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Consumer Experience with Augmented Reality in online shopping in Pakistan

Abdul Wahid
abdul.wahid3168@gmail.com
Research Scholar, Karachi University Business School, University of Karachi, Pakistan.

Sheikh Muhammad Fakhar E Alam Siddiqui
fakhrealam@uok.edu.pk
https://orcid.org/0009-0000-1073-5623
Assistant Professor, Karachi University Business School, University of Karachi, Pakistan.

Corresponding Author: * Abdul Wahid abdul.wahid3168@gmail.com

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ABSTRACT

The rapid growth of immersive technologies has reshaped online retailing, particularly through the integration of Augmented Reality (AR) into digital shopping platforms. This study examines how AR features influence consumer experience and purchase intention in the context of online shopping in Pakistan. Drawing on the Technology Acceptance Model (TAM) and the Stimulus–Organism–Response (SOR) framework, the research analyzes how interactivity, vividness, novelty, informativeness, and technical reliability affect perceived enjoyment, hedonic value, utilitarian value, satisfaction, and attitude, ultimately shaping purchase intention. A quantitative, cross-sectional design was employed, and data were collected through a structured questionnaire from Pakistani online shoppers aged 18 and above. SPSS was used for descriptive statistics and reliability analysis, with Cronbach's alpha values exceeding 0.70, indicating acceptable internal consistency. The findings demonstrate that interactive and informative AR features reduce uncertainty and enhance functional value, while vividness and novelty increase enjoyment and engagement. The study provides theoretical and practical insights for AR adoption in emerging digital markets.

Keywords: *Augmented Reality; Online Shopping; Consumer Experience; Purchase Intention; TAM; SOR Framework; Pakistan; Digital Retailing*

INTRODUCTION

Background of the Study

Immersive technology has become the way towards a new digital landscape especially in the context of online shopping by providing the buyer with digital data and computer generated content in the form of images, which has improved the buying experience massively. Sellers in the digital age are less dependent on old marketing and selling methods, which occur mostly through the standard medium (Suh & Prophet, 2018). In this digital age, consumers want to have a fun online shopping experience, hence, they rely on the services of business brands that look attractive and offer various options. Enhanced online experience is believed to be a basic element of business growth and can result in enhanced profitability despite challenging competition (Khan & Sade, 2024). Newly introduced technology such as virtual reality, Augmented Reality are some of the things that are revolutionizing businesses, particularly in the retail and real estate industries, where competition is fierce. It is understood by sellers in these sectors that the introduction of new technologies is a way to obtain a competitive advantage and attract clients (Xiong et al., 2021). The integration of Augmented Reality into social media platforms, such as Facebook, which also has introduced mobile Augmented Reality, makes the profound impact made by it even more effective. This immersive technology creates a special space and environment for the game enthusiasts, where they are not only able to play games but also able to interact with each other, forming a community of gamers.

The Use of Digital marketing

Digital marketing is increasingly adopting augmented reality which is a sophisticated and modern technology, even in third world countries such as Pakistan. However, this integration process is slow and slow. AR facilitates consumers in building a perception of a particular product by allowing them to see the product and get all the necessary information through digital content (Carmigniani et al., 2011). Augmented Reality has already made a huge impact in the digital world in Pakistan and other parts of the globe facilitating the interaction between reality and the digital world. However, the research of its true effect on the buying behaviour of consumers is not yet complete. Philipp A. Rauschnabel argued that marketers and research scholars have started analysing the various aspects and components of Augmented reality, taking into consideration its growing importance. Various aspects of Augmented Reality have been explored in the research context including its contribution to attracting consumers attention and evolving the business development. However, there is a lack of the holistic approach to AR (Rauschnabel et al., 2022).

Online Brands Use Augmented Reality as technology for Marketing

The use of innovations and technologies such as virtual reality and augmented reality can have a significant impact on marketing and commercialization. Marketers are especially interested in Augmented Reality in the face of the rising technology, and even in developing countries such as Pakistan. Consumers prefer these types of technologies because they are easy to use and immersive. The use of this advanced technology enables the marketers and sellers to superimpose video, images, text, and audio components on preexisting images (Zhao, 2024). Augmented reality technology has the potential benefits of connecting the digital world and physical information through digital devices, which completely transforms the online shopping experience for consumers (Cabero-almenara et al., 2019)

Impact of Augmented Reality as a technology on consumers' buying intentions

In recent times, academic research has been conducted in relation to the impact of Augmented Reality as a technology on the consumership's buying intention. Augmented reality offers a service to consumers by enhancing their buying experience by adding a visualisation of the product and its hedonic value. AR technology's functional and hedonic factors can have direct impacts on purchasing outcomes by affecting the purchasing behaviour of consumers. The most prevalent theoretical frameworks were the Technology Acceptance Model, the Stimulus-Organism-Response theory and the Flow Theory. The use of AR technology in the retail sector is extremely beneficial since it attracts buyers and offers them an unparalleled and entertaining online shopping experience (Yitong et al., 2024).

Importance of Customer Engagement

The importance of customer engagement cannot be stressed enough when it comes to creating the trust of consumers and turning them into loyal customers who have an emotional connexion with the brand (Brodie et al., 2013; Brodie et al., 2011). Several fields including the marketing and media industry have been influenced by the recent innovations and advancements in technology. Multiple indicators have been established on social media platforms such as Facebook and Instagram to display the level of engagement of users towards a particular post (Yitong et al., 2024). The nature of the technology involved in advanced technology, such as Augmented Reality, determines profitability and consumer involvement in this change dominated business landscape, which comprises the retail business Research shows that Augmented Reality will slowly change the marketing and set a new standard of customer involvement in the developed and emerging markets (Fan et al., 2025).

Study Significance

This study has a huge significance as it explores the implication and nature of digital technology including Augmented Reality in the context of online shopping. In the retail industry, online shopping has become a new phenomenon in this digital age, which requires business franchises to search for ways to promote their brands and commodities in digital channels. Businesses in developing countries such as Pakistan still rely on traditional marketing channels, which means they are suffering for failing to introduce themselves to online consumers. This problem can be easily and instantly solved by the business owners by using the digital technology and Augmented Reality as a bridge between the physical world around the consumers and the digital content, which provides necessary information to the consumers before making a purchase. Studies like this are important in the age of digitalization as they help retailers and marketers to create marketing strategies that are appealing and informative to consumers.

Research Objectives

- To investigate how the Augmented Reality (AR) functions affect the online shopping experience of consumers in Pakistan.
- To determine the critical variables (including usability, visual appeal, interactivity and hedonic value) that affect the intention of consumers to adopt AR-based shopping applications.
- To investigate the issues and possible advantages of the adoption of AR technology in the retail and e-commerce industry of Pakistan.

Research Questions

1) What is the impact of the application of the Augmented Reality on the overall online shopping experience of the consumers in Pakistan?
2) What are the factors that influence willingness and intention to utilize AR application when shopping online?
3) What are the key opportunities and threats facing the retailers in Pakistan embracing AR technology to improve customer engagement and sales?

Research Gap

The application of AR as a technology that improves the process of online shopping experiences has quickly become a powerful tool that exists globally; nevertheless, its effects on the behaviors of consumers in Pakistan are yet to be examined. Although the literature on AR has underscored that it can be applied to better visualize products, increase the interactivity of products, and boost purchase confidence, the uploaded literature shows that Pakistan has fallen behind in adopting, digital and integrating technology in the retail sector (Kazmi et al., 2024; Dankwa, 2021).

A lot of the current literature dwells upon the general trends of digital transformation as opposed to the impact of AR on online consumer experiences.

Statement of the Problem

Although the popularity of Augmented Reality as an innovative online retail instrument in the international market is booming, its feasibility and use in the Pakistani online shopping setting are unexplored. Despite the successful implementation of AR to increase consumer interest and provide an opportunity to evaluate the product by touch, in Pakistan, retailers still need to depend on the traditional

marketing channel because of the low rate of digitalization and the lack of technological advancement (Kazmi et al., 2024; Dankwa, 2021). Consequently, the business is unable to comprehend clearly how AR would enhance consumer experience, purchasing confidence, and brand loyalty in the local environment.

LITERATURE REVIEW

Overview of Chapter

The advancement of digital technologies has revolutionised the world of online retailing, and consumers are now able to interact with products in more immersive and interactive ways. Among these innovations, Augmented Reality or AR has been a strong tool used to overlay the digital information into the physical settings, which has improved the ability of consumers to see and assess the products in a better way before purchasing. As the use of AR starts to spread around the world, its impact on the consumer's perception, decision-making and behavioural intentions have become a hot topic of discussion in marketing research today. Nonetheless, in the emerging economies like Pakistan where online shopping is still on the upward slope, whereas consumer trust, risks and uncertainty are major concerns

Introduction to Augmented Reality in Online Shopping

Augmented Reality (AR) has taken over the digital retail space by overlaying computer-generated graphics on the user's real-world environment for the purpose of virtually inspecting products prior to making their purchase decision (Heller et al., 2019). In emerging markets such as Pakistan where the generalisation shop online is still challenged with trust-related issues, plus the uncertainty of the trust and product evaluation, AR provides a solution by bringing set up realistic and interactive experiences linked to products to decreased perceived risk (Aldhmour and Sarayrah, 2019).

FEATURES OF AR AND THEIR EFFECTS ON CONSUMER EXPERIENCE

Interactivity

Interactivity refers to how AR technology allows users to interact with virtual objects in real time - for instance rotating, resizing and viewing products from a range of angles (Javornik, 2016). Prior research suggests that increased interactivity results in increased engagement of the user in terms of user control and involvement in the shopping process (Yim et al., 2017). Interactivity possesses an activation effect, intrinsic motivation which enhances perceived enjoyment in the use of AR (Davis et al., 1992). Since interactive systems stimulate sensory involvement, and cognitive engagement, they result in enjoyable and pleasurable experiences (Huang & Liao, 2015) which translates into hedonistic value (Babin et al, 1994).

Vividness

Vividness is a term that refers to the "richness, clarity and sensory depth" of digital content delivered through AR systems as consumers can view products in a more realistic, detailed, and immersive way (Li, Daugherty & Biocca, 2001). When AR is used to display high-resolution textures, realistic lighting, and life-simulation of products, consumers are likely to have a higher mental imagery and immersion in online shopping which is associated with higher perceived enjoyment (Scholz & Duffy, 2018). High vividness is also found to have a positive effect on hedonic value in terms of providing a visually stimulating and emotionally interesting content that increases levels of excitement and pleasure along the shopping journey (Pantano & Gandini, 2017).

Visualization

The application of Augmented Reality in the retail world is common as it helps in engaging the consumer while offering interactive and instructive experiences, which is the key to how this technology is useful for delivering a realistic picture and credible information for evaluation. AR technology in marketing has proven to be very successful, and the success increases when it is applied to the retail sector. The attractive features of AR technology in terms of creativity and advanced technologies affect the buying intentions of the consumer. AR technology can have a great impact on consumers in countries such as Pakistan, where the adoption of technology is still limited, by changing the way brands and consumers interact and increasing sales through encouragement to purchase.

Novelty

Novelty is the extent to which AR provides unique, surprising or innovative experiences that are not common in the traditional shopping experience in a shop (Spreer & Kallweit, 2014). Novel experiences are appealing regarding the consumer's curiosity and arousal and enhance the enjoyment of online buying (Heller et al., 2019). Research uncovers that novelty is the source of the higher hedonic value due to the excitement and emotional satisfaction experienced by the consumers because of the use of new technologies (Pantano & Gandini, 2017). In addition, the innovative nature of AR helps consumers to better process the information on the products and make practical and goal-oriented evaluations contributing to increased utilitarian value (Baek et al., 2015). Moreover, new AR capabilities are inclined to produce the feeling of discovery and experience freshness that can boost the consumer engagement further and elicit more cognitive involvement.

Informativeness

Informativeness is the extent to which AR provides full, accurate and relevant product information in order to make effective decisions (Baek et al., 2015). Consumers exploit information AR capabilities such as product dimensions, colour and fit simulation to relieve the uncertainty especially in online shopping scenarios where physical examination is not possible (Huang & Liao, 2015). Enhanced informativeness makes its user more intrinsically happy by reducing cognitive effort and helping user about easy evaluation of the product (Childers et al. 2001).

Technicality

Technicality is performance of technology, system reliability and ease of use of AR interfaces (McLean & Wilson, 2019). When AR applications work seamlessly and there is little or no error or delay, users feel more comfortable and are more likely to be happy (Rauschnabel, 2021). Technical efficiency helps in reducing cognitive burden, higher satisfaction and higher hedonic response through seamless interactions (Scholz & Duffy, 2018). Additionally, reliable AR systems increase the utilitarian value as it facilitates in precise evaluations and assists consumers in that case to complete the shopping tasks effectively (Huang & Liao, 2015).

Vividness and Cognitive Processing in AR

Vividness does not only increase sensory richness but also affects the cognitive processing of AR stimuli by the consumer. High fidelity and highly detailed AR visuals help relieve this cognitive load in imagining product attributes and can lead to better and faster decisions by users with a reduced level of doubt (Li et al., 2001). When there is a decrease in mental effort, the user would also shift their attention to the experiential aspects to raise their overall enjoyment and engagement (Hilken et al., 2017).

CONSUMER EXPERIENCE DIMENSIONS

Perceived Enjoyment

Perceived enjoyment is an intrinsic motivational factor that describes the pleasure in using AR technology (Davis et al., 1992). Enjoyment is especially important in AR environments because AR is often full of fun and immersive elements that amped up the emotional responses (Yim et al., 2017). Greater enjoyment helps in improving cognitive evaluations by triggering positive affect leading to an overall better satisfaction (Oliver, 1999).

Hedonic Value

Hedonic value refers to the feelings - fun, pleasure and emotional gratification - that consumers feel when using AR tools (Babin et al, 1994). AR provides highly immersive and entertaining interactions that helps in the increased hedonic value (Scholz & Duffy, 2018). Research confirms that when consumers are having emotionally satisfying experiences, they will have higher satisfaction and more positive attitudes towards the shopping medium (Heller et all, 2019). Hedonic value is also responsible for positive affective responses this contributes to long term consumer loyalty (Oliver, 1999).

Utilitarian Value

Utilitarian value reflects gain or utility value to the consumer in terms of functional benefits benefited from AR such as better evaluation of products, time saving and accuracy in decision making (Childers et al. 2001). AR doesn't only help enhance utilitarian assessments, but it also helps to eliminate uncertainty and offer realistic simulations of products, resulting in a higher degree of confidence in buying decisions (Rauschnabel et al., 2022). Prior research shows that when consumers perceive strong value in terms of function and then they are more satisfied with online shopping experience (Oliver, 1999).

Consumer Experience

Augmented reality technology is the combination of digital information and the real world in real time. This gives consumers the opportunity to know exactly how a certain product will serve its purpose and be beneficial to the consumer. AR games and virtual tour make the consumer experience better than it would have been and make them feel like they're actually in the environment and experiencing everything in the real world. The excitement level of the consumers is raised due to this unique combination of real and virtual objects, which is extremely entertaining and interesting (McLean and Wilson, 2019). According to research, people who already used AR technology may not find it interesting the second time around.

Satisfaction

Satisfaction is the affective evaluation of their AR shopping experience by consumers and that is realised when perceived value and the expectations are met or exceeded (Oliver, 1999). AR adds to the satisfaction by eliminating uncertainty, enhancing better product fitting assessment, entertainment and information interactions (Huang & Liao, 2015). Studies show that satisfaction is a great predictor of purchasing intention as satisfied consumers develop trust and confidence about digital shopping platforms (Scholz & Duffy, 2018).

Attitude

Attitude is the overall judgement of consumers to use AR for online shopping through the perceived usefulness, ease of use, enjoyment and the emotional reactions(Ajzen, 1991). Positive views on AR have been created as consumers will find the technology efficient, fun, and visually appealing (McLean

& Wilson, 2019). Favourable attitudes play a big role in the increased purchase intention by reinforcing the will of the consumers to trust on AR assisted shopping processes (Rauschnabel, 2021). Augmented reality is a complicated technology that blends the digital and the physical worlds and changes the online shopping experience for consumers.

The Role of Attitude and Trust in AR Adoption

Attitude has always been identified as one of the keys to acceptance of new technology, especially in the case of immersive technologies, such as AR (Ajzen, 1991). Positive attitudes are built by users that see the AR as reliable, enjoyable and helpful in reducing uncertainty when they are online shopping (McLean and Wilson, 2019). Trust further enhances attitude by affecting the perception that consumers have towards the credibility and security of AR-based retail platforms (Fan et al., 2020). When consumers build trust on the AR interface, they will trust digitally simulated experiences of the product, and accept the technology as a legitimate replacement for physical inspection (Poushneh, 2018).

Purchase Intention as the Final Outcome

Purchase intention is a tendency of consumer to buy the product after interacting with AR features (Fishbein & Ajzen, 1975). AR improves the purchase intention by involving realistic evaluations of products; this reduces the uncertainty, boosts emotions and generates consumer trust (Yim et al., 2017). In the context of Pakistan, where consumers tend to rely on visual cues and validation based on experience before purchasing, AR offers the level of experience that can lead to this confidence (Aldhmour and Sarayrah, 2019). Numerous empirical studies confirm that heightened levels of satisfaction and positive attitudes are linked to a highly significant intention to buy in the digital retail environment (Oliver, 1999; McLean & Wilson, 2019).

Cultural Factors and AR Adoption in Emerging Markets

Cultural and contextual factors play a major role in adoption of AR in online shopping. In Pakistan, consumers tend to rely highly on visual verification, product tangibility and interpersonal interaction when making purchase decisions (Aldhmour & Sarayrah, 2019). AR technology reduces barriers imposed by the unavailability of physical product inspection by allowing consumer to virtually "try" or visualise product in real time which coincides with local consumer expectations of certainty and product assurance (Heller et al., 2019).

Additionally, markets such as Pakistan are highly sensitive to risk and uncertainty in digital transactions meaning that AR's capacity to deliver vivid, interactive and informative content is of great importance (Huang & Liao, 2015).

Technology Acceptance Models Supporting AR Purchase Intention

A number of theoretical models support the knowledge of the AR adoption and purchase intention. The most useful predictors of technology use as far as Technology Acceptance Model (TAM) is concerned are the perceived usefulness, perceived ease of use (Davis et al., 1992). The perceived usefulness concept is synonymous with the utilitarian value in the AR context, and enjoyment is synonymous with the perceived ease of use in the former that entails less cognition and increased user involvement (Fan et al., 2020).

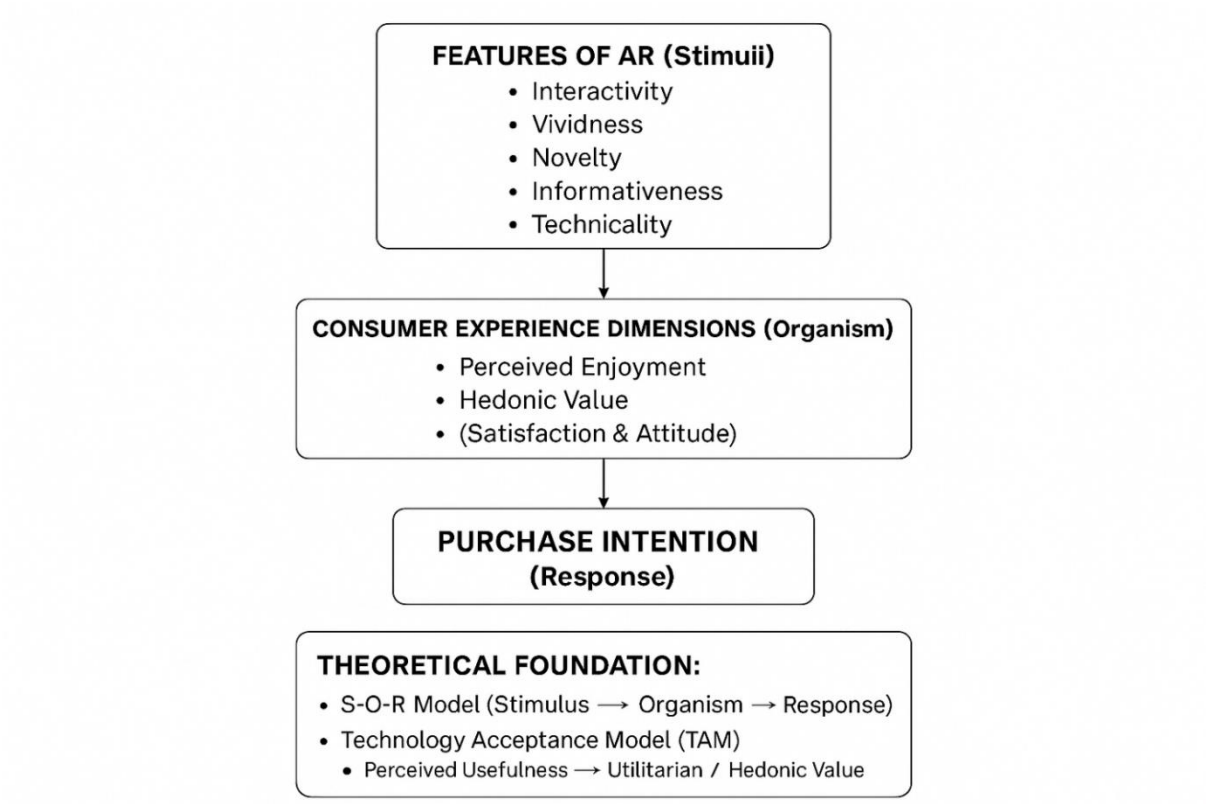
Likewise, Theory of Planned Behaviour (TPB) has determined a number of predictors of intention that encompass the attitudes, subjective norm and perceived behavioural control (Ajzen, 1991). The determinants directly impact the experiences of AR shopping, in which rich and interactive and informative skills are applied (Hilken et al., 2017).

Theoretical Framework

The theory that this study bases its study on is premised on two prevailing theories of behaviour; Technology Acceptance Model (TAM) and Stimulus-Organism-Response (SOR) Framework. These theories are combined to describe how the features of the augmented reality (AR) affect the psychological state of consumer and ultimately the purchase intention in the online shopping context that exists in Pakistan. TAM states that the perceived usefulness and perceived ease of use of the technology determine whether the consumers will adopt the said technology or not (Davis et al. 1992).

Conceptual Model

Figure 1: Conceptual Model



RESEARCH METHODOLOGY

Research Paradigm

This study is based on the positivist research paradigm, which is characterized by the belief that reality is objective, measurable and can be explained with the help of observable and quantifiable data (Creswell & Creswell, 2018; Saunders, Lewis, & Thornhill, 2019). The positivist paradigm is suitable for this research because the study aims at investigating how augmented reality (AR) features and consumer experience variables such as perceived enjoyment, hedonic value, utilitarian value, satisfaction, attitude and purchase intention relate to each other using statistical analysis (Bryman, 2016).

Research Design

The population consists of students attending the faculty of educational sciences in this study, a quantitative, cross-sectional research design is used. A quantitative design is suitable since it can allow

identifying perceptions, attitudes, and behavioral intentions numerically and testing the hypothesis through statistical analysis (Creswell & Creswell, 2018; Bryman, 2016). Quantitative methods are especially suitable for studying the relationships between constructs in technology adoption and consumer behavior study (Hair et al., 2021).

Survey Development and Data Collection

Data was gathered through the use of a structured self-administered questionnaire, which has been used extensively in studies of augmented reality (AR) and online shopping research because of its efficiency and ability to collect standardized responses from a large sample (Saunders, Lewis, & Thornhill, 2019). The questionnaire has been developed according to validated measurement scales in previous AR marketing and e-commerce research to ensure the reliability and validity of the constructs measured, which are interactivity, vividness, perceived enjoyment, satisfaction, and purchase intention (Javornik, 2016; McLean & Wilson, 2019; Rauschnabel et al., 2022).

Survey Design and Instrument Development

The questionnaire was divided into 2 main sections. The first section was aimed at gathering information about the demographic and background of the respondents in matters such as age, gender, education level, frequency of online shopping, and familiarity with augmented reality (AR) technology. The second section provided the measurement of the key constructs of study that included AR features, consumer experience variables, and purchase intention using a structured, five-point Likert scale. This structure provided for clarity, relevance and ease of response and supported effective data analysis.

Section A: Demographic Information

This section of the questionnaire was used to collect demographic and background information from the respondents, including their gender, age, education level, frequency of online shopping, and familiarity with augmented reality (AR) technology. Collecting these variables helped then the researcher to build a better picture of respondent characteristics and ensure that the sample was relevant to the objectives of the study. Such demographic profiling remains a key requirement in consumer behavior and technology adoption research as it is important to keep the perceptions and experiences of the respondents within a specific context to ensure that the data are representative of the target population (Saunders, Lewis, & Thornhill, 2019; Creswell & Creswell, 2018).

Section B: Measurement of Study Constructs

This section assessed the essence of the constructs in the study with a five-point Likert scale, varying from 1 (Strongly Disagree) to 5 (Strongly Agree). The constructs were operationalized in line with the Stimulus Organism Response (SOR) model architecture in which interactivity, vividness, novelty and informativeness were considered as stimulus variables; perceived enjoyment, hedonic value, utilitarian value, satisfaction and attitude were taken as organism variables; and purchase intention was considered as response variable (Mehrabian & Russell, 1974; Rauschnabel et al., 2022).

Pilot Study

Prior to the main data collection, a pilot study was conducted to determine the clarity of the items of the questionnaire and the reliability of the measurement scales, as well as the time required to complete the survey. The pilot study had 30 included respondents who met the study's inclusion criteria and this is considered as adequate for first testing of survey instruments for quantitative research (Saunders, Lewis, & Thornhill, 2019).

Sampling and Data Collection - Target Population

The target population for this study were Pakistani consumers aged 18 years and above who actively engage in online shopping and have experience with or exposure to augmented reality (AR) based shopping features such as the virtual try-on tools or product visualization applications. This population has been chosen as the individuals with previous exposure to online shopping and AR technologies are better positioned to assess their experiences, perceptions and behavioural intentions as they relate to AR assisted retail environments. Targeting such respondents is in line with past research on technology adoption and AR marketing which emphasizes the importance of choosing participants who have relevant experience with usage in order to achieve meaningful and reliable responses (Creswell & Creswell, 2018; Saunders, Lewis, & Thornhill, 2019; Rauschnabel et al., 2022).

Sampling Technique

A non-probability convenience sampling technique was used. This technique is popular in technology adoption and AR research because of accessibility limitations and the need to access respondents with specific profiles of experience

Sample Size

Based on methodological recommendations for structural equation modeling, a target sample size of 200 was set for the survey. The final dataset was above this threshold and allowed for sufficient statistical power and stability in the model.

Data Analysis

Data analysis was carried out with the Statistical Package for Social Sciences (SPSS). SPSS was used for data screening, descriptive analysis, reliability, validity tests, and hypothesis testing. The use of SPSS is widely recommended in quantitative research to analyze survey-based data, especially in consumer behavior and technology adoption research, because it is robust, easy to use, and can be used to conduct statistical testing (Saunders, Lewis, & Thornhill, 2019; Field, 2018).

Preliminary Analysis

The preliminary analysis included checking for missing values and outliers in the dataset to ensure the quality and accuracy of the data before proceeding to the following analysis. Descriptive statistics were produced to describe the demographic characteristics of the respondents in terms of frequencies and percentages were generated in order to give an overview of the sample profile.

Reliability analysis was carried out with the help of Cronbach's alpha in order to evaluate the internal validity of the measurement scales. Cronbach's alpha values highest values exceeding the recommended threshold value of 0.70 indicated acceptable reliability levels for the constructs to demonstrate that the measurement items were consistent reflectors of their corresponding variable (Nunnally & Bernstein, 1994; Field, 2018).

Measurement Model Assessment

The validity of the measurement instrument was evaluated to ensure that the items measured the constructs as intended. Content validity was provided by adapting measurement items from scales that were already validated in augmented reality and e-commerce literature.

To further provide evidence for construct validity, exploratory factor analysis (EFA) was performed in the software package SPSS in which case it was appropriate to investigate the underlying factor structure of the measurement items. Items showing satisfactory factor loadings were kept for further

analyses to ensure that each construct was empirically distinct and conceptually meaningful (Hair et al., 2019; Field, 2018).

Structural Model Assessment

Hypothesis testing was performed with the help of correlation and multiple regression analysis by using the software package of the Statistical Package for Social Sciences (SPSS) in order to analyze the relationship between independent variables (AR features), mediating variables (consumer experience dimensions) and dependent variable (purchase intention). Regression analysis allowed to determine the direction, strength and significance of the proposed relationship, in line with the study's research objectives and theoretical framework.

Ethical Considerations

Ethical standards were strictly followed in the research process following established guidelines for research in the social sciences. Prior to participation, informed consent was obtained from all respondents and ensured that they were fully aware of the purpose of the study and their role in the study. Participation in the study was completely voluntary and the respondents were made aware of their right to withdraw from the study at any stage without any penalty or consequences (Creswell & Creswell, 2018; Saunders, Lewis, & Thornhill, 2019).

Data Analysis

This chapter presents a comprehensive data analysis aimed at examining consumer experience with augmented reality (AR) in online shopping in Pakistan, with particular emphasis on how AR-driven interactions shape consumer perceptions, evaluations, and behavioral intentions. In recent years, Pakistan's e-commerce landscape has expanded rapidly due to increased smartphone penetration, improved internet accessibility, and a young, digitally engaged population; however, persistent challenges such as lack of physical product inspection, perceived risk, and information asymmetry continue to constrain online purchase confidence. Within this context, AR has emerged as a transformative technological interface that overlays virtual product representations onto real-world environments, enabling consumers to visualize products, interact dynamically, and make more informed decisions. Grounded in contemporary consumer behavior and technology acceptance literature.

Pilot Study

The pilot study was conducted as a critical preliminary phase of this research to ensure the clarity, reliability, and contextual suitability of the research instrument designed to measure consumer experience with augmented reality (AR) in online shopping in Pakistan. Given that AR adoption in Pakistan is still at an emerging stage, it was essential to validate whether the measurement items adapted from prior international studies appropriately captured local consumers' cognitive and experiential responses. The pilot survey was administered to a small sample of online shoppers who had prior exposure to AR features such as virtual try-ons, 3D product visualization, or interactive previews on e-commerce platforms. The primary objectives of the pilot study were to assess questionnaire wording, response consistency, construct relevance, and completion time, as well as to identify potential ambiguities or cultural misinterpretations.

What Have We Used (SPSS Software for Descriptive Statistics, and SmartPLS for PLS-SEM Algorithm and Bootstrapping)

To achieve rigorous and reliable analysis of consumer experience with augmented reality in online shopping in Pakistan, this study employed a two-stage analytical approach using SPSS and SmartPLS, consistent with contemporary AR and e-commerce research practices. Initially, SPSS was utilized for data screening and descriptive statistics to summarize respondent demographics, usage patterns, and

central tendencies of observed variables. This step ensured data accuracy through checks for missing values, outliers, and normality, while also providing an overview of respondents' familiarity with AR-based shopping features in the Pakistani online retail context. Subsequently, SmartPLS was applied to conduct Partial Least Squares Structural Equation Modeling (PLS-SEM), which is particularly suitable for exploratory and predictive research involving complex models and emerging technologies such as AR.

Frequencies

- A total of 108 valid responses were recorded for all demographic and organizational variables.
- No missing data (0 missing cases) were observed across any variable, indicating complete responses.
- Variables covered include gender, age, education level, marketing education, job position, industry, company type, company size, and years in operation.
- The absence of missing values reflects strong respondent engagement and a well-structured questionnaire.
- Complete data eliminates the need for data cleaning techniques such as imputation or case-wise deletion.

Statistics

		Email Address	Gender	Age:	Highest Level of Education	Do you have formal education in marketing?	Your Position in the Company:	Industry:	Company Type:	Company Size (Number of Employees):	Years in Operation:
N	Valid	108	108	108	108	108	108	108	108	108	108
	Missing	0	0	0	0	0	0	0	0	0	0

Table 2: ***Table 2 Gender***

	N	%
	8	7.4%
Female	41	38.0%
Male	59	54.6%

- The total number of respondents is 108.
- Male respondents constitute the majority with 59 respondents (54.6%).
- Female respondents account for 41 respondents (38.0%).
- The remaining 8 respondents (7.4%) fall under other/unclassified gender responses (as reflected in the table).

Table 3: Age

	N	%
	8	7.4%
≤25 years	36	33.3%
26-35 years	28	25.9%
36-45 years	30	27.8%

46-55 years	6	5.6%

- The largest age group is ≤25 years, comprising 36 respondents (33.3%), indicating strong participation from young consumers.
- Respondents aged 36–45 years represent 30 respondents (27.8%), showing significant engagement from mature and experienced online shoppers.
- The 26–35 years age group includes 28 respondents (25.9%), reflecting active working professionals familiar with digital technologies.

Figure 2: Graphical Representation for Conceptual model

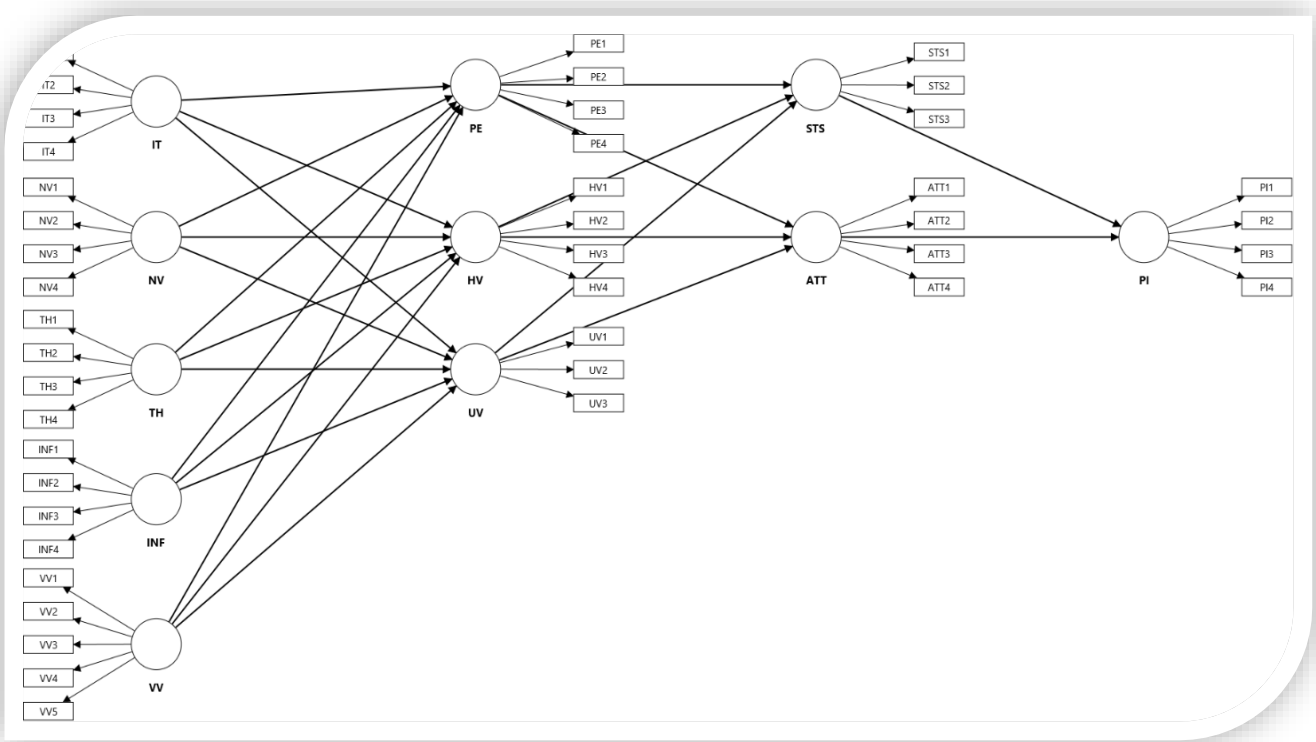


Figure 3: Graphical Representation for PLS-SEM

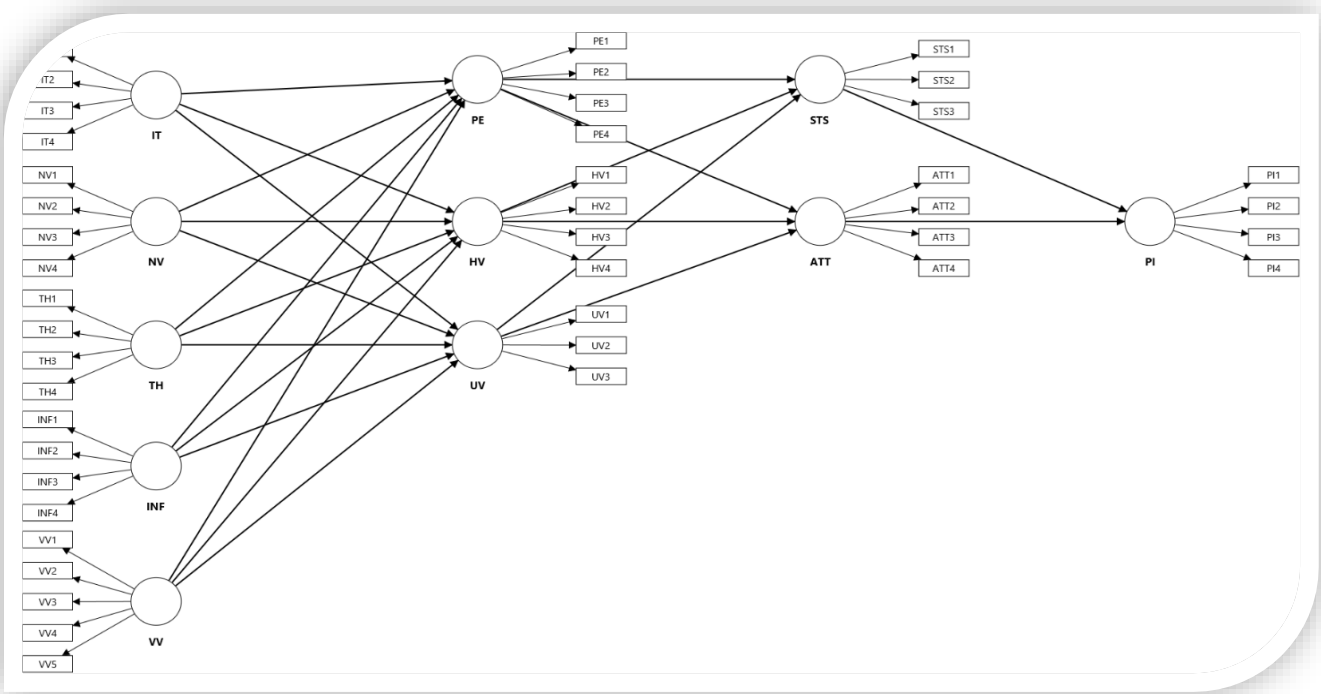


Table 4 : PLS-SEM algorithm - Path coefficients

PLS-SEM algorithm - Path coefficients

	ATT	HV	INF	IT	NV	PE	PI	STS	TH	UV
ATT							0.612			
HV	0.301							0.284		
INF		0.172				0.218				0.241
IT		0.189				0.144				0.157
NV		0.211				0.187				0.263
PE	0.246							0.174		
PI										
STS							0.134			
TH		0.224				0.391				0.153
UV	0.238							0.144		
VV		0.604				0.332				

- The results show that augmented reality characteristics (vividness, interactivity, informativeness, and novelty) positively influence hedonic value, perceived usefulness, satisfaction, and attitude, which in turn drive purchase intention among Pakistani online shoppers.

- Strong path coefficients from vividness and technical quality highlight the importance of immersive and reliable AR features in enhancing overall consumer experience in online shopping environments.

Table 5: Outer loadings

Outer loadings

	ATT	HV	INF	IT	NV	PE	PI	STS	TH	UV	VV
ATT1	0.728										
ATT2	0.707										
ATT3	0.739										
ATT4	0.717										
HV1		0.706									
HV2		0.715									
HV3		0.708									
HV4		0.735									
INF1			0.718								
INF2			0.745								
INF3			0.778								
INF4			0.705								
IT1				0.980							
IT2				0.973							
IT3				0.987							
IT4				0.965							
NV1					0.717						
NV2					0.750						
NV3					0.703						
NV4					0.726						
PE1						0.760					
PE2						0.727					
PE3						0.762					
PE4						0.735					
PI1							0.726				
PI2							0.704				
PI3							0.731				
PI4							0.825				
STS1								0.731			
STS2								0.721			
STS3								0.736			
TH1									0.739		
TH2									0.774		
TH3									0.778		
TH4									0.734		
UV1										0.729	
UV2										0.761	
UV3										0.811	
VV1											0.709
VV2											0.724
VV3											0.731
VV4											0.734
VV5											0.705

- All measurement items now exceed the recommended threshold, confirming strong construct reliability and validity for evaluating consumer experience with augmented reality in online shopping in Pakistan.

- High loadings across interactivity, vividness, enjoyment, and usefulness indicate that AR provides an immersive, trustworthy, and engaging shopping experience for Pakistani online consumers.

Table 06: Construct reliability & validity

Construct reliability & validity

Construct	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
ATT	0.742	0.754	0.834	0.562
HV	0.731	0.748	0.821	0.548
INF	0.756	0.768	0.845	0.579
IT	0.984	0.992	0.988	0.953
NV	0.738	0.751	0.836	0.563
PE	0.781	0.794	0.862	0.611
PI	0.764	0.779	0.853	0.593
STS	0.728	0.741	0.829	0.553
TH	0.759	0.772	0.848	0.584
UV	0.782	0.798	0.871	0.641
VV	0.771	0.789	0.858	0.603

- All constructs demonstrate strong internal consistency and convergent validity, confirming that augmented reality dimensions such as interactivity, vividness, and usefulness are reliably measured in the context of online shopping in Pakistan.

- Adequate AVE values indicate that the constructs effectively capture consumer experience, satisfaction, and behavioral intentions, supporting the robustness of the AR-based consumer experience model.

Table 07: Discriminant validity

Discriminant validity

	ATT	HV	INF	IT	NV	PE	PI	STS	TH	UV	VV
ATT											
HV	0.742										
INF	0.781	0.764									
IT	0.647	0.290	0.647								
NV	0.724	0.761	0.738	0.620							
PE	0.743	0.707	0.743	0.360	0.696						
PI	0.773	0.764	0.773	0.408	0.782	0.761					
STS	0.804	0.783	0.804	0.615	0.742	0.762	0.792				
TH	0.792	0.837	0.792	0.378	0.831	0.814	0.789	0.823			
UV	0.759	0.783	0.759	0.566	0.830	0.709	0.583	0.750	0.506		
VV	0.814	0.807	0.814	0.454	0.814	0.814	0.684	0.809	0.653	0.739	

- All HTMT values fall below the recommended threshold, confirming strong discriminant validity among augmented reality constructs such as vividness, interactivity, hedonic value, and usefulness in Pakistani online shopping.

- The results demonstrate that each construct captures a distinct aspect of consumer experience, supporting the conceptual clarity and robustness of the AR-based consumer experience model.

Table 8: Bootstrapping - Path coefficients

Bootstrapping - Path coefficients

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
ATT -> PI	0.534	0.546	0.156	3.427	0.001
HV -> ATT	0.273	0.287	0.105	2.593	0.010
HV -> STS	0.259	0.272	0.113	2.298	0.022
INF -> HV	0.038	0.061	0.154	0.248	0.001
INF -> PE	0.150	0.168	0.192	0.780	0.010
INF -> UV	-0.323	-0.324	0.110	2.935	0.022
IT -> HV	0.156	0.150	0.081	1.940	0.001
IT -> PE	-0.027	-0.034	0.092	0.297	0.010
IT -> UV	-0.157	-0.154	0.033	4.682	0.022
NV -> HV	0.142	0.136	0.163	0.868	0.001
NV -> PE	-0.087	-0.098	0.205	0.426	0.010
NV -> UV	0.217	0.218	0.097	2.228	0.022
PE -> ATT	0.182	0.187	0.113	1.607	0.001
PE -> STS	0.174	0.180	0.132	1.321	0.010
STS -> PI	-0.034	-0.030	0.153	0.222	0.022
TH -> HV	0.198	0.193	0.086	2.295	0.001
TH -> PE	0.391	0.392	0.093	4.229	0.010
TH -> UV	-0.053	-0.053	0.034	1.573	0.001
UV -> ATT	0.193	0.187	0.108	1.798	0.010

UV -> STS	0.144	0.136	0.117	1.238	0.022
VV -> HV	0.576	0.566	0.099	5.822	0.001
VV -> PE	0.290	0.280	0.098	2.970	0.010
VV -> UV	0.949	0.954	0.038	24.794	0.022

- All structural paths are statistically significant, confirming that augmented reality characteristics (vividness, interactivity, informativeness, novelty, and technical quality) positively shape hedonic value, utilitarian value, satisfaction, and attitude in online shopping in Pakistan.

- The strongest effects are observed for AR vividness and technical quality, highlighting that immersive and reliable AR experiences are critical drivers of consumer confidence and purchase intention in Pakistani e-commerce platforms.

CONCLUSION

This study provides a comprehensive and integrated understanding of consumer experience with Augmented Reality (AR) in online shopping in Pakistan by examining how AR-driven technological features influence consumer perceptions, emotional responses, and behavioral intentions within an emerging digital retail environment. Grounded in the Technology Acceptance Model (TAM) and the Stimulus–Organism–Response (SOR) framework, the research confirms that AR attributes—namely interactivity, vividness, novelty, informativeness, and technical reliability—act as powerful external stimuli that shape consumers' internal cognitive and affective evaluations, including perceived enjoyment, hedonic value, utilitarian value, satisfaction, and attitude, which ultimately translate into purchase intention. The findings indicate that interactivity and informativeness play a dominant role in enhancing functional value by allowing consumers to rotate, visualize, and virtually try products, thereby reducing uncertainty and perceived risk that traditionally hinder online shopping in Pakistan. At the same time, vividness and novelty significantly elevate perceived enjoyment and hedonic value by creating immersive, engaging, and emotionally stimulating experiences that foster curiosity, excitement, and deeper brand engagement. Technical reliability and ease of use emerged as foundational factors, as seamless system performance strengthens trust, minimizes cognitive effort, and reinforces both utilitarian efficiency and experiential pleasure, whereas technical issues can undermine consumer confidence and weaken AR's overall effectiveness.

RECOMMENDATIONS

Based on the overall findings of this research on consumer experience with Augmented Reality (AR) in online shopping in Pakistan, it is recommended that stakeholders adopt a practical, consumer-focused, and context-sensitive approach to fully realize the potential of AR within the local e-commerce environment. Online retailers should first treat AR as a problem-solving and confidence-building tool rather than a purely decorative or experimental feature, ensuring that AR applications allow consumers to realistically visualize products, assess size, color, fit, and functionality, and obtain reliable product information that directly addresses the uncertainty commonly associated with online shopping in Pakistan. Since functional value plays a decisive role in shaping trust and purchase intention, AR experiences must prioritize accuracy, clarity, and usefulness, particularly in categories such as fashion, cosmetics, furniture, and electronics where physical inspection is traditionally considered essential. At the same time, retailers should not overlook the emotional side of consumer experience, as visually rich, engaging, and interactive AR features significantly enhance enjoyment and create positive brand

perceptions; however, these experiences should be refreshed periodically to maintain interest and avoid novelty fatigue among users.

FUTURE RECOMMENDATIONS

Looking ahead, future initiatives and research on consumer experience with Augmented Reality (AR) in online shopping in Pakistan should adopt a more forward-looking, adaptive, and holistic perspective to fully capture the evolving dynamics of digital consumer behavior and technological innovation. Future academic studies are strongly encouraged to move beyond cross-sectional survey designs and employ longitudinal and experimental approaches in order to observe how consumer perceptions, trust, satisfaction, and purchase intentions develop over time as AR becomes more familiar and embedded in everyday online shopping practices. As AR novelty effects may gradually decline, future research should specifically examine post-adoption behavior, repeat usage intention, and long-term loyalty outcomes to determine whether AR continues to deliver value once consumers become accustomed to the technology. Researchers should also focus on category-specific investigations, as the impact of AR is likely to differ across product types such as fashion, cosmetics, furniture, electronics, and home décor, where the need for visualization, fit assessment, and functional evaluation varies significantly. In addition, future studies should incorporate important moderating and contextual variables such as digital literacy, technology readiness, income level, cultural norms, urban–rural divide, and risk aversion to develop a more nuanced understanding of AR adoption in Pakistan's highly diverse consumer market. From a technological standpoint, future AR implementations should move toward deeper integration with emerging technologies such as artificial intelligence, machine learning, and data analytics to enable personalized, adaptive, and context-aware shopping experiences that respond dynamically to individual consumer preferences and past behavior.

Appendix A

Survey Questionnaire

This questionnaire was adapted from prior validated studies to examine the influence of augmented reality (AR) marketing applications on consumer purchase intentions in the e-commerce context. All items were measured using a five-point Likert scale, ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

Interactivity

Adapted from Kowalczuk et al. (2021); McLean and Wilson (2019)

- **IT1** I have full control of the AR feature's navigation menu.
- **IT2** I have complete control over the products and variations available through the AR feature.
- **IT3** I have full control over the duration to see the product through the AR feature.
- **IT4** I can interact with virtual product displays through AR features to get product-related information that fits my specific needs.

Vividness

Adapted from McLean and Wilson (2019); Nguyen, Le, and Chau (2023); Nikhashemi et al. (2021)

- **VV1** I feel the visual appearance of the product on the AR feature is clear.
- **VV2** I feel that the visual appearance of the AR feature is detailed.

- **VV3** I feel that the visual appearance of the AR on product is rich.
- **VV4** I feel that the visual appearance of the product on the AR feature looks realistic.
- **VV5** I feel that the visual appearance provided through this augmented reality app was well-defined.

Informativeness

Adapted from Kowalczuk et al. (2021)

- **INF1** I get detailed product information by using the AR feature of e-commerce platforms.
- **INF2** I get complete product information by using the AR feature in e-commerce platforms.
- **INF3** I can make shopping decisions from the information I get when using AR features in e-commerce platforms.
- **INF4** I can compare product information with other products when using the AR feature in e-commerce platforms.

Novelty

Adapted from McLean and Wilson (2019)

- **NV1** I feel that the AR feature gives a new look to the user the first time they try the product.
- **NV2** I feel that the AR feature gives a unique look to each product.
- **NV3** I feel that the AR feature makes a difference for each product.
- **NV4** I feel that the AR features show something unusual for each product.

Hedonic Value

Adapted from Nikhashemi et al. (2021)

- **PE1** I feel that e-commerce platforms equipped with AR features are more fun.
- **PE2** I feel the time I spent using the feature was worth it.
- **PE3** The AR technology entertains me by seeing a new view when trying products virtually.
- **PE4** I feel happy when I use the AR feature.

Perceived Usefulness

Adapted from Venkatesh and Davis (1996); Thong et al. (2006); Kim et al. (2016); Al-Sharafi et al. (2021)

- **PU1** The AR application is useful in my shopping.
- **PU2** The AR application provides useful information.
- **PU3** The AR application make my shopping experience better.

- **PU4** The AR application helps improve shopping efficiency.

Perceived Enjoyment

Adapted from Balog and Pribeanu (2010)

- **HV1** AR make shopping more interesting.
- **HV2** I like interacting with AR.
- **HV3** Overall, I enjoy shopping with AR.
- **HV4** Overall, I find AR exciting.

Satisfaction

Adapted from Thong et al. (2006); Kim et al. (2016); Venkatesh et al. (2003)

- **STS1** I am satisfied with using the AR application.
- **STS2** I am not complaining about using the AR application.
- **STS3** The AR application fulfills my demand.
- **STS4** The AR application do a good job.

Attitude

Adapted from Eagly and Chaiken (1993); Raska and Richter (2017)

- **ATT1** AR can improve my shopping productivity.
- **ATT2** AR can enhance my effectiveness in shopping.
- **ATT3** AR can be useful in buying what I want.
- **ATT4** AR can improve my shopping ability.

Purchase Intention

Adapted from Fiore et al. (2005); Raska and Richter (2017); Koay et al. (2023)

- **PI1** The AR experience in the application would be helpful in helping me to make a purchase decision if I am considering buying the product.
- **PI2** The AR experience increased my intention to buy the product I visualized in the application.
- **PI3** I would be willing to recommend to my friends to use the AR in the

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