

AI-powered augmented reality app satisfies my beauty needs and want

Abstract

Purpose – Online shopping is changing because of Augmented Reality technology. The study aimed to understand augmented reality's impact on the consumer shopping experience in an online context and further understand how its information, service, and ease of use can impact its continuous intention.

Design/Methodology/approach – This research is based on a sample of 348 from China and structural equation modelling using Smart-PLS.

Findings – The study outcomes show that Chinese consumers are intrigued and feel engaged with the Augmented Reality makeup app. Most users have shown positive results towards different constructs, which shows the significance of this technology. Chinese consumers adopt such technologies because of their immersive power that enhances the real environment while shopping online for cosmetic products.

Originality – Augmented reality is a disruptive technology changing the shopping experience. The current framework helps to understand consumer engagement with this technology and contributes to the AR literature and theory. The insights provide a strong base for future strategy development to integrate this technology in online and offline stores.

Keywords: AI-powered tools, augmented reality immersive experience, augmentation quality, augmented reality expertise, enjoyment, interactivity

Paper type – Research paper

1 Introduction

In the digital transformation epoch, artificial intelligence (AI) and augmented reality are disruptive innovations (Dwivedi et al. 2019; A.H. Butt, Ahmad, Goraya, et al. 2021) that are expected to take over human resources in the future (Letheren, Russell-Bennett, and Whittaker 2020). Thanks to AI technology employed by beauty companies, clients can now easily access the right beauty items. For online and offline retail services, interactive tools such as augmented reality (AR) applications and interactive public displays will be the future (Watson, Alexander, and Salavati 2018; A. Butt, Ahmad, Muzaffar, et al. 2021). Novel technologies such as Artificial Intelligence (AI) and Augmented Reality (AR) are becoming integral to the rapidly evolving digital landscape. Such technologies offer transformative potential to businesses and consumers that drives curiosity and imagination. In the service experience, such as online shopping (Ashfaq et al. 2020), more strategic services are required to tackle the end-users' ever-growing demands and increase the firm value (Dotzel, Shankar, and Berry 2013). Hence, brands integrate AI tools with augmented reality (AR) to engage the end-user and provide an interactive experience. AR is changing consumer experiences through AI-powered tools in the online context (Simay et al. 2022; El-Shamandi Ahmed, Ambika, and Belk 2023). AI-powered tools can enhance consumers' perceptions of the physical environment with digital layouts

(Rauschnabel 2018).

The interactive and engagement landscapes are changing because of AI and AR, and consumers are adopting them to enhance their experience. AI-driven personal assistants anticipate our needs, streamline daily tasks, and offer personalized recommendations, improving convenience and efficiency. AR, conversely, enriches our experiences by overlaying digital information onto the real world, whether in gaming, navigation, or educational applications. This immersive augmentation of reality entertains and provides practical utility, making our lives more engaging and informative. AR interactive technology can influence consumers with products and services by creating desire, giving information about product promotions, and increasing awareness levels (Deloitte 2016; Liang et al. 2021; Kang et al. 2023). The study will explain the research questions, i.e., RQ1: Are consumers satisfied with using AR technology for makeup purchases? Moreover, RQ2: Can AR makeup apps indulge consumers in continuous intention? The study will highlight the information systems success (ISS) and TAM models to assess consumer satisfaction and continuous intention with AI-powered AR context-specific variables. The Information systems success (ISS) and TAM models are known theories for adopting new technologies.

However, the significance of AI and AR extends far beyond mere consumer convenience. More investigation into these technologies will provide information about the consumer-brand relationship. AI is being researched, and researchers are learning new dimensions of machine learning and natural language possession. Beauty brands are something a consumer may wish to try in person, but using AR makeup apps with their engaging content can help consumers feel, see, and believe that the makeup used in those AR apps is natural. On the AR front, studies are unlocking the potential of blending digital information seamlessly into our surroundings, offering novel ways to visualize data, learn new skills, and collaborate in real-time (Hwang et al. 2023). What makes AI and AR particularly compelling for research studies is their profound impact on diverse fields, from healthcare to education, from manufacturing to entertainment. These novel technologies are becoming a reality in many fields, and the cosmetic market integrates such technology (Chekembayeva, Garaus, and Schmidt 2023). As a result, they provide a captivating area of exploration for researchers seeking to understand, harness, and unlock their potential to solve complex problems, enhance human capabilities, and create previously unimaginable experiences.

Innovative technology may impact the relationship between consumer behavioural aspects and external stimuli (AR apps) (Tawira and Ivanov 2023). Thus, more understanding of consumer behaviour is required to assess the power of AR apps. Specific constructs will help the scholars understand how AR technology engages with consumers. Therefore, more investigation is needed to understand the AR technology functionality, impact, consumer behaviour, and usage. The current framework will try to understand these gaps and how they can impact the consumer-brand relationship. This will also not only help to understand the gaps but also contribute to the AR literature. AI and AR technologies are no longer buzzwords; in fact, they are a reality now, offering consumers immersive experiences. From

enhancing consumer experiences to serving as fertile ground for groundbreaking research, these technologies provide a wealth of possibilities that continue to shape how we live, work, and study in the digital age. The importance of AI and AR cannot be overstated, and their role in research studies is pivotal for unlocking the full spectrum of their capabilities.

This study bridges the gap by exploring AI-powered AR app tools with appropriate theories. AR has renovated the marketing field in a new way through information, real-time environment experiences with virtual layouts, and visualization of products (Y. Wang, Ko, and Wang 2021; Zhang et al. 2023). Thus, more innovative AI in AR apps gives consumers a real-time experience with the products and services. Moreover, the study focuses on the behavioural elements of the consumer with AI-powered AR context-specific variables. Interaction (Liu, Dong, and Zhu 2021; Moura and Maw 2021) and enjoyment (Jang and Park 2019; Lemmens, Simon, and Sumter 2022) in AR apps will provide the necessary insights into users' satisfaction and continuous intention. Moreover, it becomes possible to gain insights into consumers' engagement with this technology by considering specific variables related to the augmented reality (AR) context, such as immersive experience, augmentation quality, and AR expertise. The objective of this study is to expand upon existing research on AR and artificial intelligence (AI) by incorporating the Information systems success (ISS) and Technology Acceptance Model (TAM) theories to comprehend consumer behavioural aspects pertaining to the ongoing utilization of AR. The study will also help to understand enjoyment and, interactivity during the use of AR app. Furthermore, this study will highlight the AR engagement that will lead to the continuous intention of AR application usage. The ISS model used to understand the technological effectiveness on consumer behaviour. Furthermore, ISS model is used to assess the technology's information, service and system quality and how it will impact the consumer behaviour. The use of technology acceptance models helps in understand the consumer's intention to use a particularly technology. The perceived ease of use and perceived usefulness help the researchers in understanding the usage of technology such as AR. Consequently, the outcomes of the AR makeup app will have an influence on user satisfaction and their intention to continue using it (CIAR). We assess the proposed framework's relationship through the L'Oréal makeup AR app available on their website and WeChat app (Forbes 2020). We use the L'Oréal makeup AR app because it is a famous beauty brand that is famous and available worldwide and has become a luxury brand name for makeup.

The contribution of this research to the literature is three-fold. First, the latest AR literature has been used to understand how it can influence consumers to satisfy and continuously use a particular brand with technological and behavioural elements. Second, AR context-specific variables are studied with AI-powered tools to understand the consumers' behavioural characteristics. Third, information systems success and TAM theory will provide valuable insights into using AR makeup apps. The information systems success model will help comprehend the use of AR applications' information and service quality as it can impact consumer satisfaction and continuous intention to use it. Meanwhile, TAM will help understand the benefits of technology, i.e., AR beauty apps, in influencing consumer choices. TAM will help understand the AR technology features and why consumers accept and continue using them. Fourth, the study is analysed by using Smart PLS-SEM. The Literature review and the proposed framework and hypotheses are presented in the next section. The

section on research methodology, analysis and interpretation and discussion and implications follows it. The paper concludes with a section on conclusion, limitations, and future suggestions.

2 Literature Review and Framework

The perceived ease of use of the technology acceptance model (TAM) has been regarded as a vital aspect of understanding the users' continuous intention and satisfaction in the context of technology (Tzeng et al. 2021; J.-H. Kim et al. 2023). Hence, technology's easiness can help consumers have positive satisfaction, ultimately influencing them (CIAR). TAM theory has been an essential predictor of IT-related services (Manis and Choi 2019). The author used perceived ease of use as part of this study to see how consumers think an AR technology will be effortless. TAM's emphasis on perceived ease of use and perceived usefulness enables researchers and developers to gauge users' intentions to adopt such technologies, with the likelihood of acceptance influenced by users finding the technology easy to use and beneficial. We expect that AR in an online context can influence satisfaction and continuous intention toward it. AR immersive environment can influence consumers towards AR satisfaction and its continuous usage. The effortlessness of AR technology can lead to good satisfaction levels. As AR technology's function is to ease life, its information and service quality can also enhance consumer engagement. The benefits of using a particular technology can impact consumer decision-making. It can improve consumer engagement in enjoyment, interactivity, and satisfaction. Thus, ease of use will be crucial in determining satisfaction and ongoing intention (Bunz, Seibert, and Hendrickse 2021), especially in AR apps in the online platform. The perceived ease of use of AR will help the researchers understand the consumers' behavioural elements towards the beauty brand. Therefore, we propose the following hypothesis:

H1a: Perceived ease of use has a positive impact on AR satisfaction

H1b: Perceived ease of use has a positive impact on continuous intention to use AR-based services

The information systems success (ISS) model helps understand the end-users' usage behaviour (Delone and McLean 2003). The constructs of this model can help the authors to understand the AR technology functions and qualitative nature. The previous literature has provided crucial insights into relevant information system platforms (L. Gao, Waechter, and Bai 2015; Ververidis et al. 2022). ISS's focus on organizational impact broadens the scope, allowing researchers to gauge contributions to business goals, customer engagement, and overall organizational performance. Hence, in AR makeup apps, the current framework has incorporated the ISS model's essential dimensions: information quality and service quality. The function of Information quality is to promptly provide relevant and precise information (B.W. Gao and Lai 2015; Bao and Zhu 2023). Hence, the information completeness on time in using AR makeup apps will be essential to the end-user. Quick and accurate information about a product can help a beauty brand user to make a better decision. ISS's emphasis on user satisfaction and net benefits provides a nuanced understanding of the technology's effectiveness. The model's adaptability to various contexts and industries, support for interdisciplinary research, and commitment to continuous improvement make it a valuable and versatile tool for researchers seeking a

comprehensive understanding of the success of AR beauty apps in both technical and organizational dimensions.

Qualitative information can help decide whether to buy the product or not. Inadequate knowledge, especially in the beauty context, may lead to disappointment and discourage the end-user from using the brand. Another part of the Information systems success model is the service quality, which states that consumers require individual attention and quick responses to their queries, impacting their satisfaction (Kautish and Sharma 2019; Won, Chiu, and Byun 2023). Hence, the service quality can influence consumers' satisfaction with technology (Ashfaq et al. 2020), especially in AR apps; it may be important to the end-user. Good service quality can also reflect the service provider's positive image consistency, capacity, and benevolence to the end-user (L. Gao, Waechter, and Bai 2015). The quality checks in the AR makeup app produce good checks that will cater to information and provide quick service. Therefore, service quality can play a vital role in AR makeup apps because good service is something that consumers require from the service providers, especially in beauty brands. Hence, we propose the following hypothesis:

H2: Information quality has a positive impact on AR satisfaction

H3: Service quality has a positive impact on AR satisfaction

This study analytically investigates the users' satisfaction and continuous intention to use an AI-powered AR makeup app. The literature on AI mainly focuses on using or adopting innovative technology (Poushneh and Vasquez-Parraga 2017). Other elements considered for AR are expertise, interaction, and satisfaction (Javornik 2016a). After going through extensive literature on AI and AR, the authors include AR expertise, AR immersive experience, augmentation quality, perceived enjoyment, and perceived interactivity as part of the research framework. The gaps identified for this study will help to understand how AR technology engages with consumer behaviour. The current study will bridge the gaps and provide better insights into the satisfaction and continuous intention to use AR technology. Therefore, all these aspects are considered and integrated into the framework of an AI-powered AR makeup app. Figure 1 provides the details of this study's research framework.

Figure 1. Conceptual framework

Expertise is a source of information or knowledge stored in the memory used for decision-making (Sela et al. 2019; Jain, Kaul, and Sanyal 2021). It can also be called consumer expertise for the shopping experience (Sela et al. 2019). The stored information can be transformed into knowledge that can be used to make a purchase or other decision-making (Gölgeci et al. 2019; Panhale, Bryce, and Tsoungkou 2023). Hence, consumer expertise in using an AI-powered AR makeup app can also be necessary in determining user satisfaction. AR expertise also enhances the usage of such technology, and the immersive experience helps the consumers adopt and continuously use it. Consumers require cognitive efforts before making a decision related to shopping decisions. Hence, deciding according to expertise can reduce mental actions in shopping. Thus, a high level of knowledge can influence consumers to be satisfied with its usage and functionality. In technology, consumers require more information to help develop personal attributes towards its use (Atkinson and Rosenthal 2014). The ability to make an informed and detailed decision through

shopping increases with expertise (Cheung, Xiao, and Liu 2014). Accordingly, we propose the following hypothesis:

H4: AR expertise has a positive effect on AR satisfaction

The quality of a product or service is essential to the end-user, especially when it involves innovative technology such as AR (Javornik 2015; Ahmad, Butt, and Muzaffar 2022). The augmentation quality in this research study will give the users insights into its acceptance and usage. Consumers' experience is vital in using the AR app, as augmentation quality may fulfil their needs and wants. The quality content of the AR makeup app will define the users' satisfaction level. If the quality of the content, which is the digital layouts or information while staying in a real-time environment, is not good, consumers might dislike it. Hence, augmentation quality can inspire users to enjoy its functionalities while shopping online. The augmentation quality will help to understand the AR application visual layout objects in the real environment, i.e., it is more technically focused. This is why understanding the qualitative nature of AR apps and how it impact consumer satisfaction when using them is crucial. Positive outcomes can be produced using interactive quality content to help consumers fully immerse during the product's usage (D.H. Lee 2021; Anand et al. 2023). Hence, augmentation quality, perhaps in future studies, can be measured as part of the ISS model. In the current study, we have taken augmentation quality as an AR aspect because AR does not have a theory. Hence, AR variables will be measured to understand the consumers' perspective towards its satisfaction and continuous intention to use it. Consumers with positive feelings towards using a technological product or service can help develop positive attitudes and satisfaction (Liébana-Cabanillas and Lara-Rubio 2017; Harborth and Kümpers 2022). Therefore, we propose the following hypothesis:

H5: Augmentation quality has a positive effect on AR satisfaction

The immersive experience can influence consumers to have a high level of satisfaction (Scholz and Smith 2016; Helme Falk 2019). Hence, users of AR's unique features during online shopping can help comprehend the end-users' behavioural elements. AR immersive experience enhances the end-user sense of hearing, taste, touch, and smell in a broader sense. With the levels of expertise and quality immersive experience during the use of AR, consumers' levels of expertise can relatively increase and be considered a unique and vital feature (Baek, Lee, and Choo 2019; Cheng et al. 2023). The AR immersive experience will help understand the holistic experience that AR apps can bring and engage the consumer. It is essential to assess consumer engagement using novel technologies such as AR. The immersive experience enhances the real-time environment into a more personalized and customized atmosphere for the end-user. The use of AIE will also define consumers' interactive and pleasurable experiences. Immersive experience depends on the environmental embedding elements of AR technology that can alter the consumers' decision-making in the real-time environment in premeditated means (A. Butt, Ahmad, Muzaffar, et al. 2021). Hence, an AR makeup app can enhance the consumer experience in its digital layouts. Therefore, an AR immersive experience can transform the conventional understanding of online shopping into a more immersive experience with its usage. We propose the following hypothesis:

H6: AR immersive experience has a positive effect on AR satisfaction

It is pleasurable to perform a task using technology (Rana et al. 2016; Tao et al. 2018). For AR apps in shopping, perceived enjoyment is vital to entertainment and excitability (Olsson et al. 2013). Perceived Enjoyment has been critical in understanding virtual and augmented reality shopping experiences (Pillai, Sivathanu, and Dwivedi 2020; X. Wang et al. 2021). Innovative technology can provide pleasure, fun, and entertainment with its usage (Le and Wang 2020; Yu et al. 2023). AR for makeup is still improving, and more is required to comprehend consumer behaviour. Hence, a pleasurable experience provides engagement and helps develop a positive attitude. An AI-powered AR makeup app may enhance the consumer experience with pleasure and influence positive satisfaction. Using innovative technologies with AI tools provides consumers with a pleasurable experience during shopping (Vannucci and Pantano 2019). Hence, consumers might find the use of this app to be more entertaining. Subsequently, it is proposed:

H7: Perceived enjoyment has a positive effect on the continuous intention to use AR-based services

It is defined as a technology's ability to enhance the consumers' interactive experience in a real-time environment (J. Lee, Lee, and Kim 2020; Ting, Abbasi, and Ahmed 2020). The interactive experience can influence consumers towards the continuous intention to use it. Hence, in this research study, perceived interactivity will provide the end-users with insights into using the AR makeup app. The continuous, quick, smooth responses through technology can also be considered perceived interactivity (Steinhoff et al. 2019; Nandi, Nandi, and Khandker 2021). In previous studies, interactivity has been essential in using AI technologies (Pantano, Rese, and Baier 2017; A. Butt et al. 2023). In light of AR technology, perceived interactivity can help consumers develop and adopt such technologies. Consumers require new ways to shop and feel engaged while shopping. Therefore, the AR makeup app's ability to interact with the customer will be an essential feature for the end-users. The L'Oréal makeup app with AR features can interact with the end-user by providing information, guidance, colour combinations, and so forth during its usage (Insights 2018). Perceived interactivity is also a strong predictor of the online shopping experience (Aladwani and Dwivedi 2018; Joo and Yang 2023). We propose the following:

H8: Perceived interactivity has a positive effect on the continuous intention to use AR-based services

The satisfaction parameter is essential in using technology and information systems (Oktal, Alpu, and Yazici 2016; Leon and Choi 2020). Satisfaction is the emotional state of mind where a user believes using a particular product or service will provide a pleasurable experience (Ofori et al. 2017). AR satisfaction in this framework will help us determine the behavioural elements of consumers who have had experience with AR makeup apps. Previous literature has shown a positive influence of satisfaction on continuous intention (Trivedi and Yadav 2020), but AR satisfaction is scarce. More research is required to understand this concept. Therefore, it is crucial to comprehend the influence of AR satisfaction on the AR makeup app's continuous intention. Satisfaction predicts end-users behavioural engagement while using a product or

service or during a shopping experience (Li and Fang 2019). Previous studies used AR satisfaction to understand the end-users' behavioural elements (C.-H. Lee, Chiang, and Hsiao 2018; Zhu et al. 2023). Hence, we propose the following:

H9: AR satisfaction has a positive effect on the continuous intention to use AR-based services

3 Methodology

A survey was conducted with the respondents who experienced L'Oréal's AR makeup on their website and WeChat. L'Oréal has also launched an AR makeup app on WeChat (Williams 2019). The items for the questionnaire were adapted from previously established studies. The questionnaire was first developed in English and then translated into Chinese. It was thoroughly proofread by Chinese professors and professionals to address any issues related to the questionnaire. The items of AR immersive experience were adapted from Scholz and Smith (2016). The items of AR satisfaction were adapted from C.-H. Lee, Chiang, and Hsiao (2018). The items for Augmentation quality were adapted from Javornik (2015). The items for the continuous intention of AR technology were adapted from Javornik (2016b). The items for AR expertise were adapted from S.W. Wang and Scheinbaum (2018). The information quality and service quality items were adapted from Peukert et al. (2019). The items for perceived ease of use were adapted from Ozturk et al. (2016). The items for perceived enjoyment and perceived interactivity were adapted from Pillai, Sivathanu, and Dwivedi (2020). There are reasons for choosing the L'Oréal AR makeup app: it is famous and readily available online and offline in China. Second, most teenagers and young girls have information and knowledge and might have used it directly in the L'Oréal flagship brand or sub-brand. Lastly, Chinese consumers are innovative and are fond of new technology (Xu 2018). L'Oréal, a prominent player in the cosmetics industry, has consistently been at the forefront of innovation, integrating novel technologies into its products to enhance beauty and skincare. The company places a significant emphasis on research and development, constantly seeking cutting-edge solutions. In recent years, L'Oréal has explored various technologies to create groundbreaking beauty products. For instance, the company has delved into augmented reality (AR) and artificial intelligence (AI) applications, enabling consumers to virtually try on makeup or experiment with different hair colors through mobile apps.

Most Chinese people can access WeChat and other social media apps through their smart devices. Hence, the L'Oréal AR makeup app users will provide critical insights into AI-powered AR aspects. The respondents in China who met our criteria, who have used the L'Oréal beauty brand, experienced AR makeup, and used the AR WeChat app, were part of the data collection. The study included two urban cities in China, i.e., Dalian and Shenyang. Our respondents were primarily students recruited through convenience sampling with different social media apps for this survey. Our respondents were the only female, and male responses were excluded from the data collection. The reason for choosing the female segment is that L'Oréal primarily produces cosmetic products designed for and marketed towards women. Also, the AR apps the brand developed focused more on the female segment. It further ensures that the data collected is from the right target market since L'Oréal products are mainly for females. Therefore, the research aligns with the brand's cosmetic product line and can

help understand the current trends, preferences, and beauty standards within the female demographic. The respondents who did not meet our criteria were not recruited. The data was collected in May 2022. A total of 363 responses were collected, but only 348 were taken out after carefully screening the responses with careless, similar, and male responses. Table 1 further explains the details of the participants for this research study of AR makeup apps.

Table-1 Participants Characteristics

4 Results and Analysis

The reliability and validity of data and instruments were assessed in the measurement model (Barclay, Higgins, and Thompson 1995). The data reliability techniques can measure internal consistency. By utilizing the PLS-SEM methods, this study has evaluated the reliability of data. The reliability of data or internal consistency of data is based on two measures: Cronbach's Alpha and composite reliability (Joseph F Hair et al. 2017). All the Cronbach's Alpha values, composite reliability, AVE, and VIF are presented in Table 2. The values indicate the positivity of the data.

Table-2 Reliability and Validity

The Fornell-Larcker criterion and HTMT ratio are the two popular measures used to confirm the discriminant validity. Fornell-Larcker criterion results have been reported in Table 3, and all the values of the square root of AVE are more significant than the inter construct correlation in the same column.

Table-3 Fornell-Larcker Criterion

Henseler, Ringle, and Sarstedt (2015) further suggested another measure to test the DV: the HTMT ratio. The threshold HTMT value is 0.90, as recommended by (Henseler, Ringle, and Sarstedt 2015). The HTMT ratio results have been reported in Table 4. All the values are lower than the threshold of 0.90, confirming the discriminant validity.

Table-4 Heterotrait-Monotrait Ratio (HTMT)

CMB arises when data regarding dependent and independent variables are collected simultaneously from the same respondents (Podsakoff et al. 2003). This study has utilized the Bagozzi method to test CMB. According to this method, if the study variables' correlation is less than 0.90, the CMB will not be in the study (Bagozzi, Yi, and Phillips 1991). Therefore, data is free from the common method bias and can be used for further analysis. Another measure to test the existence of CMB is inner VIF developed by (Kock 2015). This measure uses a full collinearity test to detect CMB. Inner VIF is calculated by considering each variable dependent once, and the threshold value is 3.3, as suggested by Kock (2015) and is reported in Table 5.

Table-5 Inner VIF (Common Method Bias Test)

The structural model tests the hypothesized relationship's strength and significance. This study's first hypothesis proposed a positive and significant relationship between perceived ease of use and AR satisfaction; this hypothesis was accepted based on empirical results provided in Table 6 ($\beta=0.181$, T-stats=2.815,

$p < 0.05$). H1b indicates a positive and significant effect of perceived ease of use on CIAR; this hypothesis is supported by the study results ($\beta = 0.209$, $T\text{-stats} = 2.723$, $p < 0.05$). In H2, a positive impact of information quality on ARS was proposed; the results supported this. H3 is also accepted based on quantitative analysis; in H3, we proposed a positive and significant impact of service quality on AR satisfaction. The results indicate a positive relationship between AR expertise and AR satisfaction as the coefficient is positive and significant ($\beta = 0.108$, $T\text{-stats} = 1.903$, $p < 0.10$); hence H4 is accepted robustly. H5 proposed a positive and meaningful relationship between augmentation quality and AR satisfaction; this hypothesis is supported by the empirical results ($\beta = 0.168$, $T\text{-stats} = 2.472$, $p < 0.05$). Results also supported H6, where a positive relationship was proposed between AR immersive experience and AR satisfaction ($\beta = 0.242$, $T\text{-stats} = 3.696$, $p < 0.001$). Hypothesis H7, H8, and H9 are also accepted on empirical grounds. In H7, a positive relationship between perceived enjoyment and CIAR was proposed; the results supported this. In H8, perceived interactivity's positive impact on CIAR was presented, and H9 proposed the results supported a positive and significant relationship between AR satisfaction and CIAR and these hypotheses.

Table-6 Path Coefficients and Significance

The results of mediating effects of AR satisfaction have been illustrated in Table 7. The AR satisfaction positively mediates the relationship between AR expertise and CIAR at a 5% level. The mediation of AR satisfaction was weak between augmentation quality and CIAR. The AR satisfaction mediation between AR expertise and CIAR is also weak. The AR satisfaction mediation between Information quality and service quality with CIAR is insignificant. The AR satisfaction mediation between perceived ease of use and CIAR is weak and significant at a 10% level. The coefficients of all the mediation effects are small, indicating weak mediation, while the direct effects are more substantial.

Table-7 Mediating effect of AR satisfaction

The R^2 value of 0.75 is deemed acceptable, 0.50 is considered normal, and 0.25 is considered weak (Joe F Hair, Ringle, and Sarstedt 2011; Henseler, Ringle, and Sinkovics 2009). A Higher R^2 value represents higher explanatory power than lower R^2 values. According to the research context, R^2 values are always acceptable (Raithel et al. 2012). R^2 values of this study are shown in Table 8.

Table-8 Coefficient of Determination

5 Discussion and Implications

5.1 Discussion

The current research study examined the influence of AI-powered AR makeup apps on users' satisfaction and the continuous intention of a known beauty brand, L'Oréal. The AR context-specific variables with AI, such as AR expertise, quality, immersive experience, satisfaction, interactivity, and enjoyment, were part of this study. The study provided positive insights for academicians and brand managers. The study included two theories that have been previously used for the adoption and intention of

technology in the online context, i.e., TAM (Prieto, Migueláñez, and García-Peñalvo 2015; Wu and Chen 2017) and ISS (Freeze et al. 2019). TAM provided predictive power of consumer behaviour towards the intention to use AR technology. The TAM also helped understand consumer attitudes, perceptions, and behavioural outcomes towards AR technology. The ISS has been previously used in the online shopping experience, and it perfectly fits this study concerning the AR makeup app. These study results are meaningful in comprehending the behavioural elements of consumers towards innovative technologies. The study has confirmed that AR impacts the consumer's behavioural characteristics, such as satisfaction, which leads to continuous intention, as predicted in previous studies (Jiang et al. 2023; Zimmermann et al. 2023). The incorporation of the latest technologies, such as AR, is helping the end-user with an immersive experience (Scholz and Smith 2016; Bonetti et al. 2019), enjoyment (Pillai, Sivathanu, and Dwivedi 2020), and interaction (Castillo, Canhoto, and Said 2020). Further, AR satisfaction (Poushneh and Vasquez-Parraga 2017), AR immersive experience (Scholz and Smith 2016), and AR expertise (Sela et al. 2019) in this research have shown positive results as it is aligned with previous studies.

5.1.1 Theoretical contributions to AI and AR theory

Further, theoretical contributions have been asserted into AI and AR theory development through their current research study parameters. Our research has shown the importance of AI-powered AR context-specific variables within the context of users' satisfaction and continuous intention to use an established beauty brand. Firstly, perceived enjoyment and interactivity were essential in using AR technology. It shows that consumers are willing to continue using AR technology when having an enjoyable experience. A pleasurable shopping experience influences consumers' satisfaction and continuous intention to use (Jang and Park 2019; Bhattacharya, Sharma, and Gupta 2022; Xue, Parker, and Hart 2023). Further, the interactivity with the brand product or service can also help consumers be influenced by having positive vibes for long-term loyalty. Artificial intelligence is integrated into many industries and scholars are working on developing AI theory. The results of the current study will contribute to this perspective. The enjoyment and interactivity constructs can be vital to the consumer shopping experience.

Secondly, the AR aspects, such as AR immersive experience, expertise, augmentation quality, and satisfaction, provide insights into consumer behaviour's continuous intention to use AR makeup apps. The results are aligned with previous studies (Dağ, Çavuşoğlu, and Durmaz 2023; J.-H. Kim et al. 2023). These perspectives of AR can engage the consumer while shopping in online and offline contexts. The AR aspects give us the key ingredients for how AR has changed how consumers shop online for a makeup brand. Engagement, immersive interaction, qualitative environment, and satisfaction lead to continuous intention. This shows that these constructs are essential for the brands that can help to understand consumer behaviour. Thirdly, the results of this research study suggest that the use of AR in the online context of a beauty brand may be an appropriately innovative technology to activate consumers' satisfaction and drive continuous intention. AR enhances the consumer's real-time environment with digital layouts (Caboni and Hagberg 2019; Carmigniani et al. 2011); this can help make an informed and precise decision to buy a product. Therefore, the cosmetic industry, shopping, or shoe brands can integrate

AR technology to provide a satisfactory shopping experience to consumers. Hence, AI-powered integration with AR parameters has enabled us to understand the consumer's behavioural elements towards its usage. From these results, we can realize that AR impacts consumers through its ability to enhance their physical environment and make it more entertaining (Moorhouse, tom Dieck, and Jung 2018). The results of the study also show that AR has become an important technology in online and offline shopping experience. The results contribute to different AR constructs and also it adds value in the development of AR theory.

5.1.2 Managerial Implications

The results of the current research study provide several implications for the developers and AR users at the organizational level as a strategic goal. First, using AR context-specific variables is vital, along with AI-powered parameters provided by the makeup app. The findings reverberate with Pillai, Sivathanu, and Dwivedi (2020) and Ashfaq et al. (2020), who emphasize the consumers' behavioural elements. Therefore, an immersive experience during shopping can create a positive relationship between the brand and the consumer. Using novel technologies, AR can help clothing, shoes, makeup, toy stores, furniture, bakeries & restaurants, etc., positively impact consumers and increase sales. Hence, brand managers can use AR apps and devices to provide their end-users with immersive, interactive experiences and entertainment. Secondly, when users are delighted with using a brand and technology, it can further influence them and perhaps be brand loyal (Alkraihi 2020; Tran, Taylor, and Wen 2023). Hence, the AR app implementation in offline and online contexts can help the brand grow more customers, sales, and revenues and generate brand loyalty. Brand managers should look into disruptive technologies to enhance the consumer experience. As mentioned earlier, AR integration is not limited to the cosmetic industry; numerous other industries can be part of it. Therefore, app developers should remember that consumers require an entertaining experience in the online and offline context.

Thirdly, brand managers and the government sector should focus on AR's engagement experience. Effective strategies can be developed for using AR technology, which can be integrated with available resources. AR can transform a conventional shopping experience into a more innovative and exciting one (W.B. Kim and Choo 2023; Ramasundaram et al. 2023). Hence, AR variables with AI-powered tools can help consumers integrate into an immersive environment. A strong consumer-brand relationship can increase loyalty and create positive word of mouth. Therefore, using the TAM and ISS model can provide the basis for the government and managers to use theory within the practical business domain. The business operations have changed since the Pandemic. The businesses have become more digital and are focusing on integrating technologies that can help ease business. Using novel technologies such as AR, AI, and VR assists firms in maintaining their current customer base and recruiting new ones in the light of COVID-19. The worldwide business environment was affected by COVID-19 (Hasanat et al. 2020; Jabeen et al. 2023). Therefore, omnichannel strategy integration in the business can provide better results. AR technology is slowly moving towards the physical retail environment, but brands must do more to enhance consumer experience. The AR technology in the online and offline environment can be helpful for both the organization and the end-user

6 Limitations and Future Research

The current research study had limitations that can be useful for future studies. First, the study included participants with prior experience and knowledge of AR makeup apps. Hence, for future reference, the investigation can explore whether the results differ among other groups of people, such as those unfamiliar with AR makeup apps. Secondly, two well-known theories, TAM and ISS, were used to comprehend the behavioural elements of AR makeup app usage. Hence, other approaches and AR and AI-powered parameters such as AR psychological engagement, perceived customization, trust, and efficacy can be considered for future research to understand users' satisfaction and continuous intention of AR technology. Thirdly, the results were taken from an emerging global country, China. The results may differ across different places and countries due to cultural and other factors. Hence, a comparative study can help us further understand the end-user's behavioural elements for future investigations. Future research related to AR should be factorial design investigations to understand whether consumers prefer sales staff service vs. AR service, two-way vs. one-way, and static vs. dynamic in consumer services.

7 Conclusion

The research was carried out by developing a makeup app model and AI-powered AR parameters to understand users' satisfaction and continuous intention to use AR technology. Implementing such innovative technologies has provided a base for academicians to understand the consumer and managers' behavioural elements to have more sophisticated strategies incorporated with AR. In this research study, AI-powered tools with AR parameters provided significant insights into consumers' satisfaction and CIAR. Therefore, we suggest that AR technology and AI-powered tools in an online context can satisfy digital users who love shopping. Further, the ISS model and TAM dimensions significantly influenced AR satisfaction, which led to positive CIAR. Overall, using AR technology in a makeup context can benefit the end-users.

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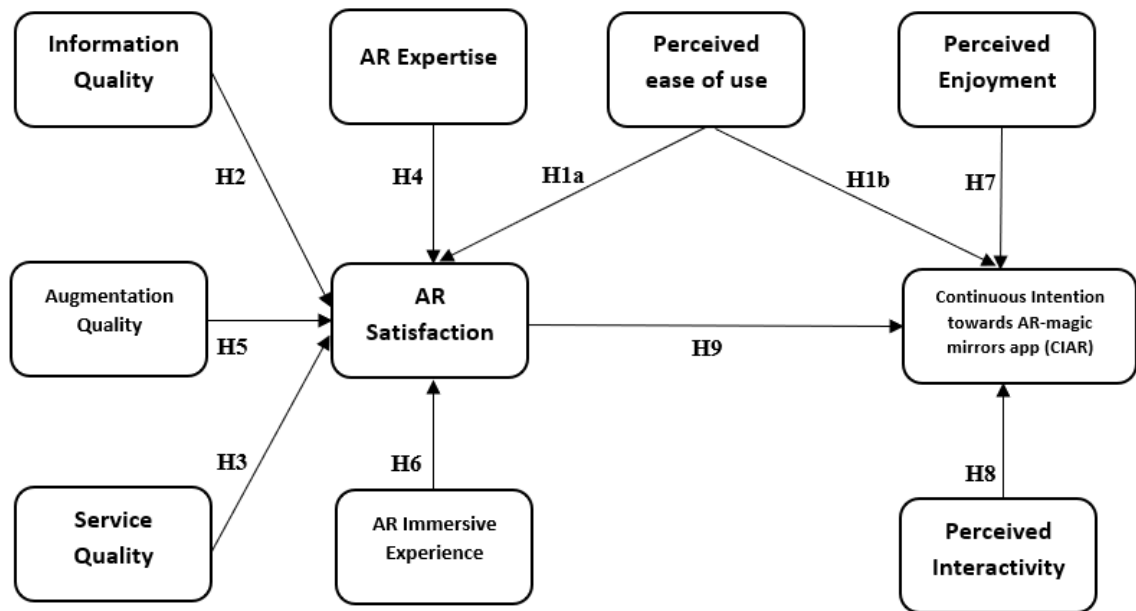


Figure 1 – Conceptual framework

Table 1 – Participants Characteristics

Characteristics	Distribution	Frequency	%
Gender	Female	348	100.00
Age	15-20	49	14.08
	21-25	161	46.26
	26-30	68	19.54
	31-35	43	12.36
	36-40	27	7.76
Education	Undergraduate Degree	288	82.76
	Master Degree	52	14.94
	Ph.D. Degree	8	2.30
Occupation	Student	241	69.25
	Job	94	27.01
	Business	13	3.74

Table-2 Reliability and Validity

Item Code	Question Statements	FL	α	CR	AVE	VIF
AIE1	The AR-magic mirrors beauty app made me feel that it was the real me in it.	0.772				1.247
AIE2	I felt like the beauty products were there on my face.	0.845	0.74	0.851	0.657	1.984
AIE3	The AR-magic mirrors beauty app provided me with such an experience that	0.812				1.828

it made me feel that I had control over the use of the services.

ARS1	The AR-magic mirrors beauty app satisfies my needs.	0.888				2.252
ARS2	I am satisfied with the functions of the AR-magic mirror beauty app.	0.889	0.87	0.92	0.794	2.251
ARS3	Overall, I am satisfied with the AR-magic mirrors beauty app.	0.896				2.401
AUQLTY1	The AR-magic mirrors beauty app functions were impressive.	0.867				1.839
AUQLTY2	I felt myself inside the AR-magic mirrors beauty app during its usage because of its qualitative features.	0.905	0.859	0.914	0.779	2.689
AUQLTY3	The AR-magic mirrors beauty app displayed wonderful visual appeal.	0.875				2.413
CIAR1	I have intentions to continue using the AR-magic mirrors beauty app in the future.	0.854				1.846
CIAR2	I will make more online visits for shopping through the AR-magic mirrors beauty app.	0.882	0.828	0.897	0.744	2.058
CIAR3	I will recommend the AR-magic mirrors beauty app to my social circle.	0.852				1.82
EXP1	I have an idea about augmented reality technology.	0.895				2.305
EXP2	I have experience in using augmented reality applications.	0.921	0.895	0.935	0.827	3.305
EXP3	The use of the AR-magic mirrors beauty app is a good integration into beauty services.	0.912				2.972
IQLTY1	The AR-magic mirrors beauty app provided me with pertinent and up-to-date information about beauty products and services.	0.748				1.124
IQLTY2	The qualitative content and the accuracy of the information provided by the AR-magic mirrors beauty app was easy to understand.	0.831	0.729	0.844	0.643	2.73
IQLTY3	The information layout of the AR-magic mirrors beauty app was suitable to my liking.	0.824				2.701
PEN1	The AR-magic mirrors beauty app usage was great.	0.807				1.88
PEN2	I had an enjoyable time with the AR-magic mirrors beauty app during shopping online.	0.879				2.536
PEN3	I felt adventurous with the AR-magic mirrors beauty app during shopping online.	0.833	0.868	0.91	0.716	1.987
PEN4	It was a stress-relieving shopping activity with the AR-magic mirrors beauty app.	0.865				2.452
PEOUS1	The AR-magic mirrors beauty app was easy to navigate.	0.848				1.787
PEOUS2	The AR-magic mirrors beauty app was effortless in its usage.	0.833	0.781	0.872	0.694	1.795
PEOUS3	I find the AR-magic mirrors beauty app very convenient.	0.818				1.442
PINT1	My interaction with the AR-magic mirrors beauty app was very smooth.	0.839				2.081
PINT2	I felt I had the power and control over the use of the AR-magic mirrors beauty app.	0.863	0.868	0.91	0.717	2.285
PINT3	I felt that I could control the information, and contents of the AR-magic mirrors beauty app.	0.839				2.019
PINT4	The AR-magic mirrors beauty app was very engaging.	0.846				2.081
SQLTY1	The AR-magic mirrors beauty app service quality provided the right outcome for my needs and wants.	0.636				1.343
SQLTY2	The AR-magic mirrors beauty app service quality gave me a quick response to my query.	0.756				1.728
SQLTY3	The AR-magic mirrors beauty app service quality visual interface was impressive.	0.797	0.815	0.871	0.576	1.778
SQLTY4	The AR-magic mirrors beauty app service quality has good standards.	0.799				1.971
SQLTY5	The AR-magic mirrors beauty app service quality communicated well for my beauty requirements.	0.797				1.92

Table-3 Fornell-Larcker Criterion

	AIE	ARS	AUQLTY	CIAR	EXP	IQLTY	PEN	PEOUS	PINT	SQLTY
AIE	0.810									
ARS	0.581	0.891								
AUQLTY	0.539	0.512	0.883							
CIAR	0.559	0.604	0.436	0.863						
EXP	0.406	0.452	0.489	0.420	0.909					
IQLTY	0.535	0.540	0.507	0.466	0.459	0.802				
PEN	0.557	0.694	0.530	0.601	0.452	0.562	0.846			
PEOUS	0.451	0.467	0.274	0.511	0.335	0.445	0.448	0.833		
PINT	0.490	0.545	0.446	0.573	0.470	0.440	0.529	0.398	0.847	
SQLTY	0.432	0.421	0.356	0.420	0.354	0.455	0.479	0.291	0.490	0.759

Note: AIE (Augmented reality immersive experience), ARS (Augmented reality satisfaction), AUQLTY (Augmentation quality), CIAR (Continuous intention of augmented reality), EXP (Augmented reality expertise), IQLTY (Information quality), PEN (Perceived enjoyment), PEOUS (Perceived ease of use), PINT (Perceived interactivity), and SQLTY (Service quality)

Table-4 Heterotrait-Monotrait Ratio (HTMT)

	AIE	ARS	AUQLTY	CIAR	EXP	IQLTY	PEN	PEOUS	PINT	SQLTY
AIE										
ARS	0.713									
AUQLTY	0.673	0.588								
CIAR	0.699	0.711	0.511							
EXP	0.492	0.510	0.555	0.485						
IQLTY	0.709	0.651	0.634	0.573	0.554					
PEN	0.681	0.797	0.607	0.706	0.510	0.675				
PEOUS	0.580	0.565	0.328	0.628	0.400	0.559	0.541			
PINT	0.596	0.627	0.512	0.675	0.533	0.527	0.609	0.480		
SQLTY	0.552	0.492	0.424	0.515	0.416	0.571	0.571	0.368	0.582	

Note: AIE (Augmented reality immersive experience), ARS (Augmented reality satisfaction), AUQLTY (Augmentation quality), CIAR (Continuous intention of augmented reality), EXP (Augmented reality expertise), IQLTY (Information quality), PEN (Perceived enjoyment), PEOUS (Perceived ease of use), PINT (Perceived interactivity), and SQLTY (Service quality)

Table-5 Inner VIF (Common Method Bias Test)

	AIE	ARS	AUQLTY	CIAR	EXP	IQLTY	PEN	PEOUS	PINT	SQLTY
AIE		1.978	1.847	1.990	1.999	1.898	2.028	2.003	2.046	1.952
ARS	2.383		2.416	2.382	2.415	2.418	2.133	2.416	2.404	2.420
AUQLTY	1.708	1.799		1.812	1.725	1.757	1.775	1.772	1.796	1.811
CIAR	2.075	2.080	2.130		2.127	2.116	2.078	2.043	2.045	2.121
EXP	1.567	1.564	1.487	1.568		1.541	1.566	1.564	1.521	1.561
IQLTY	1.838	1.883	1.741	1.920	1.808		1.866	1.877	1.925	1.847
PEN	2.457	2.161	2.408	2.414	2.462	2.422		2.470	2.470	2.376
PEOUS	1.512	1.532	1.516	1.482	1.529	1.494	1.542		1.550	1.539
PINT	1.898	1.872	1.890	1.819	1.846	1.900	1.899	1.893		1.803
SQLTY	1.515	1.528	1.506	1.539	1.533	1.493	1.500	1.540	1.460	

Note: AIE (Augmented reality immersive experience), ARS (Augmented reality satisfaction), AUQLTY (Augmentation quality), CIAR (Continuous intention of augmented reality), EXP (Augmented reality expertise), IQLTY (Information quality), PEN (Perceived enjoyment), PEOUS (Perceived ease of use), PINT (Perceived interactivity), and SQLTY (Service quality)

Table-6 Path Coefficients and Significance

Hypothesis	B	SD	T Statistics	P Values	Decision
H1a: PEOUS -> ARS	0.181	0.064	2.815	0.005	Supported
H1b: PEOUS -> CIAR	0.209	0.077	2.723	0.006	Supported
H2: IQLTY -> ARS	0.151	0.069	2.187	0.029	Supported
H3: SQLTY -> ARS	0.097	0.052	1.868	0.062	Supported
H4: EXP -> ARS	0.108	0.057	1.903	0.057	Supported
H5: AUQLTY -> ARS	0.168	0.068	2.472	0.013	Supported
H6: AIE -> ARS	0.242	0.066	3.696	0.000	Supported
H7: PEN -> CIAR	0.225	0.079	2.856	0.004	Supported
H8: PINT -> CIAR	0.255	0.093	2.739	0.006	Supported
H9: ARS -> CIAR	0.211	0.082	2.585	0.010	Supported

Note: AIE (Augmented reality immersive experience), ARS (Augmented reality satisfaction), AUQLTY (Augmentation quality), CIAR (Continuous intention of augmented reality), EXP (Augmented reality expertise), IQLTY (Information quality), PEN (Perceived enjoyment), PEOUS (Perceived ease of use), PINT (Perceived interactivity), and SQLTY (Service quality)

Table-7 Mediating effect of AR satisfaction

	Coefficient	SD	T Statistics	P Values
AIE -> ARS -> CIAR	0.051	0.025	2.036	0.042
AUQLTY -> ARS -> CIAR	0.035	0.020	1.817	0.069
EXP -> ARS -> CIAR	0.023	0.013	1.690	0.091
IQLTY -> ARS -> CIAR	0.032	0.020	1.554	0.120
PEOUS -> ARS -> CIAR	0.038	0.022	1.697	0.090
SQLTY -> ARS -> CIAR	0.020	0.014	1.508	0.131

Table-8 Coefficient of Determination		
	R Square	R Square Adjusted
ARS	0.482	0.473
CIAR	0.516	0.510
Note: ARS (Augmented reality satisfaction) and CIAR (Continuous intention of augmented reality)		