: A comparative study of Taiwan and Japan. *Telematics & Informatics*, *34*(4), 326-338.

Hsu, Tsou, & Chen. (2021). "Yes, we do. Why not use augmented reality?" customer responses to experiential presentations of AR-based applications. *Journal of Retailing and Consumer Services*, *62*, 102649. https://doi.org/10.1016/j.jretconser.2021.102649

Hu, Cao, Jiang, Hu, Chen, Zheng, & Zhou. (2023). Study on multi-objective optimization of power system parameters of battery electric vehicles. *Sustainability*, *15*(10), 8219. https://doi.org/10.3390/su15108219

Hu, Feng, Shao, Xie, Xu, Wu, & Ye. (2019). Application and prospect of mixed reality technology in medical field. *Current medical science*, *39*, 1-6. https://doi.org/10.1007/s11596-019-1992-8

Huang. (2021). Restorative experiences and online tourists' willingness to pay a price premium in an augmented reality environment. *Journal of Retailing and Consumer Services*, *58*, 102256. https://doi.org/10.1016/j.jretconser.2020.102256

Huang, & Liao. (2015). A model of acceptance of augmented-reality interactive technology: the moderating role of cognitive innovativeness. *Electronic Commerce Research*, *15*, 269-295. https://doi.org/10.1007/s10660-014-9163-2

Huang, & Liao. (2017). Creating e-shopping multisensory flow experience through augmented-reality interactive technology. *Internet Research*, *27*(2), 449-475. https://doi.org/10.1108/IntR-11-2015-0321

Huang, & Yang. (2004). A study on the potential risk of sexual victimization of middle school girls through online dating from the perspective of victim theory. *Journal of Normal University: Education*, *49*(1), 21-40. (in Chinese)

Huang, Zhu, Hao, & Deng. (2023). How social presence influences consumer purchase intention in live video commerce: the mediating role of immersive experience and the moderating role of positive emotions. *Journal of Research in Interactive Marketing*, *17*(4), 493-509. https://doi.org/10.1108/JRIM-01-2022-0009

Hyejeung, & Norbert. (2012). I like your product when I like my photo: Misattribution using interactive virtual mirrors. *Journal of Interactive Marketing*, *26*(4), 235-243. https://doi.org/10.1016/j.intmar.2012.03.003

Islam, & Rahman. (2017). The impact of online brand community characteristics on customer engagement: An application of Stimulus-Organism-Response paradigm. *Telematics and Informatics*, *34*(4), 96-109. https://doi.org/10.1016/j.tele.2017.01.004

Israel, Zerres, Tscheulin, Buchweitz, & Korn. (2019). Presenting your products in virtual reality: do not underestimate cybersickness. HCI in Business, Government and Organizations. eCommerce and Consumer Behavior: 6th International Conference, HCIBGO 2019, Held as Part of the 21st HCI International Conference, HCII 2019, Orlando, FL, USA, July 26-31, 2019, Proceedings, Part I 21, Copenhagen, Denmark.

Javornik. (2016). 'It's an illusion, but it looks real!'Consumer affective, cognitive and behavioural responses to augmented reality applications. *Journal of Marketing Management*, *32*(9-10), 987-1011. https://doi.org/10.1080/0267257X.2016.1174726

Jessen, Hilken, Chylinski, Mahr, Heller, Keeling, & de Ruyter. (2020). The playground effect: How augmented reality drives creative customer engagement. *Journal of Business Research*, *116*, 85-98. https://doi.org/10.1016/j.jbusres.2020.05.002

Jiang, & Lyu. (2024). The role of augmented reality app attributes and customer-based brand equity on consumer behavioral responses: an S-O-R framework perspective. *Journal of Product & Brand Management*, *33*(6), 702–716. https://doi.org/10.1108/JPBM-09-2023-4706

Johanson, & Brooks. (2010). Initial scale development: sample size for pilot studies. *Educational and psychological measurement*, *70*(3), 394-400. https://doi.org/10.1177/0013164409355692

Kamrani, & Ali. (2011). Urdu translation and adaptation of fenigstein paranoia scale. *International Journal of Business and Social Science*, *2*(16). https://doi.org/10.30845/ijbss

Kannan. (2017). Digital marketing: A framework, review and research agenda. *International Journal of Research in Marketing*, *34*(1), 22-45. https://doi.org/10.1016/j.ijresmar.2016.11.006

Kim, & Forsythe. (2008). Adoption of virtual try-on technology for online apparel shopping. *Journal of Interactive Marketing*, *22*(2), 45-59. https://doi.org/10.1002/dir.20113

Kim, & Hwang. (2012). A study of mobile internet user's service quality perceptions from a user's utilitarian and hedonic value tendency perspectives. *Information Systems Frontiers*, *14*, 409-421.

Kim, & Im. (2024). Can augmented reality impact your self - perceptions? The malleability of the self and brand relationships in augmented reality try - on services. *Journal of Consumer Behaviour*, *23*(4), 1623-1637. https://doi.org/10.1002/cb.2296

Kim, Lee, & Bonn. (2017). Obtaining a better understanding about travel-related purchase intentions among senior users of mobile social network sites. *International Journal of Information Management*, *37*(5), 484-496. https://doi.org/10.1016/j.ijinfomgt.2017.04.006

Kim, & Lennon. (2013). Effects of reputation and website quality on online consumers' emotion, perceived risk and purchase intention: Based on the stimulus‐organism‐response model. *Journal of Research in Interactive Marketing*, *7*(1), 33-56.

Kim, & Niehm. (2009). The impact of website quality on information quality, value, and loyalty intentions in apparel retailing. *Journal of Interactive Marketing*, *23*(3), 221-233. https://doi.org/10.1016/j.intmar.2009.04.009

Kim, & Steiner. (2016). Quasi-experimental designs for causal inference. *Educational psychologist*, *51*(3-4), 395-405. https://doi.org/10.1080/00461520.2016.1207177

Kisang, & SooCheong. (2007). The effect of environmental perceptions on behavioral intentions through emotions: The case of upscale restaurants. *Journal of Hospitality & Tourism Research*, *31*(1), 56-72. https://doi.org/10.1177/1096348006295506

Kitsantas, Baylor, & Hiller. (2019). Intelligent technologies to optimize performance: Augmenting cognitive capacity and supporting self-regulation of critical thinking skills in decision-making. *Cognitive Systems Research*, *58*, 387-397. https://doi.org/10.1016/j.cogsys.2019.09.003

Kline. (1998). Structural equation modeling. *New York: Guilford*, *33*.

Kong, & Chunhua. (2022). Research on the influence of beauty function in AR product display on consumers' purchase intention. *Journal of Zhejiang Shuren University(Humanities and Social Sciences)*. (in Chinese)

Kowalczuk, Siepmann, & Adler. (2021). Cognitive, affective, and behavioral consumer responses to augmented reality in e-commerce: A comparative study. *Journal of Business Research*, *124*, 357-373. https://doi.org/10.1016/j.jbusres.2020.10.050

Kühn, & Petzer. (2018). Fostering purchase intentions toward online retailer websites in an emerging market: An SOR perspective. *Journal of Internet Commerce*, *17*(3), 255-282. https://doi.org/10.1080/15332861.2018.1463799

Lao. (2023). Technology research and application of AR in security industry. *China Security*(4), 6. (in Chinese)

Lavoye, Mero, & Tarkiainen. (2021). Consumer behavior with augmented reality in retail: a review and research agenda. *The International Review of Retail, Distribution and Consumer Research*, *31*(3), 299-329. https://doi.org/10.1080/09593969.2021.1901765

Lee. (2014). Examining the factors that influence early adopters' smartphone adoption: The case of college students. *Telematics and Informatics*, *31*(2), 308-318. https://doi.org/10.1016/j.tele.2013.06.001

Lee, Xu, & Porterfield. (2022). Antecedents and moderators of consumer adoption toward AR‐enhanced virtual try‐on technology: A stimulus‐organism‐response approach. *International Journal of Consumer Studies*, *46*(4), 1319-1338. https://doi.org/10.1111/ijcs.12760

Lele, & Shaw. (2021). Augmented reality: does it encourage customer loyalty? International Conference on Human-Computer Interaction, Copenhagen, Denmark.

Leone, Perugini, & Bagozzi. (2005). Emotions and decision making: Regulatory focus moderates the influence of anticipated emotions on action evaluations. *Cognition & Emotion*, *19*(8), 1175-1198. https://doi.org/10.1080/02699930500203203

Li. (2013). *To explore the impulse buying, behavior of consumers in social shopping community* [Doctor Thesis, University of Science and Technology of China]. (in Chinese)

Li. (2016). Application of big data and AR in upgrading and transformation of traditional industries. Internet Society of China,

Li. (2020). Construction strategy of children's e-book business ecosystem based on augmented reality technology. *Creative City Journal*(4), 7. (in Chinese)

Li. (2023). Studio AR robot camera system design. *Modern television technology*(3), 77-81. (in Chinese)

Li, Bear, Liu, & He. (2017). VR and AR technology help power simulation training. *China Electric Power Education*(2), 6. (in Chinese)

Li, & Gao. (2023). Influencing factors of users' willingness to use AR for cultural heritage. *Packaging engineering*, *44*(4), 87-98. (in Chinese)

Li, & Xu. (2019). Chinese Consumers' Adoption Behaviors Toward Virtual Fitting Rooms: From the Perspective of Technology Acceptance Model. International Textile and Apparel Association Annual Conference Proceedings, Las Vegas, Nevada.

Li, Yi, Chi, Wang, & Chan. (2018). A critical review of virtual and augmented reality (VR/AR) applications in construction safety. *Automation in Construction*, *86*, 150-162.

Li, & Zhou. (2024). The impact of augmented reality (AR) technology experience on consumers' willingness to purchase shoes. *E-commerce reviews*, *13*(3), 8843-8856. (In Chinese)

Liao. (2020). Design of AR game based on image processing algorithm. *The Electronic world*(17), 2.

Lin. (2004). Webcasting adoption: technology fluidity,-user'innovativeness, and media substitution. *Journal of Broadcasting & Electronic Media*, *48*(3), 157-178. https://doi.org/10.1207/s15506878jobem4803_6

Lin. (2008). Technology fluidity and on-demand webcasting adoption. *Telematics and Informatics*, *25*(2), 84-98. https://doi.org/10.1016/j.tele.2006.06.002

Ling. (2011). *Research on impulsive purchasing behavior of consumers online* [Doctor Thesis, Hebei University of Technology]. (in Chinese)

Lisboa, Martin, Coelho, De, & Martin. (2023). Impulse buying behaviour in omnichannel retail: an approach through the stimulus-organism-response theory. *International Journal of Retail & Distribution Management*, *51*(1), 39-58. https://doi.org/10.1108/IJRDM-09-2021-0394

Liu. (2015). Research on the Construction of user experience model for augmented reality interactive games. *Science of Publishing*, *23*(2), 4. (in Chinese)

Liu. (2016). *Research on experiential learning activity design based on augmented reality* [Doctor Thesis, East China Normal University]. (in Chinese)

Liu, Balakrishnan, & Saari. (2024). The Impact of Augmented Reality (AR) Technology on Consumers' Purchasing Decision Processes. *Frontiers in Business, Economics and Management*, *13*(2), 181-185.

Liu, Ma, Yu, Li, & Jiang. (2022). Research and prospect of the influence of augmented reality technology on venue learning effect. *Modern Distance Education*(3), 10. (in Chinese)

Liu, Shi, & Zhuang. (2017). Research on the application of augmented reality, virtual reality and mixed reality technology in power system. *Power information and communication technology*, *15*(4), 8. (in Chinese)

Liu, & Walsh. (2019). Study on development strategies of fresh agricultural products e-commerce in China. *International Business Research*, *12*(8), 61-70. (in Chinese)

Liu, Xie, & Chang. (2018). Y-Generation digital natives' impulsive buying behavior. 2018 3rd Technology Innovation Management and Engineering Science International Conference (TIMES-iCON),

Longmei, & Sally. (2019). *China's digital economy: Opportunities and risks*. International Monetary Fund. https://ssrn.com/abstract=3333740

Lu. (2017). AR? Augmented reality and printing. *Print magazine*(12), 3. (in Chinese)

Luo. (2021). Application of AR technology in automobile repair course teaching. *China New Communications*, *23*(21), 2. (in Chinese)

Luo, Ma, Rao, Zheng, Li, & Xu. (2020). Research on the Influence of Logistics Service Quality on Post-purchase Behavior in E-business. 2020 IEEE 3rd International Conference on Electronic Information and Communication Technology (ICEICT), Shenzhen, China.

Ma, & Choi. (2007). The Virtuality and Reality of Augmented Reality. *J. Multim.*, *2*(1), 32-37. https://doi.org/10.4304/jmm.2.1.32-37

MacKinnon. (2012). *Introduction to statistical mediation analysis*. Routledge. https://doi.org/10.4324/9780203809556

Mainemelis, & Dionysiou. (2015). Play, flow, and timelessness. *The Oxford handbook of creativity, innovation, and entrepreneurship*, 121-140.

Mallinckrodt, Abraham, Wei, & Russell. (2006). Advances in testing the statistical significance of mediation effects. *Journal of counseling psychology*, *53*(3), 372. https://doi.org/10.1037/0022-0167.53.3.372

Malterud, Siersma, & Guassora. (2016). Sample size in qualitative interview studies: guided by information power. *Qualitative health research*, *26*(13), 1753-1760. https://doi.org/10.1177/1049732315617444

Malthouse, & Krishnamurthi. (2015). On the go: How mobile shopping affects customer purchase behavior. *Journal of Retailing*, *91*(2), 217-234. https://doi.org/10.1007/978-3-319-11815-4_215

Mann, & Whitney. (1947). On a test of whether one of two random variables is stochastically larger than the other. *The annals of mathematical statistics*, 50-60. www.jstor.org/stable/2236101

Margetis, Ntoa, & Stephanidis. (2019). Smart omni-channel consumer engagement in malls. HCI International 2019-Posters: 21st International Conference, HCII 2019, Orlando, FL, USA, July 26–31, 2019, Proceedings, Part III 21, Copenhagen, Denmark.

Massetti. (1996). An empirical examination of the value of creativity support systems on idea generation. *MIS Quarterly*, 83-97. https://doi.org/10.2307/249543

Massey Jr. (1951). The Kolmogorov-Smirnov test for goodness of fit. *Journal of the American statistical Association*, *46*(253), 68-78. https://doi.org/10.1080/01621459.1951.10500769

Massoudi, Birdawod, & Raewf. (2023). Personal Digital Marketing Influence on Successful Marketing Campaign in Today's Digital Age. *Cihan University-Erbil Journal of Humanities and Social Sciences*, *7*(1), 158-165. https://doi.org/10.24086/cuejhss.v7n1y2023.pp158-165

Matveev. (2002). The advantages of employing quantitative and qualitative methods in intercultural research: Practical implications from the study of the perceptions of intercultural communication competence by American and Russian managers. *Theory of communication and applied communication*, *1*(6), 59-67.

McLean, & Wilson. (2019). Shopping in the digital world: Examining customer engagement through augmented reality mobile applications. *Computers in Human Behavior*, *101*, 210-224. https://doi.org/10.1016/j.chb.2019.07.002

Mehrabian, & Russell. (1974). *An approach to environmental psychology*. An approach to environmental psychology.

Mekacher. (2019). Augmented Reality (AR) and Virtual Reality (VR): The future of interactive vocational education and training for people with handicap. *International Journal of Teaching, Education and Learning*, *3*(1), 118-129. https://doi.org/10.20319/pijtel.2019.31

Melo, Coelho, Gonçalves, Losada, Jorge, Teixeira, & Bessa. (2022). Immersive multisensory virtual reality technologies for virtual tourism: A study of the user's sense of presence, satisfaction, emotions, and attitudes. *Multimedia Systems*, *28*(3), 1027-1037. https://doi.org/10.1007/s00530-022-00898-7

Menandro, & Arnab. (2020). Smart and Sustainable Manufacturing Systems. *Smart and Sustainable Manufacturing Systems*, *5*(2).

Meng. (2012). *Research of Opinion Leaders' impact on Purchase Intention Under Social Commerce Context* [Doctor Thesis, Nanjing University]. (in Chinese)

Meredith. (1993). Measurement invariance, factor analysis and factorial invariance. *Psychometrika*, *58*(4), 525-543. https://doi.org/10.1007/BF02294825

Merle, Senecal, & St-Onge. (2012). Whether and how virtual try-on influences consumer responses to an apparel web site. *International Journal of Electronic Commerce*, *16*(3), 41-64. https://doi.org/10.2753/JEC1086-4415160302

Milgram, Takemura, Utsumi, & Kishino. (1995). Augmented reality: A class of displays on the reality-virtuality continuum. Telemanipulator and telepresence technologies, Boston, MA, United States.

Mischel, Ayduk, Berman, Casey, Gotlib, Jonides, Kross, Teslovich, Wilson, & Zayas. (2011). 'Willpower'over the life span: decomposing self-regulation. *Social cognitive and affective neuroscience*, *6*(2), 252-256. https://doi.org/10.1093/scan/nsq081

Mobile. (2022). *AR Industry Application Scenarios and Key Technologies White Paper*.

Moon, Kim, Choi, & Sung. (2013). Keep the social in social media: The role of social interaction in avatar-based virtual shopping. *Journal of Interactive Advertising*, *13*(1), 14-26. https://doi.org/10.1080/15252019.2013.768051

Morillo, Orduña, Casas, & Fernández. (2019). A comparison study of AR applications versus pseudo-holographic systems as virtual exhibitors for luxury watch retail stores. *Multimedia Systems*, *25*, 307-321. https://doi.org/10.1007/s00530-019-00606-y

Moro, Phelps, Redmond, & Stromberga. (2021). HoloLens and mobile augmented reality in medical and health science education: A randomised controlled trial. *British Journal of Educational Technology*, *52*(2), 680-694. https://doi.org/10.1111/bjet.13049

Myung, Choong-Ki, & Timothy. (2020). Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model. *Journal of travel research*, *59*(1), 69-89. https://doi.org/10.1177/0047287518818915

Nam, Cho, & Kim. (2021). Cross-cultural examination of apparel online purchase intention: SOR paradigm. *Journal of Global Fashion Marketing*, *12*(1), 62-76. https://doi.org/10.1080/20932685.2020.1845766

Narang, & Shankar. (2019). Mobile marketing 2.0: State of the art and research agenda. *Marketing in a Digital World*, 97-119. https://doi.org/10.1108/S1548-643520190000016008

Nawaz. (2022). *Augmented Reality is Reshaping Consumer-Brand Relationship:Role of Consumer's Self-Avatar in Moderating the Relationship* [Doctor Thesis, Dongbei University of Finance and Economics].

Nielsen. (2017). *Nielsen Global E-Commerce Report*.

Nikhashemi, Knight, Nusair, & Liat. (2021). Augmented reality in smart retailing: A (n)(A) Symmetric Approach to continuous intention to use retail brands' mobile AR apps. *Journal of Retailing and Consumer Services*, *60*, 102464. https://doi.org/10.1016/j.jretconser.2021.102464

Noghabaei, Heydarian, Balali, & Han. (2020). Trend analysis on adoption of virtual and augmented reality in the architecture, engineering, and construction industry. *Data*, *5*(1), 26. https://doi.org/10.3390/data5010026

Nuckols. (1953). A note on pre-testing public opinion questions. *Journal of Applied Psychology*, *37*(2), 119. https://doi.org/10.1037/h0063482

Oliver. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, *17*(4), 460-469. https://doi.org/10.1177/002224378001700405

Overby, & Lee. (2006). The effects of utilitarian and hedonic online shopping value on consumer preference and intentions. *Journal of Business Research*, *59*(10-11), 1160-1166. https://doi.org/10.1016/j.jbusres.2006.03.008

Owyang. (2010). Disruptive technology–The new reality will be augmented. *Customer Relationship Management Magazine*, *23*(2), 32-33.

Oyman, Bal, & Ozer. (2022). Extending the technology acceptance model to explain how perceived augmented reality affects consumers' perceptions. *Computers in Human Behavior*, *128*, 107127. https://doi.org/10.1016/j.chb.2021.107127

Pan, Cen, Chen, Cheng, & Wen. (2022). Design and implementation of intelligent wearable mobile terminal for power grid field operation based on AR technology. *Automation technology and application*, *41*(1), 5. (in Chinese)

Pan, Li, & Wang. (2019). Study on the willingness to use cultural and educational AR products and its influencing factors. *Journal of Tonghua Teachers College*, *40*(1), 6. (in Chinese)

Pantano, Rese, & Baier. (2017). Enhancing the online decision-making process by using augmented reality: A two country comparison of youth markets. *Journal of Retailing and Consumer Services*, *38*, 81-95. https://doi.org/10.1016/j.jretconser.2017.05.011

Park, Stoel, & Lennon. (2008). Cognitive, affective and conative responses to visual simulation: The effects of rotation in online product presentation. *Journal of Consumer Behaviour: An International Research Review*, *7*(1), 72-87. https://doi.org/doi.org/10.1002/cb.237

Park, Sutherland, & Lee. (2021). Effects of online reviews, trust, and picture-superiority on intention to purchase restaurant services. *Journal of Hospitality and Tourism Management*, *47*, 228-236. https://doi.org/10.1016/j.jhtm.2021.03.007

Park, & Yoo. (2020). Effects of perceived interactivity of augmented reality on consumer responses: A mental imagery perspective. *Journal of Retailing and*

Consumer Services, *52*, 101912. https://doi.org/10.1016/j.jretconser.2019.101912

Pavlik. (2018). Experiential media and transforming storytelling: A theoretical analysis. *Journal of Creative Industries and Cultural Studies-JOCIS*(3), 046-067.

Pei. (2015). *Research on workshop facility layout and production logistics system simulation optimization of H company* [Master Thesis, Guangxi University]. (in Chinese)

Pereira, Silva, & Alves. (2011). Virtual fitting room augmented reality techniques for e-commerce. ENTERprise Information Systems: International Conference, CENTERIS 2011, Vilamoura, Portugal, October 5-7, 2011, Proceedings, Part II, Vilamoura, Algarve, Portugal.

Pessoa, João, Sara, & Correia. (2022). How augmented reality media richness influences consumer behaviour. *International Journal of Consumer Studies*, *46*(6), 2351-2366. https://doi.org/10.1111/ijcs.12790

Pfeifer, Hilken, Heller, Alimamy, & Di Palma. (2023). More than meets the eye: In-store retail experiences with augmented reality smart glasses. *Computers in Human Behavior*, *146*, 107816. https://doi.org/10.1016/j.chb.2023.107816

Plonsky, & Ghanbar. (2018). Multiple regression in L2 research: A methodological synthesis and guide to interpreting R2 values. *The Modern language journal*, *102*(4), 713-731.

Plotkina, & Saurel. (2019). Me or just like me? The role of virtual try-on and physical appearance in apparel M-retailing. *Journal of Retailing and Consumer Services*, *51*, 362-377. https://doi.org/10.1016/j.jretconser.2019.07.002

Poushneh. (2017). Discernible impact of augmented reality on retail customer's experience, satisfaction and willingness to buy. *Journal of Retailing and Consumer Services*, *34*, 229-234. https://doi.org/10.1016/j.jretconser.2016.10.005

Poushneh. (2018). Augmented reality in retail: A trade-off between user's control of access to personal information and augmentation quality. *Journal of Retailing and Consumer Services*, *41*, 169-176. https://doi.org/10.1016/j.jretconser.2017.12.010

Pöyry, Parvinen, & Malmivaara. (2013). Can we get from liking to buying? Behavioral differences in hedonic and utilitarian Facebook usage. *Electronic Commerce Research and Applications*, *12*(4), 224-235. https://doi.org/10.1016/j.elerap.2013.01.003

Preacher, Rucker, & Hayes. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate behavioral research*, *42*(1), 185-227. https://doi.org/10.1080/00273170701341316

Priporas, Stylos, & Fotiadis. (2017). Generation Z consumers' expectations of interactions in smart retailing: A future agenda. *Computers in Human Behavior*, *77*, 374-381. https://doi.org/10.1016/j.chb.2017.01.058

Qin, Peak, & Prybutok. (2021). A virtual market in your pocket: How does mobile augmented reality (MAR) influence consumer decision making? *Journal of Retailing and Consumer Services*, *58*, 102337. https://doi.org/10.1016/j.jretconser.2020.102337

Rauschnabel. (2021). Augmented reality is eating the real-world! The substitution of physical products by holograms. *International Journal of Information Management*, *57*, 102279. https://doi.org/10.1016/j.ijinfomgt.2020.102279

Rauschnabel, Babin, Tom Dieck, Krey, & Jung. (2022). What is augmented reality marketing? Its definition, complexity, and future. In (Vol. 142, pp. 1140-1150): Elsevier.

Rauschnabel, Felix, & Hinsch. (2019). Augmented reality marketing: How mobile AR-apps can improve brands through inspiration. *Journal of Retailing and Consumer Services*, *49*, 43-53. https://doi.org/10.1016/j.jretconser.2019.03.004

Rauschnabel, Felix, Hinsch, Shahab, & Alt. (2022). What is XR? Towards a framework for augmented and virtual reality. *Computers in Human Behavior*, *133*, 107289. https://doi.org/10.1016/j.chb.2022.107289

Rauschnabel, He, & Ro. (2018). Antecedents to the adoption of augmented reality smart glasses: A closer look at privacy risks. *Journal of Business Research*, *92*, 374-384. https://doi.org/10.1016/j.jbusres.2018.08.008

Rese, Baier, Geyer-Schulz, & Schreiber. (2017). How augmented reality apps are accepted by consumers: A comparative analysis using scales and opinions. *Technological Forecasting and Social Change*, *124*, 306-319. https://doi.org/10.1016/j.techfore.2016.10.010

Riar, Xi, Korbel, Zarnekow, & Hamari. (2022). Using augmented reality for shopping: a framework for AR induced consumer behavior, literature review and future agenda. *Internet Research*, *33*(1), 242-279. https://doi.org/10.1108/intr-08-2021-0611

Ridge. (2021). Fun and (striving) games: Playfulness and agential fluidity. *Journal of the Philosophy of Sport*, *48*(3), 403-413. https://doi.org/10.1080/00948705.2021.1948338

Samir, & Islam. (2019). An android augmented reality application for retail fashion shopping. https://www.learntechlib.org/p/207187/

Saura. (2024). Algorithms in digital marketing: does smart personalization promote a privacy paradox? In (Vol. 13, pp. 499-502): SAGE Publications Sage India: New Delhi, India.

Schiavi, Havard, Beddiar, & Baudry. (2022). BIM data flow architecture with AR/VR technologies: Use cases in architecture, engineering and construction. *Automation in Construction*, *134*, 104054. https://doi.org/10.1016/j.autcon.2021.104054

Scholz, & Duffy. (2018). We ARe at home: How augmented reality reshapes mobile marketing and consumer-brand relationships. *Journal of Retailing and Consumer Services*, *44*, 11-23. https://doi.org/10.1016/j.jretconser.2018.05.004

Schuemie, Van Der Straaten, Krijn, & Van Der Mast. (2001). Research on presence in virtual reality: A survey. *CyberPsychology & Behavior*, *4*(2), 183-201. https://doi.org/10.1089/109493101300117884

Schuir, & Teuteberg. (2021). Understanding augmented reality adoption trade-offs in production environments from the perspective of future employees: A choice-based conjoint study. *Information Systems and e-Business Management*, *19*(3), 1039-1085. https://doi.org/10.1007/s10257-021-00529-0

Schumacker, & Lomax. (2004). *A beginner's guide to structural equation modeling*. psychology press. https://doi.org/10.4324/9781003044017

Sears. (2023). Fracturing & fluidity, isolation & (dis) integration: mapping ecological islands & edges in painting & music. *International Journal of Cartography*, 1-22.

SGIA. (2025). *Towards 2025: China Consumer Outlook* (NielsenIQ, Issue. https://mp.weixin.qq.com/s?__biz=MzAwMjM5ODU5MA==&mid=2247509147&idx=1&sn=9589c2d8b4e057ab8a54cfb05a999ed7&chksm=9b3662bd28

0e16a1b7f60f5a47245c6e6283a3f1ed8886c739dc377c23fd661510da1207bd5c&scene=27

Sha, & Ye. (2012). The influence of customer identification on consumer streaming experience based on S-O-R model. *Industrial Engineering Journal*, *15*(4), 6. (in Chinese)

Sha, Zhang, Shen, Li, & Mei. (2023). Deep person generation: A survey from the perspective of face, pose, and cloth synthesis. *ACM Computing Surveys*, *55*(12), 1-37.

Shangguan. (2021). Design of virtual simulation system for rare wild animals based on AR technology. *Experimental technology and management*. (in Chinese)

Shen, Tan, Guo, Zhao, & Qin. (2021). How to promote user purchase in metaverse? A systematic literature review on consumer behavior research and virtual commerce application design. *Applied Sciences*, *11*(23), 11087. https://doi.org/10.3390/app112311087

Shi. (2024). Discovering the Impact of Chinese Social Media Influencers on Generation Z Consumer Behaviour. SHS Web of Conferences,

Shi, Deng, Zhang, & Long. (2025). How telepresence and perceived enjoyment mediate the relationship between interaction quality and continuance intention: Evidence from China Zisha-ware Digital Museum. *PloS one*, *20*(1), e0317784.

Shi, Meng, Li, & Jiang. (2017). Study on purchasing intention of online group buying consumers based on SOR model. *Commercial economic research*(20), 3. (in Chinese)

Shi, & Zhang. (2016). The rise of virtual/augmented reality and the shift to traditional journalism. *News reporter*(1), 8. (in Chinese)

Shin, & Jeong. (2021). Travelers' motivations to adopt augmented reality (AR) applications in a tourism destination. *Journal of Hospitality and Tourism Technology*, *12*(2), 389-405. https://doi.org/10.1108/JHTT-08-2018-0082

Shrout, & Bolger. (2002). Mediation in experimental and nonexperimental studies: new procedures and recommendations. *Psychological methods*, *7*(4), 422. https://doi.org/10.1037/1082-989X.7.4.422

Shuai. (2012). *Research on registration and collaborative interaction of workshop layout design in augmented reality environment* [Master Thesis, Guangdong University of Technology]. (in Chinese)

Sitkin, Sutcliffe, & Barrios‐Choplin. (1992). A dual‐capacity model of communication media choice in organizations. *Human Communication Research*, *18*(4), 563-598. https://doi.org/10.1111/j.1468-2958.1992.tb00572.x

Smink, Van Reijmersdal, Van Noort, & Neijens. (2020). Shopping in augmented reality: The effects of spatial presence, personalization and intrusiveness on app and brand responses. *Journal of Business Research*, *118*, 474-485. https://doi.org/10.1016/j.jbusres.2020.07.018

Song, Baek, & Choo. (2020). Try-on experience with augmented reality comforts your decision: Focusing on the roles of immersion and psychological ownership. *Information Technology & People*, *33*(4), 1214-1234. https://doi.org/10.1108/ITP-02-2019-0092

Song, Hu, & Deng. (2019). How to Satisfy Post-90s Consumers? An Empirical Study on Influencing Factors of Post-90s Consumers' Online Shopping Satisfactory. 4th Annual International Conference on Social Science and Contemporary Humanity Development (SSCHD 2018),

Square, Xu, Lei, & Li. (2023). Research and application progress of tracking registration methods in AR enhanced assembly. *Journal of System*

SimulationJournal of System Simulation, *35*(7), 1438-1454. https://doi.org/10.16182/j.issn1004731x.joss.22-0335

Stapleton, Hughes, Moshell, Micikevicius, & Altman. (2002). Applying mixed reality to entertainment. *Computer*, *35*(12), 122-124. https://doi.org/10.1109/MC.2002.1106186

Steuer, Biocca, & Levy. (1995). Defining virtual reality: Dimensions determining telepresence. *Communication in the age of virtual reality*, *33*, 37-39.

Strauss, & Corbin. (1998). Basics of qualitative research techniques.

Sun, Fang, Kong, Chen, & Liu. (2022). Influence of augmented reality product display on consumers' product attitudes: A product uncertainty reduction perspective. *Journal of Retailing and Consumer Services*, *64*, 102828. https://doi.org/10.1016/j.jretconser.2021.102828

Sun, Shen, Wan, Wu, Fang, & Gao. (2024). A survey of iot privacy security: Architecture, technology, challenges, and trends. *IEEE Internet of Things Journal*.

Sun, Xu, Zhang, & Cui. (2019). How Augmented Reality Affects People's Perceptions: Adoption of AR in Product Display Improves Consumers' Product Attitude. Journal of Physics: Conference Series, Wuhan, China.

Sung, Bae, Han, & Kwon. (2021). Consumer engagement via interactive artificial intelligence and mixed reality. *International Journal of Information Management*, *60*, 102382. https://doi.org/10.1016/j.ijinfomgt.2021.102382

Tae-Im, Han, Leslie, & Stoel. (2017). Using rich media to motivate fair-trade purchase. *Journal of Research in Interactive Marketing*. https://doi.org/10.1108/JRIM-05-2016-0057

Tan, Chandukala, & Reddy. (2022). Augmented reality in retail and its impact on sales. *Journal of Marketing*, *86*(1), 48-66. https://doi.org/10.1177/0022242921995449

Tian, Guan, & Wang. (2010). Real-time occlusion handling in augmented reality based on an object tracking approach. *Sensors*, *10*(4), 2885-2900. https://doi.org/10.3390/s100402885

Tsepapadakis, & Gavalas. (2023). Are you talking to me? An Audio Augmented Reality conversational guide for cultural heritage. *Pervasive and Mobile Computing*, *92*, 101797. https://doi.org/10.1016/j.pmcj.2023.101797

Uhm, Kim, Do, & Lee. (2022). How augmented reality (AR) experience affects purchase intention in sport E-commerce: Roles of perceived diagnosticity, psychological distance, and perceived risks. *Journal of Retailing and Consumer Services*, *67*, 103027. https://doi.org/10.1016/j.jretconser.2022.103027

Vallerand. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. In *Advances in experimental social psychology* (Vol. 29, pp. 271-360). Elsevier.

Van der Heijden. (2004). User acceptance of hedonic information systems. *MIS Quarterly*, 695-704. https://doi.org/10.2307/25148660

Van Esch, Arli, Gheshlaghi, Andonopoulos, von der Heidt, & Northey. (2019). Anthropomorphism and augmented reality in the retail environment. *Journal of Retailing and Consumer Services*, *49*, 35-42. https://doi.org/10.1016/j.jretconser.2019.03.002

Van Kerrebroeck, Brengman, & Willems. (2017). When brands come to life: experimental research on the vividness effect of Virtual Reality in transformational marketing communications. *Virtual Reality*, *21*, 177-191. https://doi.org/10.1007/s10055-017-0306-3

Venkatakrishnan, Venkatakrishnan, Anaraky, Volonte, Knijnenburg, & Babu. (2020). A structural equation modeling approach to understand the relationship between control, cybersickness and presence in virtual reality. 2020 IEEE conference on virtual reality and 3D user interfaces (VR), Atlanta, GA, USA.

Venkatesh. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information systems research*, *11*(4), 342-365. https://doi.org/10.1287/isre.11.4.342.11872

Verhagen, Vonkeman, Feldberg, & Verhagen. (2014). Present it like it is here: Creating local presence to improve online product experiences. *Computers in Human Behavior*, *39*, 270-280. https://doi.org/10.1016/j.chb.2014.07.036

Vieira. (2013). Stimuli–organism-response framework: A meta-analytic review in the store environment. *Journal of Business Research*, *66*(9), 1420-1426. https://doi.org/10.1016/j.jbusres.2012.05.009

Wang. (2020). *Research on Formation mechanism and evaluation of consumer perceived usefulness of online reviews based on SOR theory* [Doctor Thesis, Harbin University of Science and Technology]. (in Chinese)

Wang. (2023). The consumption behaviors of Generation Z: evidence from China. *Advances in Economics and Management Research*, *7*(1), 568-568. https://doi.org/doi.org/10.56028/aemr.7.1.568.2023

Wang, Bai, & Zhao. (2025). Additional reviews, perceived credibility and consumer online purchasing behavior: a study of university students in China. *Asia Pacific Journal of Marketing and Logistics*, *37*(4), 914-930. https://doi.org/10.1108/APJML-04-2024-0535

Wang, Chen, & Kao. (2012). The Digital Design Applied to Consumer Garment Try-On Experience Integrated with Augmented Reality. In *Recent Advances in Computer Science and Information Engineering: Volume 1* (pp. 115-122). Springer. https://doi.org/10.1007/978-3-642-25781-0_18

Wang, Gu, Zhao, & Li. (2023). Research on the Influence Mechanism of Augmented Reality Technology on Consumers' Purchase Behavior in Online Shopping. *Nankai Business Review*, *3*(2), 34-43. (In Chinese)

Wang, & Jiang. (2024). A Study on the Willingness of "Generation Z" Consumers to Use Online Virtual Try-On Shopping Services Based on the SOR Framework. *Systems*, *12*(6), 217. https://doi.org/10.3390/systems12060217

Wang, Ko, & Wang. (2022). Augmented reality (AR) app use in the beauty product industry and consumer purchase intention. *Asia Pacific Journal of Marketing and Logistics*, *34*(1), 110-131.

Wang, Lee, Bermejo Fernandez, & Hui. (2024). The dark side of augmented reality: Exploring manipulative designs in AR. *International Journal of Human–Computer Interaction*, *40*(13), 3449-3464.

Wang, & Luo. (2021). Research on the influencing mechanism of consumers' purchase intention of "national tide". *China Economic & Trade Herald*, *000*(002), 165-168. (in Chinese)

Wang, & Tang. (2017). Research on teaching methods based on new mobile augmented reality technology. *China Education Journal*(S1), 3. (in Chinese)

Watson, Alexander, & Salavati. (2018). The impact of experiential augmented reality applications on fashion purchase intention. *International Journal of Retail & Distribution Management*, *48*(5), 433-451. https://doi.org/10.1108/IJRDM-06-2017-0117

Watson, & John. (1917). An Attempted formulation of the scope of behavior psychology. *Psychological Review*, *24*(5), 329. https://doi.org/10.1037/h0073044

Whang, Song, Choi, & Lee. (2021). The effect of Augmented Reality on purchase intention of beauty products: The roles of consumers' control. *Journal of Business Research*, *133*, 275-284. https://doi.org/10.1016/j.jbusres.2021.04.057

Wheaton, Muthen, Alwin, & Summers. (1977). Assessing reliability and stability in panel models. *Sociological methodology*, *8*, 84-136. https://doi.org/10.2307/270754

Wiederhold. (2017). How Augmented Reality Is Poised to Outpace Virtual Reality. *Cyberpsychology, Behavior and Social Networking*, *20*(8), 461-462. https://doi.org/10.1089/cyber.2017.29080.bkw

Wikitude. (2020). *statistics every app developer should know about augmented reality*.

Wiyata, Putri, & Gunawan. (2020). Pengaruh Customer Experience, Ease of Use, dan Customer Trust Terhadap Repurchase Intention Konsumen Situs Jual Beli Online Shopee. https://doi.org/10.52851/cakrawala.v3i1.36

Wiyata, Putri, & Gunawan. (2020). Pengaruh Customer Experience, Ease of Use, dan Customer Trust Terhadap Repurchase Intention Konsumen Situs Jual Beli Online Shopee. *Cakrawala Repositori IMWI*, *3*(1), 11-21. https://doi.org/10.52851/cakrawala.v3i1.36

Woo, Ian, & Ki. (2021). Effects of online reviews, trust, and picture-superiority on intention to purchase restaurant services. *Journal of Hospitality and Tourism Management*, *47*, 228-236.

Wu. (2019). *Improving food preparation through technology integration* University of Illinois at Urbana-Champaign].

Wu. (2020). *Study on purchasing intention of fresh agricultural products consumers on live streaming e-commerce platform -- based on perceived value perspective* [Doctor Thesis, South China Agricultural University]. (in Chinese)

Wu, Lin, & Bowman. (2022). Watching VR advertising together: How 3D animated agents influence audience responses and enjoyment to VR advertising. *Computers in Human Behavior*, *133*, 107255. https://doi.org/10.1016/j.chb.2022.107255

Wuthisuthimethawee, Rojsaengroeng, & Krongtrivate. (2021). Development of hospital MCI and disaster preparedness assessment tool for Thailand. *Risk Management and Healthcare Policy*, 3465-3471. https://doi.org/10.31014/aior.1993.05.04.571

Xi, Chen, Gama, Riar, & Hamari. (2023). The challenges of entering the metaverse: An experiment on the effect of extended reality on workload. *Information Systems Frontiers*, *25*(2), 659-680. https://doi.org/10.1007/s10796-022-10244-x

Xi, & Hamari. (2021). Shopping in virtual reality: A literature review and future agenda. *Journal of Business Research*, *134*, 37-58. https://doi.org/10.1016/j.jbusres.2021.04.075

Xia. (2019). *China leads the e-tail revolution*. https://www.upm.com/news-and-stories/articles/2019/10/china-leads-the-e-tail-revolution/.

Xia. (2021). *China leads the e-tail revolution*. https://www.upm.com/news-and-stories/articles/2019/10/china-leads-the-e-tail-revolutionp.

Xia, You, & Li. (2022). An e-commerce system featuring real-time interactive experience based on AR technology. *Video Engineering*, *42*(2), 7. (In Chinese)

Xiao, Guo, Yu, & Liu. (2019). The Effects of Online Shopping Context Cues on Consumers' Purchase Intention for Cross-Border E-Commerce Sustainability. *Sustainability*, *11*. https://doi.org/10.3390/su11102777

Xu, Zeng, & He. (2021). The impact of information disclosure on consumer purchase behavior on sharing economy platform Airbnb. *International Journal of Production Economics*, *231*, 107846. https://doi.org/10.1016/j.ijpe.2020.107846

Xu, Zhang, Cui, & Yang. (2020). How and when AR technology affects product attitude. *Asia Pacific Journal of Marketing and Logistics*, *32*(6), 1226-1241. https://doi.org/10.1108/APJML-03-2019-0221

Xue. (2022). *Designing effective augmented reality platforms to enhance the consumer shopping experiences* Loughborough University]. https://repository.lboro.ac.uk/account/articles/19635462.

Yanbin. (2016). An Empirical Research on Factors Influencing Online Consumption Psychological Orientation of Chinese Post-90s College Students. *Journal of Computational and Theoretical Nanoscience*, *13*(11), 7779-7784.

Yang. (2017). Research on influencing factors and relationship of user information behavior in enterprise wechat marketing. *Jilin University*. (in Chinese)

Yang. (2021). Augmented reality in experiential marketing: The effects on consumer utilitarian and hedonic perceptions and behavioural responses. In *Information technology in organisations and societies: Multidisciplinary perspectives from AI to Technostress* (pp. 147-174). Emerald Publishing Limited. https://doi.org/10.1108/978-1-83909-812-320211006

Yang, Cai, Zhou, & Zhou. (2005). Development and validation of an instrument to measure user perceived service quality of information presenting web portals. *Information & Management*, *42*(4), 575-589. https://doi.org/10.1016/j.im.2004.03.001

Yim, Chu, & Sauer. (2017). Is augmented reality technology an effective tool for e-commerce? An interactivity and vividness perspective. *Journal of Interactive Marketing*, *39*(1), 89-103. https://doi.org/10.1016/j.intmar.2017.04.001

Yim, & Park. (2019). “I am not satisfied with my body, so I like augmented reality (AR)”: Consumer responses to AR-based product presentations. *Journal of Business Research*, *100*, 581-589. https://doi.org/10.1016/j.jbusres.2018.10.041

Yin. (2021). Analysis and process design of online immersive teaching system based on digital twin platform. *Journal of Distance Education*, *039*(001), 51-62.

Yitong, Thoo, Lo, & Huam. (2024). Online Shopping in Augmented Reality: Systematic Literature Review of Consumer Behavior. *Evolutionary Studies in Imaginative Culture*, *8*(1). https://doi.org/10.70082/esiculture.vi.1934

You, Vadakkepatt, & Joshi. (2015). A meta-analysis of electronic word-of-mouth elasticity. *Journal of Marketing*, *79*(2), 19-39. https://doi.org/10.1509/jm.14.0169

Young, & Hyunjoo. (2012). Role of web site design quality in satisfaction and word of mouth generation. *Journal of Service Management*, *23*(1), 79-96. https://doi.org/10.1108/09564231211208989

Yu. (2017). *A study on the influence of product information presentation of online merchants on consumers' purchase intention* [Doctor Thesis, Jilin University]. (in Chinese)

Yu. (2018). *Research on consumer purchase decision model based on AR experiential marketing* [Master Thesis, Jinan University]. (in Chinese)

Yu. (2019). Characteristics and trends of investment and financing in China's VR/AR industry in 2019. *The World of Electronics*, *26*(7), 5. https://doi.org/10.1007/s12109-019-09657-5

Yu, & Fan. (2023). Generation Z's response to the virtual reality advertising in China. *Young Consumers*, *24*(3), 367-377. https://doi.org/10.1108/YC-07-2022-1558

Yuan, Wang, Yu, Kim, & Moon. (2021). The influence of flow experience in the augmented reality context on psychological ownership. *International Journal of Advertising*, *40*(6), 922-944. https://doi.org/10.1080/02650487.2020.1869387

Yuen, Yaoyuneyong, & Johnson. (2011). Augmented reality: An overview and five directions for AR in education. *Journal of Educational Technology Development and Exchange (JETDE)*, *4*(1), 11.

Zanna, & Rempel. (2008). Attitudes: A new look at an old concept.

Zeng, Xing, & Jin. (2023). The impact of VR/AR-based consumers' brand experience on consumer–brand relationships. *Sustainability*, *15*(9), 7278. https://doi.org/10.3390/su15097278

Zhang. (2012). The design and implementation of sports TV program based on A.R. technology -- the design and application of ball competition program. *Today Media*(3), 3. (in Chinese)

Zhang. (2019). *Design and application of experiential learning activities for primary school English based on AR* [Master Thesis, Central China Normal University]. (in Chinese)

Zhang. (2021). Exploration of news narrative innovation strategy based on augmented reality media. *Chinese Journal of Journalism & Communication*(2015-4), 106-114. (in Chinese)

Zhang, & Jin. (2018). Augmented Reality Technology and Its Application in Automobiles and Automobile Maintenance Services (II). *Automobile maintenance and repair*. (in Chinese)

Zhang, Tang, & Zhang. (2017). Analysis of influencing factors of user knowledge sharing behavior in virtual community based on S-O-R paradigm. *Information Science*, *35*(11), 7. (in Chinese)

Zhang, Wang, Cao, & Wang. (2019). The role of virtual try-on technology in online purchase decision from consumers' aspect. *Internet Research*, *29*(3), 529-551. https://doi.org/10.1108/IntR-12-2017-0540

Zhang, Wang, Zhang, & Chu. (2022). Live-streaming community interaction effects on travel intention: the mediation role of sense of community and swift-guanxi. *Information Technology & Tourism*, *24*(4), 485-509. https://doi.org/10.1007/s40558-022-00239-4

Zhao, & Liu. (2018). AR immersive panoramic simulation studio system. *Modern television technology*(10), 5. (in Chinese)

Zheng. (2016). The construction of virtual communication mode in virtual/augmented reality -- based on the deconstruction and integration of digital intelligence and media characteristics. *Journal of Nanchang University: Humanities and Social Sciences Edition*, *47*(4), 7. (in Chinese)

Zhou. (2013). *Development and design of augmented reality (AR) games* [Master Thesis, Peking University]. (in Chinese)

Zhou, Hua, & Chen. (2023). Augmented reality head-up shows the current situation and outlook. *Advances in laser and optoelectronics*, *60*(8), 0811008. (in Chinese)

Zhou, & Wang. (2019). Application research of AR technology combined with game in digital media environment. *Computer products and circulation*(6), 1. (in Chinese)

Zikmund, Babin, Carr, & Griffin. (2013). *Business research methods*. Cengage learning. https://bookboon.com/en

APPENDIX

APPENDIX A

Consent Form to Participate in the Experiment

APPENDIX A

CONSENT FORM TO PARTICIPATE IN THE EXPERIMENT

Title of the Experiment: An experiment on mobile shopping

Introduction:

You are invited to participate in a research study conducted by Ludan Yu. This research is part of a doctoral dissertation at the Business School, King Mongkut's Institute of Technology LatKrabang Bangkok. Before you decide whether to participate, it is important for you to understand why the research is being conducted, what will be involved, and how your personal information will be used. Please take the time to read the following information carefully. If you have any questions, feel free to contact Ludan Yu at 466737413@qq.com.

Purpose of the Study: Study the impact of mobile shopping.

Experiment Procedures:

- First, all participants need to download the Dewu APP. Secondly, we will provide instructions on how to utilize the Dewu APP. Thirdly, participants must select shoes priced between 200 and 400 RMB on the Dewu APP. In the process：

Treatment group: participants utilizing the AR virtual try-on function should employ it to check the effect of AR virtual try-on, such as color preference and the effect of shoes on feet.

Control group: those participants who do not utilize the AR virtual try-on function should browse relevant shoe information and imagine its effects based on textual descriptions, pictures, and videos.

- All participants need to complete a questionnaire.

The duration of the Experiment: About half an hour.

Confidentiality:

- The authors promise that all data will not be leaked and will only be used for the academic research.
- The participant data will be anonymized.

Voluntary Participation:

Your participation in this study is entirely voluntary. You may refuse to participate or withdraw from the study at any time.

Consent:

By signing this form, it indicates that you have read and understood the information provided in this consent form and voluntarily agree to participate in the study.

Signature (Date) __________

APPENDIX B

Consent Form to Participate (Back translation)

APPENDIX B

参与实验同意书

实验标题：关于移动购物的实验

实验介绍：

欢迎您参与由玉露丹进行的研究。此研究是 King Mongkut's Institute of Technology LatKrabang 商学院博士论文的一部分。在您决定是否参与实验之前，了解研究的目的、参与的内容以及个人信息的使用是非常重要的。请仔细阅读以下信息。如果您有任何问题，请随时联系玉露丹，邮箱：466737413@qq.com。

研究目的：研究移动购物的影响。

实验步骤：

- 您将被邀请使用您自己的智能手机。
- 首先，所有参与者将被要求下载得物 APP。其次，我们将会提供如何使用得物 APP 的说明。第三，参与者需要在得物 APP 上选择价格在 200 至 400 人民币之间的鞋子。在此过程中：
  变量组：利用 AR 虚拟试穿功能的参与者应使用它来检查 AR 虚拟试穿的效果，如颜色是否是自己喜欢的以及鞋子是否合脚等。
  对照组：那些不使用 AR 虚拟试穿功能的参与者需要浏览相关的鞋子信息，并根据文字描述、图片和视频来想象鞋子在脚上的效果。
- 所有参与者需要填写一份调查问卷。

实验持续时间：约半小时。

保密性：

- 作者承诺所有数据不会泄露，仅仅用于学术研究目的。
- 参与者数据将会匿名化。

自愿参与：

您完全自愿参与此研究。另外，您可以随时拒绝参与或退出研究。

同意：

通过签署此表格，表明您已阅读并理解了本同意书中提供的信息，并自愿同意参与研究。

签名（日期）________________________

APPENDIX C

Questionnaire

APPENDIX C

QUESTIONNAIRE ON MOBILE SHOPPING

Respected Sir/Madam,

Greetings! I sincerely apologize for taking up your valuable time to participate in the completion of this survey questionnaire. I am also immensely grateful for your willingness to allocate time amidst your busy schedule for this survey. This research survey does not require personal identification, and the answers provided carry no right or wrong judgments. The data collected through this survey will be strictly utilized for academic research purposes only and will not be used for any other intentions. I assure you that, in accordance with relevant national laws and ethical standards, the information you provide will be treated with the utmost confidentiality, and your privacy will not be compromised. This questionnaire is part of a doctoral dissertation at the Business School, King Mongkut's Institute of Technology LadKrabang Bangkok, aiming to investigate mobile shopping. I appreciate your cooperation and support!

Thank you very much!

Do you agree to participate in the experiment on a voluntary basis and agree with the authors to use the questionnaire data for academic research?

○ Yes ○ No (if no.Stop.)

Part 1: The following is a description of your personal information. Please mark "√" in the following questions according to your actual situation.

1. Gender

○Male ○Female

2. Age

○ Under 18 years old ○ 18-23 years old ○ 23-28 years old ○ 28-33 years old ○ Over 33 years old

3. Current level of education

○ Undergraduate students ○ Master student ○ Doctoral student

4. Have you ever had an Augmented Reality shopping experience?

○ Yes ○ No

(if yes, please select)

○ Once a week

○ Twice a week

○ Three times a week

○ More than three times a week

Part 2: Variables Measurement. (Please check the box next to the statement that best aligns with your situation and mark it with "√" on the corresponding number.)

Perceived Augmented Realism

Questions	1 strongly disagree	2 disagree	3 moderately disagree	4 neutral	5 moderately agree	6 agree	7 strongly agree
1. The virtual objects on the APP with the AR function (without the AR function) seem real to me.	○	○	○	○	○	○	○
2. The experience on the APP with the AR function	○	○	○	○	○	○	○

(without the AR function) seems real to me.							
3. The shoes on the APP with AR function (without the AR function) are similar to reality.	○	○	○	○	○	○	○
4. My interactions with the virtual object on the APP with AR function (without the AR function) seem natural to me, like those in the real world.	○	○	○	○	○	○	○
5. In my opinion, the quality of the images of the APP with AR function (without the AR function) objects is high.	○	○	○	○	○	○	○
6. My experience with the APP with AR function (without the AR function) is congruent to other experiences in the real world.	○	○	○	○	○	○	○

Perceived Technology Fluidity

Questions	1 strongly disagree	2 disagree	3 moderately disagree	4 neutral	5 moderately agree	6 agree	7 strongly agree
7. The APP with AR function (without AR function) can surf across	○	○	○	○	○	○	○

content features that provide tips, information, and fun.							
8. I can get any new content features I need on the APP with AR function (without AR function).	○	○	○	○	○	○	○
9. I can get any information about the content features I need on the APP with AR function (without AR function).	○	○	○	○	○	○	○
10. On the APP with AR function (without AR function), I can get any fun content features I need.	○	○	○	○	○	○	○
11. On the APP with AR function (without AR function), I can access any items I need anytime.	○	○	○	○	○	○	○
12. I can review any items I need anytime on the APP with the AR function (without the AR function).	○	○	○	○	○	○	○
13. I can search for any archive items I need anytime on the APP with the AR function (without the AR function).	○	○	○	○	○	○	○

14. I can freely flow from one subject to the next on the APP with the AR function (without the AR function).	○	○	○	○	○	○	○

Attitudes

Questions	1 strongly disagree	2 disagree	3 moderately disagree	4 neutral	5 moderately agree	6 agree	7 strongly agree
15. I am positive about the APP with AR function (without AR function).	○	○	○	○	○	○	○
16. The use of the APP with an AR function (without an AR function) is a good idea.	○	○	○	○	○	○	○
17. It just makes sense to use the APP with the AR function (without the AR function).	○	○	○	○	○	○	○
18. The APP with AR function (without AR function) is so interesting that I just want to learn more about it.	○	○	○	○	○	○	○
19. I would recommend the APP with AR function (without AR function) to others.	○	○	○	○	○	○	○

Perceived Information Quality

Questions	1 strongly disagree	2 disagree	3 moderately disagree	4 neutral	5 moderately agree	6 agree	7 strongly agree
20. The APP with AR function (without AR function) provided me with the information I expected.	○	○	○	○	○	○	○
21. The APP with AR function (without AR function) provides trustworthy and reliable information about shoes.	○	○	○	○	○	○	○
22. The APP with AR function (without AR function) provides detailed information about shoes.	○	○	○	○	○	○	○
23. The APP with AR function (without AR function) provides complete information about shoes.	○	○	○	○	○	○	○
24. The APP with AR function (without AR function) provides personalized information about shoes.	○	○	○	○	○	○	○
25. The APP with AR function (without AR function) provides	○	○	○	○	○	○	○

information that helps me in my decision.							

Immersion

Questions	1 strongly disagree	2 disagree	3 moderately disagree	4 neutral	5 moderately agree	6 agree	7 strongly agree
26. Shopping on the APP with the AR function (without the AR function) made me deeply engrossed.	○	○	○	○	○	○	○
27. Shopping on the APP with AR function (without AR function) made me absorbed.	○	○	○	○	○	○	○
28. Shopping on the APP with AR function (without AR function) focused my attention.	○	○	○	○	○	○	○

Enjoyment

Questions	1 strongly disagree	2 disagree	3 moderately disagree	4 neutral	5 moderately agree	6 agree	7 strongly agree
29. Shopping on the APP with AR function (without AR function) is enjoyable.	○	○	○	○	○	○	○
30. Shopping on the APP with AR function (without AR function) is pleasurable.	○	○	○	○	○	○	○

31. Shopping on the APP with an AR function (without an AR function) is fun for its own sake.	○	○	○	○	○	○	○
32. Shopping on the APP with AR function (without AR function) make me happy.	○	○	○	○	○	○	○
33. Shopping on the APP with an AR function (without an AR function) make me exciting.	○	○	○	○	○	○	○

Purchase Intention

Questions	1 strongly disagree	2 disagree	3 moderately disagree	4 neutral	5 moderately agree	6 agree	7 strongly agree
34. I intend to buy my shoes on the APP with the AR function (without the AR function).	○	○	○	○	○	○	○
35. The probability that I would consider buying the shoes on the APP with the AR function (without the AR function) is very high.	○	○	○	○	○	○	○
36. If I plan to buy shoes, I would very probably buy them on the APP with AR function (without AR function).	○	○	○	○	○	○	○

37. I would consider to buy the shoes on the APP with the AR function (without the AR function).	○	○	○	○	○	○	○
38. My willingness to buy the shoes on APP with AR function (without AR function) is high.	○	○	○	○	○	○	○

The questionnaire is over. Thank you for your support!

If you have any questions or suggestions, please contact Miss Ludan at 466737413@qq.com

APPENDIX D

Questionnaire (Back translation)

APPENDIX D

关于手机购物对购买行为的影响的问卷

尊敬的先生/女士：

您好！很抱歉占用您宝贵的时间来参加此次调查问卷的填写。也非常感谢您能从百忙之中抽出时间完成此问卷调查。此次调查研究无需署名，答案并无对错之分，从中得到的数据资料仅作为学术研究使用，不涉及其他任何用途。本人以相关国家法律以及道德规范来保障您填写的数据将严格保密，绝不会泄露您的任何隐私。本问卷是泰国先皇理工大学工商管理学院博士学位论文的一部分，旨在研究 AR 体验对购买意愿的影响。感谢您的合作和支持！

您是否同意在自愿的基础上参与实验，并同意作者将问卷数据用于科学研究？

○ 是　　○否（如果否，停止问卷）

第一部分：以下是关于您个人相关信息的一些描述，请根据您的实际情况在下面各题中打“√”

1. 性别［单选题］*

○男　　○女

2. 年龄［单选题］*

○18 岁以下　○18-23 岁　○23-28 岁　○28-33 岁　○33 岁以上

3. 目前教育程度［单选题］*

○本科生　○ 硕士生　○博士生

4. 是否有过 AR 购物经历？［单选题］*

〇是（如果是，请选择）　　　〇 否

〇 一周一次

〇 一周两次

〇 一周三次

〇 一周三次以上

第二部分：变量测量（请在以下陈述中勾选与您情况最为符合的一项，在对应的数字上打“√”。）

感知增强真实感［矩阵量表题］＊

问题	1 非常不同意	2 不同意	3 有点不同意	4 不确定	5 有点同意	6 同意	7 非常同意
1. 应用程序上带有 AR 功能(没有 AR 功能)的虚拟对象在我看来是真实的。	o	o	o	o	o	o	o
2. 在应用程序上有 AR 功能(没有 AR 功能)的体验对我来说是真实的。	o	o	o	o	o	o	o
3. APP 上带有 AR 功能(没有 AR 功能)的鞋子与现实相似。	o	o	o	o	o	o	o
4. 我与应用程序上具有 AR 功能(没有 AR 功能)的虚拟对象的交互对我来说似乎很自然，就像现实世界中的交互一样。	o	o	o	o	o	o	o

5. 在我看来，带有 AR 功能(没有 AR 功能)的应用程序对象的图像质量很高。	○	○	○	○	○	○	○
6. 我使用具有 AR 功能(没有 AR 功能)的应用程序的经验与现实世界中的其他经验一致。	○	○	○	○	○	○	○

感知技术流畅性 ［矩阵量表题］＊

问题	1 非常不同意	2 不同意	3 有点不同意	4 不确定	5 有点同意	6 同意	7 非常同意
7.带有 AR 功能（无 AR 功能）的 APP，可以浏览包含提示和娱乐内容的信息。	○	○	○	○	○	○	○
8.我可以在带有 AR 功能（无 AR 功能）的 APP 中获取我需要的任何新内容特性。	○	○	○	○	○	○	○
9.我可以在带有 AR 功能（无 AR 功能）的 APP 中获取我需要的关于鞋子的任何信息。	○	○	○	○	○	○	○
10.在带有 AR 功能（无 AR 功能）的 APP 中，我可以获取我需要的任何有趣的内容特性。	○	○	○	○	○	○	○
11.在带有 AR 功能（无 AR 功能）的 APP 中，我可以随时访问我需要的任何物品。	○	○	○	○	○	○	○

12.在带有 AR 功能（无 AR 功能）的 APP 中，我可以随时浏览我需要的任何物品。	○	○	○	○	○	○	○
13.在带有 AR 功能（无 AR 功能）的 APP 中，我可以随时搜索我需要的鞋子。	○	○	○	○	○	○	○
14.在带有 AR 功能（无 AR 功能）的 APP 中，我可以自由地从一个主题流动到下一个主题。	○	○	○	○	○	○	○

态度［矩阵量表题］＊

问题	1 非常不同意	2 不同意	3 有点不同意	4 不确定	5 有点同意	6 同意	7 非常同意
15.我对带有 AR 功能（无 AR 功能）的 APP 持积极态度。	○	○	○	○	○	○	○
16.使用带有 AR 功能（无 AR 功能）的得物 APP 是个不错的主意。	○	○	○	○	○	○	○
17.使用带有 AR 功能（无 AR 功能）的 APP 很有意义。	○	○	○	○	○	○	○
18.带 AR 功能 (不带 AR 功能) 的 APP 非常有趣，我很想多了解一下。	○	○	○	○	○	○	○
19.我会向其他人推荐带有 AR 功能（无 AR 功能）的 APP。	○	○	○	○	○	○	○

感知信息质量［矩阵量表题］＊

问题	1 非常不同意	2 不同意	3 有点不同意	4 不确定	5 有点同意	6 同意	7 非常同意
20.带有 AR 功能（无 AR 功能）的 APP 为我提供了我期望的信息。	○	○	○	○	○	○	○
21.带有 AR 功能（无 AR 功能）的 APP 提供了关于鞋类的可信赖和可靠的信息。	○	○	○	○	○	○	○
22.带有 AR 功能（无 AR 功能）的 APP 提供了关于鞋类的详细信息。	○	○	○	○	○	○	○
23.带有 AR 功能（无 AR 功能）的 APP 提供了关于鞋类的完整信息。	○	○	○	○	○	○	○
24.带有 AR 功能（无 AR 功能）的 APP 提供了关于鞋类的个性化信息	○	○	○	○	○	○	○
25.带有 AR 功能（无 AR 功能）的 APP 提供的信息对我做出决策有帮助。	○	○	○	○	○	○	○

沉浸[矩阵量表题] *

问题	1 非常不同意	2 不同意	3 有点不同意	4 不确定	5 有点同意	6 同意	7 非常同意
26.在带有 AR 功能（无 AR 功能）的 APP 上购物让我深感沉浸其中。	○	○	○	○	○	○	○
27.在带有 AR 功能（无 AR 功能）的 APP 上购物让我全神贯注。	○	○	○	○	○	○	○

28.在带有 AR 功能（无 AR 功能）的 APP 上购物使我的注意力集中。	○	○	○	○	○	○	○

享受［矩阵量表题］*

问题	1 非常不同意	2 不同意	3 有点不同意	4 不确定	5 有点同意	6 同意	7 非常同意
29.在带有 AR 功能（无 AR 功能）的 APP 上购物感到很享受。	○	○	○	○	○	○	○
30.在带有 AR 功能（无 AR 功能）的 APP 上购物是一种愉悦的体验。	○	○	○	○	○	○	○
31.在有 AR 功能 (无 AR 功能)的 APP 上购物本身就是一种乐趣。	○	○	○	○	○	○	○
32.在带有 AR 功能（无 AR 功能）的 APP 上购物是一种快乐的体验。	○	○	○	○	○	○	○
33.在带有 AR 功能（无 AR 功能）的 APP 上购物是一种令人兴奋的体验。	○	○	○	○	○	○	○

购买意愿［矩阵量表题］*

问题	1 非常不同意	2 不同意	3 有点不同意	4 不确定	5 有点同意	6 同意	7 非常同意

34.我打算在带有 AR 功能（无 AR 功能）的 APP 上购买我的鞋子。	○	○	○	○	○	○	○
35.我考虑在带有 AR 功能（无 AR 功能）的 APP 上购买鞋子的概率非常高。	○	○	○	○	○	○	○
36.如果我计划购买鞋子，我很可能会在带有 AR 功能（无 AR 功能）的 APP 上购买。	○	○	○	○	○	○	○
37.我会考虑在带有 AR 功能（无 AR 功能）的 APP 上购买鞋子。	○	○	○	○	○	○	○
38.我在有 AR 功能 (没有 AR 功能) 的 APP 上购买鞋子的意愿很高。	○	○	○	○	○	○	○

问卷结束，非常感谢您的支持！

如果您有任何问题或建议，请通过邮箱 466737413@qq. com 与作者联系。

APPENDIX E

Semi-structured interview questions

APPENDIX E

SEMI-STRUCTURED INTERVIEW QUESTIONS

Semi-structured interview questions

Part	Answer
Part 1 Personal information of key informant. Q1: Gender Q2: Age Q3: Have you ever had an AR shopping experience? (If yes), how often, on average, do you use AR mobile shopping? Q4：Group with AR or Group without AR?	Answer
Part 2 Interview questions about the feelings during the experiment. Q1: On the APP, did you perceive the products to look realistic? (If yes), do you consider the level of realism to be high or low? Q2: When browsing products on the APP, how would you rate the system fluidity and interface responsiveness? Would you consider it high or low? Q3: Did the realism of the product and the fluidity of the APP system affect your perception of the quality of product information and your attitude towards the product? Q4: Did the realism of the product and the fluidity of the APP system affect your perception of enjoyment and immersion in the shopping process? Q5: Do you think realism, system fluency, attitude, perceived information quality, enjoyment, and immersion influence your purchase intentions?	Answer
Part 3 How important are these factors on purchase intention, in your opinion? Q1: In your opinion, how important is the realism of the product perceived on the APP to purchase intention? Q2: How fluid is the APP system, and how responsive is the interface when browsing products on the APP? High or low? Q3: In your opinion, how important is the individual's attitude on the intention to purchase shoes? Q4: In your opinion, how important is the perceived information quality on purchase intention on the APP? Q5: In your opinion, how important is the sense of immersion during the shopping process on purchase intention? Q6: In your opinion, how important is the sense of enjoyment during the shopping process on purchase intention?	Answer

APPENDIX F

Semi-structured interview questions (Back translation)

APPENDIX F

SEMI-STRUCTURED INTERVIEW QUESTIONS (BACK TRANSLATION)

半结构式访谈问题

部分	回答
第一部分：个人信息 Q1: 性别 Q2: 年龄 Q3: 之前是否有过 AR 购物经验？ Q4: AR 组或无 AR 组	回答
第二部分：关于实验过程中的感受。 Q1: 在 APP 上，你觉得商品看起来真实吗？（如果是），你觉得真实感是高还是低？ Q2：在 APP 上浏览商品时，APP 系统流畅度和界面响应速度如何？高还是低？ Q3: 商品的真实感以及 APP 系统的流畅度是否影响了您对产品信息质量的感知以及对产品的态度？ Q4: 商品的真实感以及 APP 系统的流畅度是否影响了您在购物过程的愉悦感和沉浸感？ Q5: 您是否认为真实感、系统流畅性、态度、感知信息质量、愉悦感和沉浸感影响您的购买意向？	回答
Part 3 这些因素对购买意向的重要性？ Q1: 在您看来，在 APP 上感知到的商品的真实感对购买意向有多重要？ Q2: 在您看来，在 APP 上感知到的系统流畅性对购买意向有多重要？ Q3: 在您看来，个体的态度对购买鞋子的意向有多重要？ Q4: 在您看来，在 APP 上感知到的信息质量对购买意向有多重要？ Q5: 在您看来，购物过程中的沉浸感对购买意向有多重要？ Q6: 在您看来，购物过程中的享受感对购买意向有多重要？	回答

APPENDIX G

The Item Objective Congruence Result

APPENDIX G

THE ITEM OBJECTIVE CONGRUENCE RESULT

Methods and Procedures

Five experts rated each question in the questionnaire. The score value was then averaged for each query to calculate the Index of Item-Objective Congruence (IOC). It is preferable if each query has an IOC of 0.6 or higher.

Score+1 = if the expert is certain that the item accurately calculates the attribute.

Score 0 = if the expert is not certain that the item accurately calculates the attribute.

Score -1 = if the expert is certain that the object does not calculate the attribute.

List of Names of Experts Determining the Research Questionnaire by Using IOC Technique

No	Name-Surname	Position
1	Assoc.Prof.Dr.Krisda Tanchaisak	Vice president of Ramkhamhaeng University.
2	Dr.Navidreza Ahadi	Lecturer at the College of Creative Industry, Srinakarinvirot University.
3	Dr.Jiaohao Chen	Lecturer of Guangxi University Business School
4	Dr.Sarist Gulthawatvichai	Lecturer of KMITL Business School
5	Dr.Vasu Keerativutises	Lecturer of KMITL Business School

Questionnaire IOC results

Screening Question	No. of experts					IOC	Analysis result
	1	2	3	4	5		
Do you agree to participate in the experiment on a voluntary basis and agree with the authors to use the questionnaire data for academic research? ○ Yes ○ No (If no. Stop.)	1	1	1	1	1	1	pass
Personal Information	**No. of experts**					**IOC**	**Analysis result**
	1	2	3	4	5		
1. Gender ○ Male ○ Female	1	1	1	1	1	1	passed
2. Age ○ Under 18 years old ○ 18-23 years old ○ 23-28 years old ○ 28-33 years old ○ Over 33 years old	1	1	1	1	1	1	passed
3. Current level of education ○ Undergraduate students ○ Master student ○ Doctoral student	1	1	1	1	1	1	passed
4. Have you ever had an AR shopping experience? ○ Yes ○No (If yes, please select) ○ Once a week	1	1	1	1	1	1	passed

○ Twice a week ○ Three times a week ○ More than three times a week							

Part 2: Questions about Latent Variables

Variables Measurement for Treatment Group (APP With AR)		**No. of experts**					**IOC**	**Analysis result**
		1	2	3	4	5		
Perceived Augmented Realism	1. The virtual objects on the APP with the AR function seem real to me.	1	1	1	1	1	1	passed
	2. The experience on the APP with the AR function seems real to me.	1	1	1	1	1	1	passed
	3. The shoes on the APP with AR function are similar to reality.	1	1	1	1	1	1	passed
	4. My interactions with the virtual object on the APP with AR function seem natural to me, like those in the real world.	1	0	1	1	1	0.8	passed
	5. In my opinion, the quality of the images of the APP with AR function objects is high.	1	0	1	0	1	0.6	passed
	6. My experience with the APP with AR function is congruent with other experiences in the real world.	0	1	1	1	1	0.8	passed
Perceived Technology Fluidity	7. The APP with AR function can surf across content features that provide tips, information, and fun.	1	1	1	1	1	1	passed
	8. I can get any new content features I need on the APP with AR function.	1	1	1	1	1	1	passed
	9. I can get any information about the content features I need on the APP with AR function.	1	0	1	1	1	0.8	passed
	10. On the APP with AR function, I can get any fun content features I need.	0	1	1	0	1	0.6	passed
	11. On the APP with AR function, I can access any items I need anytime.	0	1	1	1	1	0.8	passed
	12. I can review any items I need anytime on the APP with the AR function.	0	1	1	1	1	0.8	passed
	13. I can search for any archive items I need anytime on the APP with the AR function.	1	1	1	0	1	0.8	passed
	14. I can freely flow from one subject to the next on the APP with the AR function.	1	1	1	1	1	1	passed

Attitudes	15. I am positive about the APP with AR function.	1	1	0	1	1	0.8	passed
	16. The use of the APP with an AR function is a good idea.	1	0	1	1	1	0.8	passed
	17. It just makes sense to use the APP with the AR function.	1	1	1	1	1	1	passed
	18. The APP with AR function is so interesting that I just want to learn more about it.	1	1	1	1	1	1	passed
	19. I would recommend the APP with AR function to others.	1	0	1	1	1	0.8	passed
Perceived Information Quality	20. The APP with AR function provided me with the information I expected.	1	1	1	1	1	1	passed
	21. The APP with AR function provides trustworthy and reliable information about shoes.	1	1	1	1	1	1	passed
	22. The APP with AR function provides detailed information about shoes.	1	1	1	1	1	1	passed
	23. The APP with AR function provides complete information about shoes.	1	1	1	1	1	1	passed
	24. The APP with AR function provides personalized information about shoes.	1	1	1	0	1	0.8	passed
	25. The APP with AR function provides information that helps me in my decision.	1	1	1	1	1	1	passed
Immersion	26. Shopping on the APP with the AR function made me deeply engrossed.	1	1	1	1	1	1	passed
	27. Shopping on the APP with AR function makes me absorbed.	1	1	1	1	1	1	passed
	28. Shopping on the APP with AR function focused my attention.	1	1	1	1	1	1	passed
Enjoyment	29. Shopping on the APP with AR function is enjoyable.	1	1	1	1	1	1	passed
	30. Shopping on the APP with AR function is pleasurable.	1	1	1	1	1	1	passed
	31. Shopping on the APP with an AR function is fun for its own sake.	1	1	1	1	1	1	passed
	32. Shopping on the APP with AR function is happy.	1	1	0	1	1	1	passed
	33. Shopping on the APP with AR function involves me in the shopping process.	-1	1	1	0	1	0.4	unpassed

	34. Shopping on the APP with an AR function is exciting.	0	1	1	1	1	0.8	passed
Purchase Intention	35. I intend to buy my shoes on the APP with the AR function.	1	0	1	1	1	0.8	passed
	36. The probability that I would consider buying the shoes on the APP with the AR function is very high.	1	0	1	1	1	0.8	passed
	37. If I plan to buy shoes, I would very probably buy them on the APP with AR function.	1	0	1	1	1	0.8	passed
	38. I would consider to buy the shoes on the APP with the AR function.	1	1	1	1	1	1	passed
	39. My willingness to buy shoes on APP with AR function is high.	1	1	1	1	1	1	passed

Part 2: Questions about Latent Variables (Continue)

Variables Measurement for Control Group (APP Without AR)		No. of experts					IOC	Analysis result
		1	2	3	4	5		
Perceived Augmented Realism	1. The virtual objects on the APP without the AR function seem real to me.	1	1	1	1	1	1	passed
	2. The experience on the APP without the AR function seems real to me.	1	1	1	1	1	1	passed
	3. The shoes on the APP without AR function are similar to reality.	1	1	1	1	1	1	passed
	4. My interactions with the virtual object on the APP without AR function seem natural to me, like those in the real world.	1	1	1	1	1	0.8	passed
	5. In my opinion, the quality of the images of the APP without AR function objects is high.	1	0	1	0	1	0.6	passed
	6. My experience with the APP without AR function is congruent with other experiences in the real world.	0	0	1	1	1	0.6	passed
Perceived Technology Fluidity	7. The APP without AR function can surf across content features that provide tips, information, and fun.	1	1	1	1	1	1	passed
	8. I can get any new content features I need on the APP without AR function.	1	1	1	1	1	1	passed
	9. I can get any information about the content features I need on the APP without AR function.	1	1	1	1	1	1	passed

	10. On the APP without AR function, I can get any fun content features I need.	0	1	1	0	1	0.6	passed
	11. On the APP without AR function, I can access any items I need anytime.	0	1	1	1	1	0.8	passed
	12. I can review any items I need anytime on the APP without the AR function.	0	1	1	1	1	0.8	passed
	13. I can search for any archive items I need anytime on the APP without the AR function.	1	1	1	0	1	0.8	passed
	14. I can freely flow from one subject to the next on the APP without the AR function.	1	1	1	1	1	1	passed
Attitudes	15. I am positive about the APP without AR function.	1	1	0	1	1	0.8	passed
	16. The use of the APP without an AR function is a good idea.	1	1	1	1	1	1	passed
	17. It just makes sense to use the APP without the AR function.	1	1	1	1	1	1	passed
	18. The APP without AR function is so interesting that I just want to learn more about it.	1	1	1	1	1	1	passed
	19. I would recommend the APP without AR function to others.	1	1	1	1	1	1	passed
Perceived Information Quality	20. The APP without AR function provided me with the information I expected.	1	1	1	1	1	1	passed
	21. The APP without AR function provides trustworthy and reliable information about shoes.	1	1	1	1	1	1	passed
	22. The APP without AR function provides detailed information about shoes.	1	1	1	1	1	1	passed
	23. The APP without AR function provides complete information about shoes.	1	0	1	1	1	0.8	passed
	24. The APP without AR function provides personalized information about shoes.	1		1	0	1	0.8	passed
	25. The APP without AR function provides information that helps me in my decision.	1	1	1	1	1	1	passed
Immersion	26. Shopping on the APP without the AR function made me deeply engrossed.	1	1	1	1	1	1	passed
	27. Shopping on the APP without AR function makes me absorbed.	1	1	1	1	1	1	passed
	28. Shopping on the APP without AR function focused my attention.	1	1	1	1	1	1	passed

Enjoyment	29. Shopping on the APP without AR function is enjoyable.	1	1	1	1	1	1	passed
	30. Shopping on the APP without AR function is pleasurable.	1	1	1	1	1	1	passed
	31. Shopping on the APP without an AR function is fun for its own sake.	1	1	1	1	1	1	passed
	32. Shopping on the APP without AR function is happy.	1	1	0	1	1	0.8	passed
	33. Shopping on the APP without AR function involves me in the shopping process.	-1	1	1	0	1	0.4	unpassed
	34. Shopping on the APP without an AR function is exciting.	0	1	1	1	1	0.8	passed
Purchase Intention	35. I intend to buy my shoes on the APP without the AR function.	1	1	1	1	1	1	passed
	36. The probability that I would consider buying the shoes on the APP without the AR function.	1	0	1	1	1	0.8	passed
	37. If I plan to buy shoes, I would very probably buy them on the APP without AR function.	1	0	1	1	1	0.8	passed
	38. I would consider to buy the shoes on the APP without the AR function.	1	0	1	1	1	0.8	passed
	39. My willingness to buy shoes on APP without AR function is high.	1	1	1	1	1	1	passed

APPENDIX H

Summary of Interview Answers

APPENDIX H

SUMMARY OF INTERVIEW ANSWERS

Summary of interview answers

Part 1 Respondent number and basic information		
Respondent number	Group	University
No.1-5	With AR	Guangxi University
No.6-10	Without AR	
No.11-15	With AR	Sichuan University
No.16-20	Without AR	
No.21-25	With AR	Shanghai Jiao Tong University
No.26-30	Without AR	
No.31-35	With AR	University of Science and Technology Beijing
No.36-40	Without AR	

Answers for the group with AR

Part 2 Questions about the feelings during the experiment in the group with AR.		
Questions	Respondents	Answers summary
Q1: On the APP, did you perceive the products to look realistic? (If yes), do you consider the level of realism to be high or low?	No.1-5, No.11-15, No.22-25, No.31-33 No.35	Yes, I found the products on the APP to look very realistic. The level of realism is quite high, which made it easier for me to imagine how they would appear in real life.
	No.21, No.34	I think the product on the app looks a little realistic. The level of realism is also relatively high.
Q2: When browsing products on the APP, how would you rate the system fluidity and interface?	No.1-5, No.11-14, No.21-25, No.31-33 No.35	I rate the system fluidity and interface responsiveness as very high. Navigating through the APP was smooth and quick, which enhanced my browsing experience significantly.
	No.15, No.34	I think the fluidity and interface responsiveness of the system is not very high, but it is acceptable, and the browsing experience is relatively good.

Q3: Did the realism of the product and the fluidity of the APP system affect your perception of the quality of product information and your attitude towards the product?	No.1-5, No.11-15, No.21-25, No.31-35	Yes. The realism of the products and the smooth operation of the APP system gave me confidence in the quality of the product information provided. It also positively influenced my attitude towards the products, as I felt more assured about what I was considering.
Q4: Did the realism of the product and the fluidity of the APP system affect your perception of enjoyment and immersion in the shopping process?	No.1-5, No.11-15, No.21-25, No.31-35	Yes, definitely. The realistic appearance of the products and the fluidity of the APP made the shopping experience more enjoyable and immersive. It felt almost like browsing through a physical store, which kept me engaged and interested in exploring more.
Q5: Do you think realism, system fluency, attitude, perceived information quality, enjoyment, and immersion influence your purchase intentions?	No.1-5, No.11-15, No.21-25, No.31-35	Yes, all these factors have a significant impact on my purchase intentions. When the products look realistic, the system operates smoothly, and I have a positive attitude towards the information provided, it increases my enjoyment and immersion in the shopping process. Ultimately, this influences my decision to make a purchase.
Part 3 How important are the factors to purchase intention in the group with AR		
Questions	Respondents	Answers summary
Q1: In your opinion, how important is the realism of the product perceived on the APP to purchase intention?	No.1-5, No.12-15, No.21-25, No.31-35	Very important. The realism of product images on the app plays a crucial role in purchase intention. Clear, realistic visuals give customers confidence in what they're buying.
	No.11	Not very important.
Q2: How fluid is the APP system, and how responsive is the interface when browsing	No.1-5, No.11-15, No.21-25, No.32-35	High. The app system is very fluid, and the interface is highly responsive. This enhances user experience, making browsing and shopping seamless and enjoyable
	No.34	Not very high

products on the APP? High or low?		
Q3: In your opinion, how important is the individual's attitude on the intention to purchase shoes?	No.1-5, No.11-15, No.21-25, No.31-35	Very important. A positive attitude towards the shoes greatly influences purchase intention. When customers have a favorable opinion, they are more likely to proceed with buying
Q4: In your opinion, how important is the perceived information quality on purchase intention on the APP?	No.1-5, No.11-15, No.21-25, No.31-35	Very important. High-quality, accurate information on the app significantly boosts purchase intention. Customers rely on detailed and trustworthy information to make informed decisions
Q5: In your opinion, how important is the sense of immersion during the shopping process on purchase intention?	No.2-5, No.11-15, No.21, No.23-25, No.31-35	Very important. Creating a sense of immersion in the shopping process is critical for enhancing purchase intention. It engages customers more deeply and fosters a connection with the products
	No.1, No.22,	Not very important.
Q6: In your opinion, how important is the sense of enjoyment during the shopping process on purchase intention?	No.1-5, No.11-15, No.21-25, No.31-35	Very important. Ensuring a sense of enjoyment during the shopping process is key to increasing purchase intention. When customers have a pleasant experience, they are more likely to make a purchase.

Answers for the group without AR

Part 2 Questions about the feelings during the experiment in the group without AR.		
Questions	Respondents	Answers summary
Q1: On the APP, did you perceive the products to look realistic? (If yes), do you consider the level of realism to be high or low?	No.6-10, No.16-20, No.26-30, No.36-40	Not very high. The products on the APP did not look realistic to me. The level of realism was not very high, which made it a little hard to visualize how the products would appear in real life.
Q2: When browsing products on the APP, how would you rate the	No.6-9, No.16-18, No.26-29,	I rate the system fluidity and interface responsiveness as very high. Navigating through the APP was smooth and quick, which

system fluidity and interface?	No.36-40	enhanced my browsing experience significantly.
	No.10, No.19-20, No.30	The system fluidity and interface responsiveness were low. Browsing products on the APP was frustrating due to lagging and unresponsive controls.
Q3: Did the realism of the product and the fluidity of the APP system affect your perception of the quality of product information and your attitude towards the product?	No.6-10, No.16-20, No.26-30, No.36-40	Yes, the lack of realism in the products and the poor system fluidity negatively impacted my perception of the quality of product information. It made me doubt the accuracy and reliability of the details.
Q4: Did the realism of the product and the fluidity of the APP system affect your perception of enjoyment and immersion in the shopping process?	No.6-10, No.16-20, No.26-30, No.36-40	Yes. The unrealistic product representation and the sluggish APP system greatly diminished my enjoyment and immersion in the shopping process. It felt disconnected and unengaging.
Q5: Do you think realism, system fluency, attitude, perceived information quality, enjoyment, and immersion influence your purchase intentions?	No.6-10, No.16-20, No.26-30, No.36-40	Yes. All these factors have a significant impact on my purchase intentions. If given the poor realism, system fluency, and overall experience, my purchase intentions were significantly affected. I couldn't trust the product information, and the lack of immersion made me less inclined to consider making a purchase through the APP.
Part 3 How important are the factors to purchase intention in the group with AR		
Questions	Respondents	Answers summary
Q1: In your opinion, how important is the realism of the product perceived on the APP to purchase intention?	No.6-10, No.16-20, No.26-30, No.36-40	Very important. The realism of product images on the app plays a crucial role in purchase intention. Clear, realistic visuals give customers confidence in what they're buying.

Q2: How fluid is the APP system, and how responsive is the interface when browsing products on the APP? High or low?	No.9, No.16, No.27, No.38	Not very high. The app system is not very fluid, and the interface is not highly responsive.
	No.6-8, No.10, No.26, No.28-30, No.36-37, No.39-40	High. The app system is very fluid, and the interface is highly responsive. This enhances user experience, making browsing and shopping seamless.
Q3: In your opinion, how important is the individual's attitude on the intention to purchase shoes?	No.6-10, No.16-20, No.26-30, No.36-40	Very important. A positive attitude towards the shoes greatly influences purchase intention. When customers have a favorable opinion, they are more likely to proceed with buying
Q4: In your opinion, how important is the perceived information quality on purchase intention on the APP?	No.6-10, No.16-20, No.26-30, No.36-40	Very important. High-quality, accurate information on the app significantly boosts purchase intention. Customers rely on detailed and trustworthy information to make informed decisions
Q5: In your opinion, how important is the sense of immersion during the shopping process on purchase intention?	No.20, No.26	Very important. Creating a sense of immersion in the shopping process is critical for enhancing purchase intention. It engages customers more deeply and fosters a connection with the products
	No.6-10, No.16-19, No.27-30, No.36-40	Not very important.
Q6: In your opinion, how important is the sense of enjoyment during the shopping process on purchase intention?	No.6-10, No.16-20, No.26-30, No.36-40	Very important. Ensuring a sense of enjoyment during the shopping process is key to increasing purchase intention. When customers have a pleasant experience, they are more likely to make a purchase.

APPENDIX I

CFA-group with AR

APPENDIX I

CFA-GROUP WITH AR

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
PAR1	<---	Perceived_augmented_realism	1.000				
PAR2	<---	Perceived_augmented_realism	.964	.060	16.156	***	
PAR3	<---	Perceived_augmented_realism	.949	.059	16.067	***	
PAR4	<---	Perceived_augmented_realism	.954	.059	16.236	***	
PAR5	<---	Perceived_augmented_realism	1.008	.062	16.197	***	
PAR6	<---	Perceived_augmented_realism	.939	.059	15.930	***	
PTF1	<---	Perceived_technology_fluidity	1.000				
PTF2	<---	Perceived_technology_fluidity	1.006	.054	18.527	***	
PTF3	<---	Perceived_technology_fluidity	.915	.052	17.471	***	
PTF4	<---	Perceived_technology_fluidity	.891	.051	17.374	***	
A1	<---	Attitudes	1.000				
A2	<---	Attitudes	1.017	.062	16.353	***	
A3	<---	Attitudes	1.048	.061	17.260	***	
A4	<---	Attitudes	.959	.062	15.492	***	
A5	<---	Attitudes	1.024	.063	16.282	***	
PIQ1	<---	Perceived_information_quality	1.000				
PIQ2	<---	Perceived_information_quality	1.000	.061	16.354	***	
PIQ3	<---	Perceived_information_quality	.996	.062	16.035	***	
PIQ4	<---	Perceived_information_quality	1.050	.064	16.404	***	
PIQ5	<---	Perceived_information_quality	.993	.064	15.546	***	
PIQ6	<---	Perceived_information_quality	.960	.062	15.603	***	
I1	<---	Immersion	1.000				
I2	<---	Immersion	.997	.070	14.188	***	
I3	<---	Immersion	1.059	.072	14.722	***	
E1	<---	Enjoyment	1.000				
E2	<---	Enjoyment	1.014	.071	14.204	***	
E3	<---	Enjoyment	1.084	.073	14.864	***	
E4	<---	Enjoyment	1.137	.074	15.463	***	
E5	<---	Enjoyment	1.020	.069	14.736	***	
PI1	<---	Purchase_intention	1.000				
PI2	<---	Purchase_intention	1.021	.068	15.092	***	
PI3	<---	Purchase_intention	1.062	.068	15.632	***	

			Estimate	S.E.	C.R.	P	Label
PI4	<---	Purchase_intention	1.106	.068	16.170	***	
PI5	<---	Purchase_intention	1.086	.070	15.489	***	
PTF5	<---	Perceived_technology_fluidity	.996	.053	18.732	***	
PTF6	<---	Perceived_technology_fluidity	.928	.053	17.403	***	
PTF7	<---	Perceived_technology_fluidity	.922	.052	17.846	***	
PTF8	<---	Perceived_technology_fluidity	.899	.052	17.426	***	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
PAR1	<---	Perceived_augmented_realism	.779
PAR2	<---	Perceived_augmented_realism	.773
PAR3	<---	Perceived_augmented_realism	.770
PAR4	<---	Perceived_augmented_realism	.776
PAR5	<---	Perceived_augmented_realism	.775
PAR6	<---	Perceived_augmented_realism	.764
PTF1	<---	Perceived_technology_fluidity	.815
PTF2	<---	Perceived_technology_fluidity	.804
PTF3	<---	Perceived_technology_fluidity	.771
PTF4	<---	Perceived_technology_fluidity	.767
A1	<---	Attitudes	.779
A2	<---	Attitudes	.786
A3	<---	Attitudes	.824
A4	<---	Attitudes	.751
A5	<---	Attitudes	.783
PIQ1	<---	Perceived_information_quality	.770
PIQ2	<---	Perceived_information_quality	.790
PIQ3	<---	Perceived_information_quality	.777
PIQ4	<---	Perceived_information_quality	.792
PIQ5	<---	Perceived_information_quality	.756
PIQ6	<---	Perceived_information_quality	.759
I1	<---	Immersion	.773
I2	<---	Immersion	.763
I3	<---	Immersion	.818
E1	<---	Enjoyment	.738
E2	<---	Enjoyment	.741
E3	<---	Enjoyment	.775
E4	<---	Enjoyment	.807

			Estimate
E5	<---	Enjoyment	.769
PI1	<---	Purchase_intention	.757
PI2	<---	Purchase_intention	.759
PI3	<---	Purchase_intention	.784
PI4	<---	Purchase_intention	.809
PI5	<---	Purchase_intention	.777
PTF5	<---	Perceived_technology_fluidity	.810
PTF6	<---	Perceived_technology_fluidity	.768
PTF7	<---	Perceived_technology_fluidity	.783
PTF8	<---	Perceived_technology_fluidity	.769

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Perceived_augmented_realism	<-->	Perceived_technology_fluidity	.653	.101	6.450	***	
Perceived_augmented_realism	<-->	Attitudes	.764	.102	7.490	***	
Perceived_augmented_realism	<-->	Perceived_information_quality	.541	.094	5.770	***	
Perceived_augmented_realism	<-->	Immersion	.549	.097	5.658	***	
Perceived_augmented_realism	<-->	Enjoyment	.533	.088	6.044	***	
Perceived_augmented_realism	<-->	Purchase_intention	.599	.093	6.465	***	
Enjoyment	<-->	Purchase_intention	.522	.085	6.132	***	
Immersion	<-->	Purchase_intention	.543	.094	5.796	***	
Perceived_information_quality	<-->	Purchase_intention	.558	.091	6.115	***	
Attitudes	<-->	Purchase_intention	.636	.094	6.756	***	
Perceived_technology_fluidity	<-->	Purchase_intention	.669	.099	6.768	***	
Immersion	<-->	Enjoyment	.476	.089	5.344	***	
Perceived_information_quality	<-->	Enjoyment	.493	.087	5.672	***	
Attitudes	<-->	Enjoyment	.557	.089	6.245	***	
Perceived_technology_fluidity	<-->	Enjoyment	.571	.093	6.126	***	
Perceived_information_quality	<-->	Immersion	.552	.097	5.677	***	

			Estimate	S.E.	C.R.	P	Label
Attitudes	<-->	Immersion	.616	.099	6.198	***	
Perceived_technology_fluidity	<-->	Immersion	.527	.101	5.229	***	
Attitudes	<-->	Perceived_information_quality	.634	.097	6.534	***	
Perceived_technology_fluidity	<-->	Perceived_information_quality	.710	.103	6.864	***	
Perceived_technology_fluidity	<-->	Attitudes	.745	.105	7.129	***	

Correlations: (Group number 1 - Default model)

			Estimate
Perceived_augmented_realism	<-->	Perceived_technology_fluidity	.400
Perceived_augmented_realism	<-->	Attitudes	.506
Perceived_augmented_realism	<-->	Perceived_information_quality	.357
Perceived_augmented_realism	<-->	Immersion	.363
Perceived_augmented_realism	<-->	Enjoyment	.387
Perceived_augmented_realism	<-->	Purchase_intention	.418
Enjoyment	<-->	Purchase_intention	.400
Immersion	<-->	Purchase_intention	.380
Perceived_information_quality	<-->	Purchase_intention	.389
Attitudes	<-->	Purchase_intention	.445
Perceived_technology_fluidity	<-->	Purchase_intention	.432
Immersion	<-->	Enjoyment	.346
Perceived_information_quality	<-->	Enjoyment	.357
Attitudes	<-->	Enjoyment	.405
Perceived_technology_fluidity	<-->	Enjoyment	.384
Perceived_information_quality	<-->	Immersion	.366
Attitudes	<-->	Immersion	.409
Perceived_technology_fluidity	<-->	Immersion	.323
Attitudes	<-->	Perceived_information_quality	.420
Perceived_technology_fluidity	<-->	Perceived_information_quality	.435
Perceived_technology_fluidity	<-->	Attitudes	.458

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	97	736.385	644	.007	1.143

Model	NPAR	CMIN	DF	P	CMIN/DF
Saturated model	741	.000	0		
Independence model	38	9316.922	703	.000	13.253

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.081	.914	.901	.794
Saturated model	.000	1.000		
Independence model	.771	.210	.168	.199

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.921	.914	.989	.988	.989
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.916	.844	.906
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	92.385	29.542	163.520
Saturated model	.000	.000	.000
Independence model	8613.922	8305.666	8928.625

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.846	.232	.074	.410
Saturated model	.000	.000	.000	.000
Independence model	23.351	21.589	20.816	22.378

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.019	.011	.025	1.000

Model	RMSEA	LO 90	HI 90	PCLOSE
Independence model	.175	.172	.178	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	930.385	951.402	1317.557	1414.557
Saturated model	1482.000	1642.550	4439.675	5180.675
Independence model	9392.922	9401.156	9544.598	9582.598

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.332	2.174	2.510	2.384
Saturated model	3.714	3.714	3.714	4.117
Independence model	23.541	22.769	24.330	23.562

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	382	396
Independence model	33	34

Execution time summary

Minimization: .021

Miscellaneous: .329

Bootstrap: .000

Total: .350

APPENDIX J

CFA-group without AR

APPENDIX J

CFA-GROUP WITHOUT AR

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
PAR1	<---	Perceived_augmented_realism	1.000				
PAR2	<---	Perceived_augmented_realism	.893	.077	11.521	***	
PAR3	<---	Perceived_augmented_realism	1.007	.083	12.082	***	
PAR4	<---	Perceived_augmented_realism	.991	.081	12.194	***	
PAR5	<---	Perceived_augmented_realism	1.078	.085	12.713	***	
PAR6	<---	Perceived_augmented_realism	.975	.079	12.358	***	
PTF1	<---	Perceived_technology_fluidity	1.000				
PTF2	<---	Perceived_technology_fluidity	.970	.081	11.978	***	
PTF3	<---	Perceived_technology_fluidity	.985	.082	12.012	***	
PTF4	<---	Perceived_technology_fluidity	1.010	.082	12.382	***	
A1	<---	Attitudes	1.000				
A2	<---	Attitudes	1.027	.068	15.180	***	
A3	<---	Attitudes	1.031	.068	15.047	***	
A4	<---	Attitudes	.960	.064	14.953	***	
A5	<---	Attitudes	.968	.067	14.525	***	
PIQ1	<---	Perceived_information_quality	1.000				
PIQ2	<---	Perceived_information_quality	1.083	.085	12.776	***	
PIQ3	<---	Perceived_information_quality	1.042	.085	12.244	***	
PIQ4	<---	Perceived_information_quality	1.082	.086	12.601	***	
PIQ5	<---	Perceived_information_quality	1.010	.083	12.106	***	
PIQ6	<---	Perceived_information_quality	1.022	.084	12.211	***	
I1	<---	Immersion	1.000				
I2	<---	Immersion	.964	.079	12.217	***	
I3	<---	Immersion	1.041	.082	12.622	***	
E1	<---	Enjoyment	1.000				
E2	<---	Enjoyment	.932	.059	15.751	***	
E3	<---	Enjoyment	1.013	.060	16.904	***	
E4	<---	Enjoyment	.912	.059	15.410	***	
E5	<---	Enjoyment	.854	.056	15.301	***	
PI1	<---	Purchase_intention	1.000				
PI2	<---	Purchase_intention	1.086	.078	13.925	***	
PI3	<---	Purchase_intention	1.028	.074	13.840	***	

			Estimate	S.E.	C.R.	P	Label
PI4	<---	Purchase_intention	1.045	.076	13.753	***	
PI5	<---	Purchase_intention	1.084	.078	13.978	***	
PTF5	<---	Perceived_technology_fluidity	.920	.080	11.456	***	
PTF6	<---	Perceived_technology_fluidity	.971	.080	12.112	***	
PTF7	<---	Perceived_technology_fluidity	.959	.080	11.924	***	
PTF8	<---	Perceived_technology_fluidity	1.087	.086	12.704	***	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
PAR1	<---	Perceived_augmented_realism	.699
PAR2	<---	Perceived_augmented_realism	.649
PAR3	<---	Perceived_augmented_realism	.684
PAR4	<---	Perceived_augmented_realism	.691
PAR5	<---	Perceived_augmented_realism	.725
PAR6	<---	Perceived_augmented_realism	.702
PTF1	<---	Perceived_technology_fluidity	.665
PTF2	<---	Perceived_technology_fluidity	.686
PTF3	<---	Perceived_technology_fluidity	.689
PTF4	<---	Perceived_technology_fluidity	.714
A1	<---	Attitudes	.766
A2	<---	Attitudes	.768
A3	<---	Attitudes	.761
A4	<---	Attitudes	.757
A5	<---	Attitudes	.737
PIQ1	<---	Perceived_information_quality	.701
PIQ2	<---	Perceived_information_quality	.723
PIQ3	<---	Perceived_information_quality	.689
PIQ4	<---	Perceived_information_quality	.711
PIQ5	<---	Perceived_information_quality	.680
PIQ6	<---	Perceived_information_quality	.687
I1	<---	Immersion	.757
I2	<---	Immersion	.711
I3	<---	Immersion	.789
E1	<---	Enjoyment	.806
E2	<---	Enjoyment	.750
E3	<---	Enjoyment	.796
E4	<---	Enjoyment	.737

			Estimate
E5	<---	Enjoyment	.732
PI1	<---	Purchase_intention	.723
PI2	<---	Purchase_intention	.756
PI3	<---	Purchase_intention	.751
PI4	<---	Purchase_intention	.746
PI5	<---	Purchase_intention	.759
PTF5	<---	Perceived_technology_fluidity	.652
PTF6	<---	Perceived_technology_fluidity	.695
PTF7	<---	Perceived_technology_fluidity	.683
PTF8	<---	Perceived_technology_fluidity	.736

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Perceived_augmented_realism	<-->	Perceived_technology_fluidity	.268	.075	3.593	***	
Perceived_augmented_realism	<-->	Attitudes	.443	.088	5.040	***	
Perceived_augmented_realism	<-->	Perceived_information_quality	.305	.076	4.007	***	
Perceived_augmented_realism	<-->	Immersion	.158	.081	1.934	.053	
Perceived_augmented_realism	<-->	Enjoyment	.359	.090	3.998	***	
Perceived_augmented_realism	<-->	Purchase_intention	.313	.078	3.995	***	
Enjoyment	<-->	Purchase_intention	.490	.094	5.210	***	
Immersion	<-->	Purchase_intention	.284	.085	3.359	***	
Perceived_information_quality	<-->	Purchase_intention	.276	.076	3.633	***	
Attitudes	<-->	Purchase_intention	.422	.088	4.814	***	
Perceived_technology_fluidity	<-->	Purchase_intention	.316	.077	4.119	***	
Immersion	<-->	Enjoyment	.444	.100	4.444	***	
Perceived_information_quality	<-->	Enjoyment	.346	.088	3.946	***	
Attitudes	<-->	Enjoyment	.449	.099	4.539	***	
Perceived_technology_fluidity	<-->	Enjoyment	.256	.085	3.005	.003	
Perceived_information_quality	<-->	Immersion	.289	.083	3.506	***	

			Estimate	S.E.	C.R.	P	Label
Attitudes	<-->	Immersion	.342	.092	3.703	***	
Perceived_technology_fluidity	<-->	Immersion	.207	.080	2.585	.010	
Attitudes	<-->	Perceived_information_quality	.322	.083	3.891	***	
Perceived_technology_fluidity	<-->	Perceived_information_quality	.300	.074	4.035	***	
Perceived_technology_fluidity	<-->	Attitudes	.336	.083	4.073	***	

Correlations: (Group number 1 - Default model)

			Estimate
Perceived_augmented_realism	<-->	Perceived_technology_fluidity	.220
Perceived_augmented_realism	<-->	Attitudes	.323
Perceived_augmented_realism	<-->	Perceived_information_quality	.252
Perceived_augmented_realism	<-->	Immersion	.119
Perceived_augmented_realism	<-->	Enjoyment	.244
Perceived_augmented_realism	<-->	Purchase_intention	.249
Enjoyment	<-->	Purchase_intention	.327
Immersion	<-->	Purchase_intention	.210
Perceived_information_quality	<-->	Purchase_intention	.223
Attitudes	<-->	Purchase_intention	.301
Perceived_technology_fluidity	<-->	Purchase_intention	.254
Immersion	<-->	Enjoyment	.282
Perceived_information_quality	<-->	Enjoyment	.240
Attitudes	<-->	Enjoyment	.275
Perceived_technology_fluidity	<-->	Enjoyment	.176
Perceived_information_quality	<-->	Immersion	.222
Attitudes	<-->	Immersion	.232
Perceived_technology_fluidity	<-->	Immersion	.158
Attitudes	<-->	Perceived_information_quality	.238
Perceived_technology_fluidity	<-->	Perceived_information_quality	.251
Perceived_technology_fluidity	<-->	Attitudes	.248

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	97	788.776	644	.000	1.225
Saturated model	741	.000	0		
Independence model	38	6969.346	703	.000	9.914

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.095	.897	.881	.780
Saturated model	.000	1.000		
Independence model	.562	.349	.314	.331

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.887	.876	.977	.975	.977
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.916	.812	.895
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	144.776	77.773	219.969
Saturated model	.000	.000	.000
Independence model	6266.346	6001.990	6537.205

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.967	.361	.194	.549
Saturated model	.000	.000	.000	.000

Model	FMIN	F0	LO 90	HI 90
Independence model	17.380	15.627	14.968	16.302

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.024	.017	.029	1.000
Independence model	.149	.146	.152	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	982.776	1003.677	1370.432	1467.432
Saturated model	1482.000	1641.663	4443.371	5184.371
Independence model	7045.346	7053.533	7197.211	7235.211

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.451	2.284	2.638	2.503
Saturated model	3.696	3.696	3.696	4.094
Independence model	17.569	16.910	18.245	17.590

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	358	372
Independence model	45	46

APPENDIX K

Structural Model Analysis-Group With AR

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	90	842.980	651	.000	1.295
Saturated model	741	.000	0		
Independence model	38	9316.922	703	.000	13.253

Model	RMR	GFI	AGFI	PGFI
Default model	.245	.904	.890	.794
Saturated model	.000	1.000		
Independence model	.771	.210	.168	.199

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.910	.902	.978	.976	.978
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Model	PRATIO	PNFI	PCFI
Default model	.926	.842	.905
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

Model	NCP	LO 90	HI 90
Default model	191.980	121.179	270.900
Saturated model	.000	.000	.000
Independence model	8613.922	8305.666	8928.625

Model	FMIN	F0	LO 90	HI 90
Default model	2.113	.481	.304	.679
Saturated model	.000	.000	.000	.000
Independence model	23.351	21.589	20.816	22.378

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.027	.022	.032	1.000
Independence model	.175	.172	.178	.000

Model	AIC	BCC	BIC	CAIC
Default model	1022.980	1042.480	1382.212	1472.212
Saturated model	1482.000	1642.550	4439.675	5180.675

Model	AIC	BCC	BIC	CAIC
Independence model	9392.922	9401.156	9544.598	9582.598

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.564	2.386	2.762	2.613
Saturated model	3.714	3.714	3.714	4.117
Independence model	23.541	22.769	24.330	23.562

Model	HOELTER .05	HOELTER .01
Default model	337	350
Independence model	33	34

			Estimate	S.E.	C.R.	P	Label
Immersion	<---	Perceived_augmented_realism	.289	.056	5.156	***	
Immersion	<---	Perceived_technology_fluidity	.233	.056	4.159	***	
Perceived_information_quality	<---	Perceived_augmented_realism	.225	.049	4.569	***	
Enjoyment	<---	Perceived_augmented_realism	.215	.051	4.213	***	
Perceived_information_quality	<---	Perceived_technology_fluidity	.354	.053	6.718	***	
Enjoyment	<---	Perceived_technology_fluidity	.235	.051	4.614	***	
Enjoyment	<---	Immersion	.176	.056	3.150	.002	
Attitudes	<---	Perceived_augmented_realism	.314	.054	5.855	***	
Attitudes	<---	Perceived_technology_fluidity	.230	.055	4.173	***	
Attitudes	<---	Perceived_information_quality	.165	.057	2.907	.004	
Attitudes	<---	Enjoyment	.156	.059	2.663	.008	
Purchase_intention	<---	Enjoyment	.233	.058	4.018	***	
Purchase_intention	<---	Attitudes	.265	.059	4.508	***	
Purchase_intention	<---	Perceived_information_quality	.199	.055	3.601	***	
PAR4	<---	Perceived_augmented_realism	.946	.058	16.179	***	
PAR3	<---	Perceived_augmented_realism	.943	.059	16.049	***	
PAR2	<---	Perceived_augmented_realism	.959	.059	16.155	***	

			Estimate	S.E.	C.R.	P	Label
PAR1	<---	Perceived_augmented_realism	1.000				
PTF8	<---	Perceived_technology_fluidity	1.000				
PTF7	<---	Perceived_technology_fluidity	1.020	.061	16.597	***	
PTF6	<---	Perceived_technology_fluidity	1.029	.063	16.273	***	
PTF5	<---	Perceived_technology_fluidity	1.104	.064	17.333	***	
PTF4	<---	Perceived_technology_fluidity	.986	.061	16.208	***	
PTF3	<---	Perceived_technology_fluidity	1.014	.062	16.323	***	
PTF2	<---	Perceived_technology_fluidity	1.114	.065	17.162	***	
PTF1	<---	Perceived_technology_fluidity	1.111	.063	17.512	***	
I1	<---	Immersion	1.000				
I2	<---	Immersion	.990	.073	13.627	***	
I3	<---	Immersion	1.058	.075	14.067	***	
E5	<---	Enjoyment	1.000				
E4	<---	Enjoyment	1.116	.071	15.644	***	
E3	<---	Enjoyment	1.065	.071	14.992	***	
E2	<---	Enjoyment	.997	.070	14.280	***	
E1	<---	Enjoyment	.983	.069	14.216	***	
PI1	<---	Purchase_intention	1.000				
PI2	<---	Purchase_intention	1.022	.070	14.582	***	
PI3	<---	Purchase_intention	1.069	.070	15.184	***	
PI4	<---	Purchase_intention	1.108	.071	15.620	***	
PI5	<---	Purchase_intention	1.089	.073	14.992	***	
PIQ6	<---	Perceived_information_quality	1.000				
PIQ5	<---	Perceived_information_quality	1.036	.070	14.796	***	
PIQ4	<---	Perceived_information_quality	1.094	.070	15.558	***	
PIQ3	<---	Perceived_information_quality	1.041	.068	15.267	***	

			Estimate	S.E.	C.R.	P	Label
PIQ2	<---	Perceived_information_quality	1.039	.067	15.460	***	
PIQ1	<---	Perceived_information_quality	1.040	.069	15.038	***	
PAR5	<---	Perceived_augmented_realism	1.006	.062	16.264	***	
PAR6	<---	Perceived_augmented_realism	.937	.059	15.994	***	
A1	<---	Attitudes	1.000				
A2	<---	Attitudes	1.017	.066	15.433	***	
A3	<---	Attitudes	1.049	.064	16.283	***	
A4	<---	Attitudes	.958	.066	14.600	***	
A5	<---	Attitudes	1.027	.067	15.410	***	

			Estimate
Immersion	<---	Perceived_augmented_realism	.297
Immersion	<---	Perceived_technology_fluidity	.232
Perceived_information_quality	<---	Perceived_augmented_realism	.243
Enjoyment	<---	Perceived_augmented_realism	.239
Perceived_information_quality	<---	Perceived_technology_fluidity	.369
Enjoyment	<---	Perceived_technology_fluidity	.253
Enjoyment	<---	Immersion	.191
Attitudes	<---	Perceived_augmented_realism	.332
Attitudes	<---	Perceived_technology_fluidity	.236
Attitudes	<---	Perceived_information_quality	.162
Attitudes	<---	Enjoyment	.148
Purchase_intention	<---	Enjoyment	.228
Purchase_intention	<---	Attitudes	.273
Purchase_intention	<---	Perceived_information_quality	.201
PAR4	<---	Perceived_augmented_realism	.773
PAR3	<---	Perceived_augmented_realism	.767
PAR2	<---	Perceived_augmented_realism	.772
PAR1	<---	Perceived_augmented_realism	.782
PTF8	<---	Perceived_technology_fluidity	.771
PTF7	<---	Perceived_technology_fluidity	.781
PTF6	<---	Perceived_technology_fluidity	.768
PTF5	<---	Perceived_technology_fluidity	.809
PTF4	<---	Perceived_technology_fluidity	.766

			Estimate
PTF3	<---	Perceived_technology_fluidity	.770
PTF2	<---	Perceived_technology_fluidity	.803
PTF1	<---	Perceived_technology_fluidity	.816
I1	<---	Immersion	.767
I2	<---	Immersion	.752
I3	<---	Immersion	.813
E5	<---	Enjoyment	.758
E4	<---	Enjoyment	.799
E3	<---	Enjoyment	.766
E2	<---	Enjoyment	.731
E1	<---	Enjoyment	.728
PI1	<---	Purchase_intention	.748
PI2	<---	Purchase_intention	.749
PI3	<---	Purchase_intention	.779
PI4	<---	Purchase_intention	.802
PI5	<---	Purchase_intention	.770
PIQ6	<---	Perceived_information_quality	.749
PIQ5	<---	Perceived_information_quality	.748
PIQ4	<---	Perceived_information_quality	.784
PIQ3	<---	Perceived_information_quality	.770
PIQ2	<---	Perceived_information_quality	.779
PIQ1	<---	Perceived_information_quality	.759
PAR5	<---	Perceived_augmented_realism	.776
PAR6	<---	Perceived_augmented_realism	.765
A1	<---	Attitudes	.763
A2	<---	Attitudes	.771
A3	<---	Attitudes	.811
A4	<---	Attitudes	.733
A5	<---	Attitudes	.770

APPENDIX L

Structural Model Analysis-Group Without AR

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	90	832.227	651	.000	1.278
Saturated model	741	.000	0		
Independence model	38	6969.346	703	.000	9.914

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.148	.892	.878	.784
Saturated model	.000	1.000		
Independence model	.562	.349	.314	.331

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.881	.871	.971	.969	.971
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.926	.815	.899
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	181.227	111.216	259.373
Saturated model	.000	.000	.000
Independence model	6266.346	6001.990	6537.205

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.075	.452	.277	.647
Saturated model	.000	.000	.000	.000
Independence model	17.380	15.627	14.968	16.302

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.026	.021	.032	1.000
Independence model	.149	.146	.152	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	1012.227	1031.620	1371.908	1461.908
Saturated model	1482.000	1641.663	4443.371	5184.371
Independence model	7045.346	7053.533	7197.211	7235.211

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.524	2.350	2.719	2.573
Saturated model	3.696	3.696	3.696	4.094
Independence model	17.569	16.910	18.245	17.590

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	343	356
Independence model	45	46

Estimates (Group number 1 - Default model)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Immersion	<---	Perceived_augmented_realism	.108	.064	1.686	.092	
Immersion	<---	Perceived_technology_fluidity	.145	.059	2.463	.014	
Perceived_information_quality	<---	Perceived_augmented_realism	.220	.059	3.725	***	
Enjoyment	<---	Perceived_augmented_realism	.203	.058	3.513	***	
Perceived_information_quality	<---	Perceived_technology_fluidity	.203	.054	3.784	***	
Enjoyment	<---	Perceived_technology_fluidity	.101	.052	1.946	.052	
Enjoyment	<---	Immersion	.232	.057	4.054	***	

			Estimate	S.E.	C.R.	P	Label
Attitudes	<---	Perceived_augmented_realism	.253	.066	3.831	***	
Attitudes	<---	Perceived_technology_fluidity	.159	.058	2.745	.006	
Attitudes	<---	Perceived_information_quality	.113	.064	1.762	.078	
Attitudes	<---	Enjoyment	.188	.062	3.027	.002	
Purchase_intention	<---	Enjoyment	.250	.059	4.240	***	
Purchase_intention	<---	Attitudes	.193	.055	3.516	***	
Purchase_intention	<---	Perceived_information_quality	.126	.058	2.188	.029	
PAR4	<---	Perceived_augmented_realism	.990	.081	12.218	***	
PAR3	<---	Perceived_augmented_realism	1.000	.083	12.039	***	
PAR2	<---	Perceived_augmented_realism	.890	.077	11.527	***	
PAR1	<---	Perceived_augmented_realism	1.000				
PTF8	<---	Perceived_technology_fluidity	1.000				
PTF7	<---	Perceived_technology_fluidity	.881	.068	13.024	***	
PTF6	<---	Perceived_technology_fluidity	.893	.067	13.292	***	
PTF5	<---	Perceived_technology_fluidity	.848	.068	12.462	***	
PTF4	<---	Perceived_technology_fluidity	.929	.068	13.653	***	
PTF3	<---	Perceived_technology_fluidity	.905	.069	13.137	***	
PTF2	<---	Perceived_technology_fluidity	.892	.068	13.112	***	
PTF1	<---	Perceived_technology_fluidity	.920	.072	12.699	***	
I1	<---	Immersion	1.000				
I2	<---	Immersion	.974	.080	12.111	***	
I3	<---	Immersion	1.055	.085	12.435	***	
E5	<---	Enjoyment	1.000				
E4	<---	Enjoyment	1.070	.077	13.929	***	

			Estimat e	S.E.	C.R.	P	Labe l
E3	<---	Enjoyment	1.186	.07 9	14.99 1	***	
E2	<---	Enjoyment	1.093	.07 7	14.17 3	***	
E1	<---	Enjoyment	1.171	.07 7	15.16 7	***	
PI1	<---	Purchase_intention	1.000				
PI2	<---	Purchase_intention	1.084	.07 8	13.81 3	***	
PI3	<---	Purchase_intention	1.025	.07 5	13.70 7	***	
PI4	<---	Purchase_intention	1.042	.07 6	13.63 0	***	
PI5	<---	Purchase_intention	1.084	.07 8	13.89 3	***	
PIQ6	<---	Perceived_information_qualit y	1.000				
PIQ5	<---	Perceived_information_qualit y	.985	.08 4	11.77 1	***	
PIQ4	<---	Perceived_information_qualit y	1.053	.08 6	12.21 5	***	
PIQ3	<---	Perceived_information_qualit y	1.019	.08 5	11.93 1	***	
PIQ2	<---	Perceived_information_qualit y	1.058	.08 5	12.41 8	***	
PIQ1	<---	Perceived_information_qualit y	.978	.08 1	12.10 7	***	
PAR5	<---	Perceived_augmented_realis m	1.077	.08 5	12.73 7	***	
PAR6	<---	Perceived_augmented_realis m	.971	.07 9	12.34 5	***	
A1	<---	Attitudes	1.000				
A2	<---	Attitudes	1.027	.06 9	14.90 8	***	
A3	<---	Attitudes	1.034	.07 0	14.82 3	***	
A4	<---	Attitudes	.962	.06 5	14.71 7	***	
A5	<---	Attitudes	.971	.06 8	14.30 8	***	

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Immersion	<---	Perceived_augmented_realism	.102
Immersion	<---	Perceived_technology_fluidity	.147
Perceived_information_quality	<---	Perceived_augmented_realism	.220

			Estimate
Enjoyment	<---	Perceived_augmented_realism	.201
Perceived_information_quality	<---	Perceived_technology_fluidity	.219
Enjoyment	<---	Perceived_technology_fluidity	.108
Enjoyment	<---	Immersion	.245
Attitudes	<---	Perceived_augmented_realism	.231
Attitudes	<---	Perceived_technology_fluidity	.156
Attitudes	<---	Perceived_information_quality	.103
Attitudes	<---	Enjoyment	.173
Purchase_intention	<---	Enjoyment	.248
Purchase_intention	<---	Attitudes	.208
Purchase_intention	<---	Perceived_information_quality	.124
PAR4	<---	Perceived_augmented_realism	.692
PAR3	<---	Perceived_augmented_realism	.680
PAR2	<---	Perceived_augmented_realism	.648
PAR1	<---	Perceived_augmented_realism	.700
PTF8	<---	Perceived_technology_fluidity	.736
PTF7	<---	Perceived_technology_fluidity	.682
PTF6	<---	Perceived_technology_fluidity	.695
PTF5	<---	Perceived_technology_fluidity	.653
PTF4	<---	Perceived_technology_fluidity	.714
PTF3	<---	Perceived_technology_fluidity	.687
PTF2	<---	Perceived_technology_fluidity	.686
PTF1	<---	Perceived_technology_fluidity	.665
I1	<---	Immersion	.750
I2	<---	Immersion	.712
I3	<---	Immersion	.793
E5	<---	Enjoyment	.730
E4	<---	Enjoyment	.736
E3	<---	Enjoyment	.794
E2	<---	Enjoyment	.749
E1	<---	Enjoyment	.804
PI1	<---	Purchase_intention	.722
PI2	<---	Purchase_intention	.753
PI3	<---	Purchase_intention	.747
PI4	<---	Purchase_intention	.742
PI5	<---	Purchase_intention	.758
PIQ6	<---	Perceived_information_quality	.685
PIQ5	<---	Perceived_information_quality	.676

			Estimate
PIQ4	<---	Perceived_information_quality	.706
PIQ3	<---	Perceived_information_quality	.687
PIQ2	<---	Perceived_information_quality	.720
PIQ1	<---	Perceived_information_quality	.699
PAR5	<---	Perceived_augmented_realism	.726
PAR6	<---	Perceived_augmented_realism	.700
A1	<---	Attitudes	.760
A2	<---	Attitudes	.763
A3	<---	Attitudes	.759
A4	<---	Attitudes	.753
A5	<---	Attitudes	.733

APPENDIX M

The Mediating Effect

APPENDIX M

THE MEDIATING EFFECT

The mediating effect of the group with AR

Variable		Perceived augmented realism	Perceived technology fluidity	Attitudes	Perceived information quality	Immersion	Enjoyment	Purchase intention
Standardization total effect	Immersion	0.232	0.297	0	0	0	0	0
	Perceived technology fluidity	0.369	0.243	0	0	0	0	0
	Enjoyment	0.298	0.296	0.191	0	0	0	0
	Attitudes	0.34	0.415	0.028	0.162	0.148	0	0
	Purchase intention	0.235	0.23	0.051	0.246	0.268	0.273	0
Standardization direct effect	Immersion	0.232	0.297	0	0	0	0	0
	Perceived technology fluidity	0.369	0.243	0	0	0	0	0
	Enjoyment	0.253	0.239	0.191	0	0	0	0
	Attitudes	0.236	0.332	0	0.162	0.148	0	0
	Purchase intention	0	0	0	0.201	0.228	0.273	0
Indirect effects of standardization	Immersion	0	0	0	0	0	0	0
	Perceived technology fluidity	0	0	0	0	0	0	0
	Enjoyment	0.044	0.057	0	0	0	0	0
	Attitudes	0.104	0.083	0.028	0	0	0	0
	Purchase intention	0.235	0.23	0.051	0.044	0.041	0	0

The mediating effect of the group without AR

Variable		Perceived augmented realism	Perceived technology fluidity	Attitudes	Perceived information quality	Immersion	Enjoyment	Purchase intention
Standardization total effect	Immersion	0.232	0.297	0	0	0	0	0
	Perceived technology fluidity	0.369	0.243	0	0	0	0	0
	Enjoyment	0.298	0.296	0.191	0	0	0	0
	Attitudes	0.34	0.415	0.028	0.162	0.148	0	0
	Purchase intention	0.235	0.23	0.051	0.246	0.268	0.273	0
Standardization direct effect	Immersion	0.232	0.297	0	0	0	0	0
	Perceived technology fluidity	0.369	0.243	0	0	0	0	0
	Enjoyment	0.253	0.239	0.191	0	0	0	0
	Attitudes	0.236	0.332	0	0.162	0.148	0	0
	Purchase intention	0	0	0	0.201	0.228	0.273	0
Indirect effects of standardization	Immersion	0	0	0	0	0	0	0
	Perceived technology fluidity	0	0	0	0	0	0	0
	Enjoyment	0.044	0.057	0	0	0	0	0
	Attitudes	0.104	0.083	0.028	0	0	0	0
	Purchase intention	0.235	0.23	0.051	0.044	0.041	0	0

APPENDIX N

Multi-group SEM Analysis

APPENDIX N
MULTI-GROUP SEM ANALYSIS

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Unconstrained	180	1675.208	1302	.000	1.287
Measurement weights	149	1699.169	1333	.000	1.275
Structural weights	135	1715.937	1347	.000	1.274
Structural covariances	133	1726.460	1349	.000	1.280
Structural residuals	128	1736.422	1354	.000	1.282
Measurement residuals	166	1693.009	1316	.000	1.286
Saturated model	1482	.000	0		
Independence model	76	16286.283	1406	.000	11.583

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Unconstrained	.202	.904	.89	.789
Measurement weights	.204	.902	.891	.807
Structural weights	.220	.901	.891	.814
Structural covariances	.241	.901	.891	.814
Structural residuals	.239	0.9	.891	.817
Measurement residuals	.218	.896	.889	.797
Saturated model	.000	1.000		
Independence model	.674	.263	.223	.249

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Unconstrained	.906	.898	.979	.977	.978
Measurement weights	.904	.899	.979	.977	.979
Structural weights	.904	.899	.979	.978	.979
Structural covariances	.903	.899	.979	.978	.979
Structural residuals	.903	.899	.979	.978	.978
Measurement residuals	.899	.898	.976	.976	.976
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Unconstrained	.926	.831	.903
Measurement weights	.948	.849	.925
Structural weights	.958	.857	.934
Structural covariances	.959	.858	.935
Structural residuals	.963	.860	.938
Measurement residuals	.936	.839	.912
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Unconstrained	373.208	271.962	482.570
Measurement weights	366.169	264.496	475.971
Structural weights	368.937	266.764	479.238
Structural covariances	377.460	274.802	488.242
Structural residuals	382.422	279.382	493.580
Measurement residuals	377.009	275.211	486.925
Saturated model	.000	.000	.000
Independence model	14880.283	14472.861	15294.175

FMIN

Model	FMIN	F0	LO 90	HI 90
Unconstrained	2.094	.467	.340	.603
Measurement weights	2.124	.458	.331	.595
Structural weights	2.145	.461	.333	.599
Structural covariances	2.158	.472	.344	.610
Structural residuals	2.171	.478	.349	.617
Measurement residuals	2.116	.471	.344	.609
Saturated model	.000	.000	.000	.000
Independence model	20.358	18.600	18.091	19.118

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Unconstrained	.018	.016	.022	1.000
Measurement weights	.018	.016	.021	1.000
Structural weights	.018	.016	.021	1.000
Structural covariances	.018	.016	.021	1.000
Structural residuals	.018	.016	.021	1.000
Measurement residuals	.019	.016	.022	1.000
Independence model	.115	.113	.117	.000

AIC

Model	AIC	BCC	BIC	CAIC
Unconstrained	2009.434	2074.100		
Measurement weights	1975.613	2029.363		
Structural weights	1962.884	2015.106		
Structural covariances	1959.883	2021.197		
Structural residuals	1957.252	2020.079		
Measurement residuals	1957.197	2060.876		
Saturated model	2964.000	3284.213		
Independence model	16438.283	16454.704		

ECVI

Model	ECVI	LO	HI	MECVI
Unconstrained	2.512	2.417	2.681	2.593
Measurement weights	2.47	2.369	2.634	2.537
Structural weights	2.454	2.355	2.620	2.519
Structural covariances	2.45	2.362	2.629	2.526

Structural residuals	2.447	2.362	2.629	2.525
Measurement residuals	2.446	2.404	2.669	2.576
Saturated model	3.705	3.705	3.705	4.105
Independence model	20.548	20.039	21.065	20.568

HOELTER

Model	HOELTER	HOELTER
Unconstrained	664	681
Measurement weights	670	687
Structural weights	670	687
Structural covariances	667	684
Structural residuals	665	682
Measurement residuals	664	681
Independence model	75	77

Nested Model Comparisons

Assuming model Unconstrained to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	31	23.961	.812	.001	.002	-.001	-.001
Structural weights	45	40.729	.653	.003	.003	-.001	-.001
Structural covariances	47	51.252	.311	.003	.003	-.001	-.001
Structural residuals	52	61.214	.179	.004	.004	.000	.000
Measurement residuals	14	17.801	.216	.001	.001	.000	.000

Assuming model Measurement weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	14	16.768	.269	.001	.001	.000	.000
Structural covariances	16	27.291	.038	.002	.002	.000	.000
Structural residuals	21	37.253	.016	.002	.002	.001	.001

Assuming model Structural weights to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural covariances	2	10.523	.005	.001	.001	.001	.001
Structural residuals	7	20.485	.005	.001	.001	.001	.001

Assuming model Structural covariances to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural residuals	5	9.962	.076	.001	.001	.000	.000

Assuming model Measurement residuals to be correct:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	31	22.928	.852	.001	.002	-.001	-.001

Structural covariances	33	33.451	.445	.002	.002	-.001	-.001
Structural residuals	38	43.413	.252	.003	.003	.000	.000

APPENDIX O
The R^2 of Endogenous Variables

APPENDIX O

THE R^2 OF ENDOGENOUS VARIABLES

Squared Multiple Correlations for the AR Group

	Estimate
Immersion	.292
Perceived_information_quality	.295
Enjoyment	.308
Attitudes	.327
Purchase_intention	.366
A5	.593
A4	.537
A3	.657
A2	.595
A1	.582
PAR6	.586
PAR5	.602
PIQ1	.577
PIQ2	.607
PIQ3	.593
PIQ4	.614
PIQ5	.559
PIQ6	.561
PI5	.593
PI4	.642
PI3	.607
PI2	.562
PI1	.559
E1	.530
E2	.535
E3	.587
E4	.638

	Estimate
E5	.574
I3	.661
I2	.566
I1	.589
PTF1	.666
PTF2	.645
PTF3	.593
PTF4	.586
PTF5	.655
PTF6	.590
PTF7	.610
PTF8	.595
PAR1	.611
PAR2	.595
PAR3	.589
PAR4	.597

Squared Multiple Correlations for the non-AR Group

	Estimate
Immersion	.232
Perceived_information_quality	.296
Enjoyment	.330
Attitudes	.264
Purchase_intention	.362
A5	.538
A4	.568
A3	.576
A2	.582
A1	.578
PAR6	.590
PAR5	.527
PIQ1	.588
PIQ2	.519
PIQ3	.572

	Estimate
PIQ4	.599
PIQ5	.557
PIQ6	.569
PI5	.575
PI4	.551
PI3	.558
PI2	.567
PI1	.521
E1	.646
E2	.561
E3	.630
E4	.541
E5	.533
I3	.628
I2	.507
I1	.562
PTF1	.542
PTF2	.571
PTF3	.572
PTF4	.510
PTF5	.526
PTF6	.584
PTF7	.565
PTF8	.542
PAR1	.550
PAR2	.520
PAR3	.563
PAR4	.579

Author Biography

Name	Ludan Yu
Date of Birth	May 1991
Place of Birth	Hechi, Nangning, Guangxi, China
Education	Received her Bachelor’s and Master’s degrees in Law from Nanning Normal University, China, between 2011 and 2017. Since September 2020, she has been pursuing a Ph.D. in Industrial Business Administration at King Mongkut’s Institute of Technology Ladkrabang, Thailand. Her primary research interests focus on digital marketing.
Academic Achievements	During her doctoral studies, she participated in research projects supported by the Guangxi Philosophy and Social Sciences Foundation and the Guangxi Young and Middle-aged Teachers’ Basic Research Capacity Improvement Program. She has published several academic papers in relevant fields.