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How Augmented Reality App Quality Shapes Online Purchase Intention: The Mediating Role of Customer Attitude among Online Shoppers

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ABSTRACT

Augmented reality (AR) is transitioning online purchasing by enabling consumers to interact with digital product representations and evaluate products in more immersive ways. However, how the quality of AR-driven apps shapes consumers' attitudes and purchase intentions requires further investigation, particularly in emerging markets. This study examines the nexus between service quality (SEQ), system quality (SYQ), information quality (INQ) and consumers' behavioral intent to purchase, with customer attitude proposed as a mediating mechanism. Grounded on the DeLone and McLean Information Systems Success Model (D&M ISSM), the research develops an integrated framework to explain consumer responses to AR-enabled online shopping. The research focuses on online consumers in Lahore, Pakistan, who are familiar with mobile applications and online shopping. A deductive, cross-sectional survey approach and purposive sampling are used to examine the proposed relationships. The framework proposes that SEQ, SYQ, and INQ impact customer attitude in a positive way, which in turn strengthens behavioral intention to purchase. Customer attitude is also examined as a mediator linking each quality dimension with purchase intention. The study advances research on AR commerce research by integrating technology-quality dimensions with an attitudinal explanation of consumer purchase intentions. Its practical implications underscore the significance of offering accurate product information, reliable application performance, and responsive customer support to improve consumer evaluations of AR shopping experiences. The research also offers a platform for future exploration across product categories and consumer markets.

Introduction

With the advent of advanced digital technologies, online shopping has undergone significant changes due to the altered way in which consumers search for, assess and use information about products in order to make purchases (Callister, 2026). The use of interactive digital technologies becomes increasingly common among retailers as a means of improving accessibility of product information and enhancing consumer engagement in the process of shopping (Capurro et al., 2026). One of the most important developments in this regard is augmented reality (AR) technology because it allows integrating digital representations of products into the physical environment of consumers (Pandey & Pandey, 2026). For online shoppers, this means having the ability to imagine and interface with products digitally prior to making decisions regarding purchases. Research suggests that AR technology influences consumer evaluations and intentions through characteristics such as interactivity and vividness (Zhang et al., 2026). However, the success of virtual shopping technologies does not only rely on the interactivity while the quality of information, technological infrastructure and support services that are available to consumers is crucial (Shahin, 2026). Therefore, the

understanding of these dimensions is necessary for explaining consumer evaluations of technology-enabled shopping environments and their purchase intentions.

The quality of digital platforms has always been an important issue in the field of IS (Bonina et al., 2018). DeLone and McLean (1992) developed an ISS framework in which the authors argued that the evaluation of information systems should be conducted using several dimensions instead of a single indicator of effectiveness. In their updated model, the SEQ, SYQ and, INQ became three key dimensions of information systems success (DeLone & McLean, 2003). The INQ defines the relevance, precision, comprehensiveness, and usefulness of the information offered by a system. The system quality involves technological performance and features of the system, comprising of its consistency, practicality along with responsiveness. The service quality involves the support services available to consumers while they are interacting with the system. These are separate but complementary dimensions of digital service delivery and a useful basis for the analysis of consumer evaluations of online shopping platforms. DeLone and McLean (2004) further expanded this framework for the purposes of evaluating electronic commerce systems.

The importance of quality of information systems becomes especially apparent in e-commerce and more specifically online shopping, where consumers have to resort to using digital information and technologically mediated interfaces to evaluate products that cannot be examined directly prior to purchase (Khatun et al., 2026). Information quality can be used for assessing certain product attributes and deciding whether the product is right for consumers (Wang et al., 2024). The system quality can help shoppers navigate around, interact with the interface and carry out other activities associated with shopping, whereas service quality can help them resolve problems and obtain additional insights about the products (Lee et al., 2019). All in all, lack of quality in any of these dimensions may produce certain negative consequences, including uncertainty, confusion, or disruptions in the shopping process. On the contrary, high-quality information systems can aid in achieving more positive assessments from consumers. All these points become especially relevant for studies of AR-enhanced retailing when consumers engage with digital representations of products via technologically supported interfaces and use the quality of the surrounding platform to make their assessments. Even if augmented reality elements make possible for customers to engage with goods in a manner impossible without such technologies, their usefulness for consumers in business terms can be considered only within the context of platform quality (Rachmad, 2024).

Even though the pertinence of the conception of IS quality for electronic commerce has already been shown, the relationship among particular quality dimensions and consumer purchase intention deserve further consideration with regard to the retailing environment mediated by technological means. Information systems literature has repeatedly focused on SEQ, INQ, and SYQ and as far as usage, satisfaction, and performance are concerned Petter et al., 2008). Still, there may be specificities related to these dimensions depending on nature of the technologies employed and particular contexts of consumer interactions with them. For instance, in the context of AR-enabled retailing, apart from evaluating the digital information available for consumers, they evaluate the capacity of the platform itself in terms of its ability to enable visualizations and interactions. It becomes important to differentiate between quality of technological environment and psychological perceptions developed by consumers in interaction with it (Widjaja, 2025).

Customer attitude serves as a theoretically interesting construct in studying the connection between information systems quality and purchase intention. Attitude represents to positive or negative judgment an individual of the particular subject or behavior and represents one of the well-known elements of behavioral decision-making models (Ajzen, 2018). Specifically, in online purchasing, consumers' judgments regarding the relevance of information presented, the performance of the shopping platform, and consumer support can become part of their overall judgments about the shopping experience in general (Yang & Babapour, 2023). As such, the positive attitude towards shopping in the digital platform may result in a higher purchase intention. This association corresponds to the present knowledge on electronic-commerce acceptance and emphasizes the importance of consumer perception as one of the determinants of behavioral intention (Masfe & Helmi, 2025). However, SEQ, SYQ, and INQ, customer attitude, and purchase intent represent different variables, thus their relationships must be studied separately from one another as not to treat these variables interchangeably within digital shopping experience.

However, the consideration of the mediating effect of customer attitude becomes relevant since information systems quality can affect the purchase intention through consumers' perceptions of the shopping environment. The quality of information, functionality of technological platform, and customer support become the basis for consumer perceptions of the experience of purchasing and can become connected to purchase intention (Han et al., 2025). Investigating the intervening mechanism of customer attitude provides a way of testing this explanatory variable. At the same time, exploring the mediating effect helps to separate the direct link between quality dimension and customer attitude from the indirect association between quality dimension and intent to purchase. While there is already substantial evidence related to attitudes of the customer and behavioral intent in

electronic commerce, the investigation of this perspective in the realm of AR-enabled shopping environment is an interesting issue to examine empirically.

The study focuses on the relationships between the variables such SEQ, SYQ, INQ, customer attitude, and behavioral intent to purchase in AR-enabled shopping context. The study draws upon D&M ISSM (DeLone & McLean, 2003). Within this conceptual paradigm, SEQ, SYQ, and INQ are viewed as separate antecedents of customer attitude. The customer attitude is then studied in terms of behavioral intention to purchase and, particularly, in terms of its possible mediating effect in the relationships between SEQ, SYQ, INQ, and behavioral intent to purchase.

The study enriches the current body knowledge in three distinct ways. Firstly, the research uses information systems success framework to examine consumer decision-making in AR driven shopping underscoring the importance of effectiveness of the digital platform as a factor affecting consumer evaluation of products. Second, the study looks into customer attitude as a potential mediator in the link between SEQ, SYQ, INQ, and intent to purchase. Finally, the research offers perspectives into the importance of separate quality dimensions in the development and management of AR-enabled shopping interfaces. Particular consideration should be given to the connection between the quality dimensions and customer attitude and purchase intention for retailers and technology suppliers developing digital shopping environments.

Literature Review

Theoretical Foundation

The D&M ISSM provides an appropriate theoretical foundation to investigate the effect that the quality of a digital shopping system can have on consumers' evaluations and responses. The framework was initially proposed by DeLone and McLean (1992) and revised later on (DeLone & McLean, 2003). Within this framework, ISS is viewed as a multidimensional construct comprising SEQ, SYQ, INQ, satisfaction of user, net benefits, and use. Instead of viewing technology adoption as a result of a particular technical attribute, the model suggests that users' responses is contingent on information accuracy, effectiveness of the system, and its support. The framework becomes relevant to electronic commerce, and the quality dimensions included into the analysis become relevant for the evaluation of digital commerce systems (DeLone & McLean, 2004).

In the case of AR shopping, the framework becomes particularly relevant as consumers use digital interfaces in order to examine the products which cannot be inspected before purchase in a physical way (Sahli & Lichy, 2026). In addition to the visual quality, consumers should have access to the information about the products, the system should be technically sound, and consumers should receive sufficient support from it. Research conducted within the information systems success framework in the setting of AR mobile commerce has addressed such topics as information and visual quality and their effect on the consumer evaluations of AR shopping experiences (Zhang et al., 2026). Research relevant to the topic of AR shopping has also addressed such issues as AR experience quality and its impact on consumers' responses.

For the purpose of the current research, the ISS framework is applied to AR shopping where SEQ, SYQ, INQ and are seen as the antecedents of consumer attitude while behavioral intention to purchase is viewed as the outcome variable. It is assumed that consumer attitude serves as a mediating variable between the consumer evaluations of the shopping system and the behavioral intention to purchase. This does not mean that consumer attitude belongs to the dimensions of the D&M framework but more precisely that it is a particular extension of it.

Hypothesis Development

Information Quality and Customer Attitude

INQ denotes the perceptions that consumers form concerning the effectiveness of information that is available via a digital shopping system (Putri & Pujani, 2019). This may be reflected depending on the measure by relevance, accuracy, completeness, clarity, currency, and usefulness of the information available for use (Kim & Yang, 2025). The significance of information quality in online shopping lies in the role that the information plays as a basis of product evaluation due to the fact that consumers often have little chance to examine the products physically before they make their choice (Aggarwal & Rahul, 2017).Hence, the standard of the content available can have some impact on consumer evaluations of the shopping experience and the perceived usefulness and reliability of the platform. INQ is one of the major dimensions of the D&M model and has been explored extensively in the context of information systems success research (DeLone & McLean, 1992, 2003).

The problem of INQ becomes even more acute for AR shopping because while AR technology can provide a virtual presentation of a goods in a real world setting of the consumer, an engaging presentation is not always enough to make a consumer feel confident

about what he sees (Chylinski et al., 2020). In order to make sense of the digital representation, consumers may need some detailed information regarding product features, specifications, dimensions, compatibility, and other aspects of interest. Thus, when information that accompanies the AR-driven good presentation is relevant and understandable, consumers may be able to evaluate their experience better and feel more positively about the technology (Riar et al., 2023).

Previous studies depict the significance of INQ in relation to consumer evaluations based on AR mobile commerce experience. Yoo (2020) explores information systems success in AR mobile commerce and analyzes the effect of perceived quality on consumers' evaluations of the technology. Additionally, according to the framework offered by D&M (2003), INQ represents one of the fundamental dimensions of system success. Such perspectives make it possible to assume a significant relation among information quality and customer attitude in case of AR shopping. Still, there is room left for empirical investigation.

H1: *Information quality positively influences customer attitude towards augmented reality driven apps.*

System Quality and Customer Attitude

System quality means a performance level of an information system (Barbacci et al., 1995). Within online shopping environment, system quality includes system's usage easiness, responsiveness, consistency, approachability, and capability to perform the intended function (Yang & Babapour, 2023). SYQ is a critical component of ISS in light of D&M (2003)'s perspective as users' experience depends not only on information but also on the performance of the IS itself.

In AR-driven shopping, the issue becomes relevant because the technology has to combine information and physical worlds of users (Anand et al., 2023). For instance, users may need to activate a camera, align virtual products, change viewing angles, modify product properties, or walk around to inspect the digital object. The delay, malfunctioning, unsteady tracking, or inconvenient navigation may hinder these actions and ruin the entire purchasing journey (Shi et al., 2025). On the contrary, the presence of responsiveness and reliability in the shopping system may allow customers to explore a product easily as the technology will not be a barrier any more. Thus, system quality seems to form the basis for more positive attitudes towards AR shopping.

Indeed, previous research devoted to AR-based product presentation pays much attention to both technological and experiential characteristics influencing consumer attitudes. Past study focused on the analysis of AR in online purchasing using vividness as well as the interactivity as independent constructs (Yim et al., 2017). While Hilken et al. (2017) explored the influence of AR on experience of consumer in retailing and their willingness to purchase. Even closer to the topic of the current paper is Yoo (2020) study where AR mobile commerce was investigated in light of information systems success model. Therefore, it seems reasonable to argue that system quality matters when it comes to AR experiences. Specifically, the present study assumes that consumers who perceive an AR shopping system as reliable and responsive will have positive attitudes towards it.

H2: *System quality positively influences customer attitude towards augmented reality driven apps.*

Service Quality and Customer Attitude

SEQ indicates the perceptions of the user regarding the facilitation and assistance offered by an information system (Cenfetelli et al., 2008). In relation to online shopping, service quality includes help availability, responsiveness to users' requests, efficient handling of complaints and providing users with necessary guidance (Jun et al., 2004). D&M (2003) have included SEQ in their updated ISSM, recognizing the fact that the surrounding support can affect users' overall perception. SEQ should not be confused with quality of system which takes into account the technical performance of the IS; quality of service relates to the assistance that consumer is likely to obtain through the system (Xu et al., 2013).

In AR-enabled online shopping, service quality becomes relevant when consumers need help using the feature, solving technical problems, clarifying product information and resolving issues related to the online order (David et al., 2021). Even though AR application is highly developed from the technical perspective, deficiency in assistance in case something goes wrong can make the shopping experience negative. On the other hand, availability of support can make the process easier and create users' perceptions of the reliability of the shopping platform. Such perceptions may result in a more positive attitude towards the AR shopping experience (Abu ELSamen et al., 2026).

It is recognized in information systems literature that SEQ is a critical aspect of system success, although the effects can differ in various settings and with different user groups. For example, Petter et al. (2008) have reviewed the measures of ISS and the relationships among them, while Jeyaraj (2025) has identified heterogeneity in the numerical evidence for the relationships specified in DeLone and McLean models. Thus, it cannot be assumed that each quality dimension has an equal effect in all

applications. However, since customers depend on the assistance from retailers and digital platforms in case of AR-enabled online shopping, service quality can explain the difference in their attitude.

H3: *Service quality positively influences customer attitude towards augmented reality driven apps.*

Customer Attitude and Behavioral Intention to Purchase

An attitude is described as an evaluation of the customer of some behavior, object, or experience which can be either favorable or unfavorable (Ajzen & Fishbein, 2000). For the current study, the construct is used to refer to the consumer's evaluation of AR-enabled shopping (Alimamy & Al-Imamy, 2022). A positive attitude is indicative of a consumer's perception that shopping through an AR-enabled platform is valuable, attractive, useful, and effective way of evaluating the products. On the other hand, a behavioral intention to purchase a product means a consumer's stated prospect or inclination to purchase particular goods (De Cannière et al., 2009). Even though attitude and purchase intention are linked, they are different constructs since the former one is an evaluation and the latter one is a prospective behavior. In turn, the connection between attitude and intention is based on the TPB proposed by Ajzen (1991). Keeping in view this theory, behavioral intent is influenced by attitude toward the behavior, perceived behavioral control, and subjective norms. The more favorable attitude to the behavior can act as a better foundation to develop an intention to perform that behavior (Ajzen,1991). Nonetheless, intention does not necessarily mean a behavior and may be impacted by other factors (Ajzen & Fishbein, 2000). In the case of AR shopping, consumers who have a positive evaluation of the experience may be willing to make purchases through AR-enabled platforms (Riar et al., 2023).

AR can help consumers to get additional information through different sensory modes about product representations and their positioning in specific situations (Yang & Lin, 2024). Nevertheless, the availability of the AR functions does not lead to the development of a buying intent directly. Consumers can enjoy the use of AR technology without having any intention to make purchases or they may develop a positive attitude toward the shopping experience but may not be able to buy products due to certain factors such as price, needs, trust, or product availability (Ganesan & Kumar, 2024). Research done on AR versus conventional product presentations suggests that consumer responses consist of different aspects such as perceived usefulness, enjoyment, product liking, and decision confidence (Yim et al., 2017). On the basis of this theoretical foundation, the current research assumes that consumers having a more positive attitude to AR-enabled shopping will have stronger purchase intentions.

H4: *Customer attitude positively influences behavioral intention to purchase towards augmented reality driven apps.*

Mediation of Customer Attitude

The attitudes of the customer could provide some explanation about the way in which the consumer's evaluation of an AR shopping system would lead to an intention to make a purchase. The variables that include SEQ, SYQ, and INQ are all unique aspects of the shopping experience; but their influence on the purchasing intent of the customer might depend, to some extent, on how the consumer evaluates his overall experience. This is particularly significant since the shopping experience might provide high-quality information and reliable functioning and services that do not necessitate purchase by all customers.

Customer Attitude as a Mediator between Information Quality and Behavioral Intention to Purchase

Quality of information may affect the purchase intention with respect to the fact that effectiveness and relevance of goods information enables consumers to evaluate the suitability of products (Wells et al., 2011). In AR-based shopping, product information may help interpret product features and conduct more informative evaluations (Kim & Choo, 2021). Yet, just the presence of high-quality information cannot guarantee purchase intention. Consumers may use the information as part of forming a general positive or negative opinion about AR shopping experience and this opinion may further correlate with their purchasing intent (Whang et al., 2021). Thus, customer attitude is one possible channel connecting quality of information with purchase intention. If consumers find information in AR shopping helpful and credible, they are likely to form a more favorable evaluation towards the shopping experience and this positive attitude will correspond with higher purchase intentions. The current study focuses on customer attitude as a channel between INQ and intent to buy.

H5: *Customer attitude mediates the relationship between information quality and behavioral intention to purchase towards augmented reality driven apps.*

Customer Attitude as a Mediator between System Quality and Behavioral Intention to Purchase

The impact of system quality on purchase intention might happen through influencing consumer experience with an augmented reality (AR) shopping platform (Ghafoor et al., 2023). Proper functioning, ease of navigation, and quickness of system performance

might decrease the difficulties consumers face while exploring the products and performing related tasks (Palaniappan et al., 2025). Such factors could create a positive experience with the AR shopping, while constant troubles could negatively impact this experience. The attitude formed as a result would then be connected to the probability of buying products using the platform (Chen, 2025). This type of association among quality of system and intent to purchase would highlight the difference between technical features of the system and evaluations of it made by consumers. A highly performative system is not automatically associated with purchase intention, since consumers might have no need for the product, consider it too expensive, or like another store more (Rafdinal et al., 2025). However, in case a technically good platform influences positively the consumers' attitude toward AR shopping, then it could be seen as a link between the two. Previous literature on AR had shown connection between the features of the system and of the experience with it and consumer reactions, including cognitive, affective, and behavioral ones.

H6: *Customer attitude mediates the relationship between system quality and behavioral intention to purchase towards augmented reality driven apps.*

Customer Attitude as a Mediator between Service Quality and Behavioral Intention to Purchase

Quality of service could impact the consumer purchase intention by virtue of the evaluation that consumers make of their shopping experience and available assistance (Gounaris et al., 2010). Provision of quick help and proper issue resolution decreases uncertainty and makes the whole shopping process more manageable. If consumers perceive that there will be some help available in case of an issue arising, then they would assess the shopping experience in a positive manner (Wu, 2023). In turn, this positive assessment could be related to higher purchase intention. Proposed mediation is particularly important if consumers use digital assistance to resolve the problems that cannot be resolved using AR-based tools. Consumers may need additional help with regard to product fit, ordering, payments, delivery, or returning of purchased items. Proper service can positively affect the consumer evaluation, while the bad service can diminish it even if the AR tool works flawlessly. However, this relationship could be conditional upon the previous experience of consumers, their expectations, and the type of purchased products. Therefore, in this study the customer attitude is considered as a potential mediator connecting SEQ with purchase intention, without taking for granted the significance of indirect effect.

H7: *Customer attitude mediates the relationship between service quality and behavioral intention to purchase towards augmented reality driven apps.*

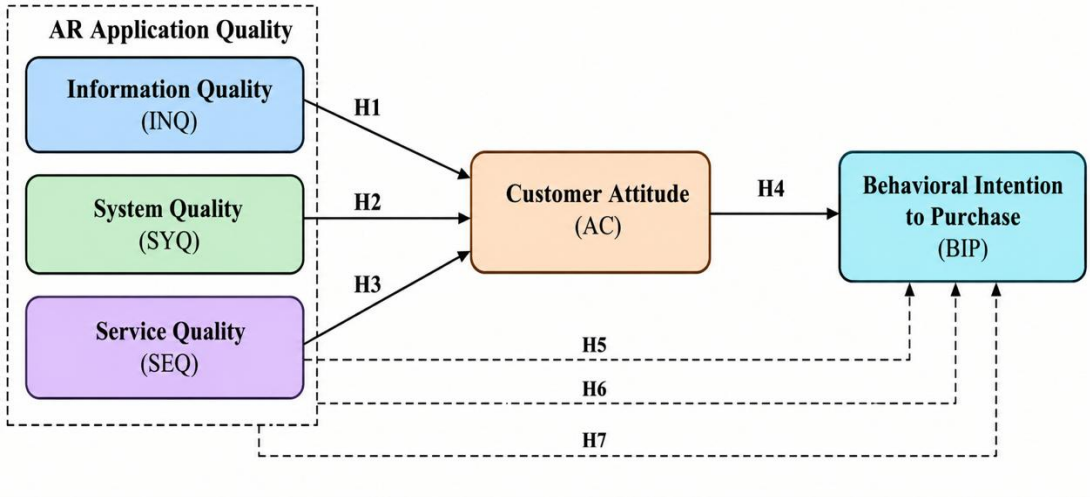


Figure 1: Research Framework

Methodology

This research employed a quantitative research design and a deductive approach for investigating the linkage among SEQ, SYQ, INQ, customer attitude, and behavioral intent to purchase in AR-enabled apps. The deductive approach was appropriate because proposed paths were formulated based on relevant theoretical basis and thereafter analyzed using empirical data (DeLone &

McLean, 2003). A cross-sectional survey design was used in order to gather data at a single point in time, making it suitable for investigating linkage among the study constructs (Setia, 2016). The target population comprised individuals in Lahore, Pakistan, who had prior knowledge of mobile applications and were familiar with online purchasing. A non-probability purposive sampling technique was utilized to select participants who met these eligibility criteria (Etikan et al., 2016). The sample size was determined using an item-to-respondent ratio of 1:20, a guideline applied in previous questionnaire-validation research (Gunawan et al., 2021; Bujang et al., 2012) and discussed in methodological literature on factor analysis (Meyers et al., 2013). As the research instrument contained 20 measurement items, a target sample of 400 respondents was established. Of the 400 questionnaires disseminated, 350 questionnaires were obtained filled completely, yielding a completion rate of 87.5%. The researcher in this study used the existing scales of the previous researches, and the data was collected from the required participants by employing a questionnaire with 7 Point-Likert measure (ranging from 1 to 7). The instrument adopted to measure the information quality is 4-items scale by (Kim & Hyun, 2016). The 5-items scale by employed to assess system quality (Kim & Hyun, 2016). A 5-items scale from the study of Kim and Hyun (2016) was used to measure the service quality. The scales for customer attitude was borrowed from literature of (Hung et al., 2021). The adopted three items scale of (Erdmann, Mas, & Arilla, 2021) was used to measure behavioral intention to purchase. The data were tested using Smart PLS to determine the reliability and validity of the scales and examine the proposed direct relationships and the mediation of customer attitude.

Analysis and Results

Data Screening

The first step while screening the data was the analysis of values which were missing. Therefore, data screening was done through the use of Little's test. Consistent with the criteria recommended by Rahi, (2018), the data utilized in the research is MCAR. In addition, the highest percentage of missing values found was 2%, which is less than 5% of data, thereby validating its quality.

Common Method Bias

As concerns common method bias (CMB), this problem was addressed. Common method variance bias is associated with the spurious correlation among predictors and criteria that may happen due to the use of the same method of assessment of predictors and criterion (Podsakoff et al., 2003). Such bias might affect results because it might influence significantly or insignificantly the relations between the constructs under consideration, causing wrong verdicts (Rahi et al., 2025: Podsakoff et al., 2003). In response to this problem, two approaches were applied: statistical and procedural. The procedural comprises of the randomization of the survey questions prior to their presentation to respondents. In relation to the second approach, the approach of unmeasured latent marker construct was applied in accordance with Rahi (2018) and Lindell and Whitney (2001). and It means that if the change of R2 when introducing the marker variable was less than 10%, then common method bias would not have been an issue. Indeed, in the current research the change of R2 was 5.9%.

Structural Equation Modeling

There are two types of structural equation modeling described in the statistical literature, covariance-based SEM (CB-SEM) and variance-based SEM (VB-SEM). According to Rahi (2017), CB-SEM can be used to test the existing model while VB-SEM should be used in case of testing a new model. Hence, the present research used VB-SEM in analyzing the data following the two-step approach (Rahi, 2017). The first step includes assessment of the validity and reliability of the variable using the measurement model while the second step entails analysis of the hypothesized association between the constructs through the structural model. The measurement model involves analysis of the reliability and validity of the constructs to check their robustness. Reliability of constructs is estimated through Cronbach's alpha and composite reliability having values higher than the threshold value of 0.70 (Rahi, 2017). Thus, the instrument reliability was estimated based on factor loadings with the minimum threshold of 0.60. All values are higher than the required threshold; therefore, instrument reliability is estimated (Rahi, 2017). The convergent validity of the constructs was tested based on the average variance extracted (AVE) (Rahi, 2017; Fornell and Larcker, 1981). The values of AVE are higher than 0.50, which confirms the convergent validity of the constructs. Thus, it is evident that factors and instruments can reliably measure distinct constructs. (Table 1)

Table 1: Factors Reliability and Validity

Constructs	Items	Factor Loadings	Cronbach's Alpha	Composite Reliability	AVE
Information Quality	INQ1	.812	.841	.895	.681
	INQ2	.846			

	INQ3	.823			
	INQ4	.815			
System Quality	SYQ1	.824	.872	.906	.659
	SYQ2	.801			
	SYQ3	.836			
	SYQ4	.819			
	SYQ5	.782			
Service Quality	SEQ1	.815	.858	.899	.641
	SEQ2	.842			
	SEQ3	.806			
	SEQ4	.788			
	SEQ5	.793			
Customer Attitude	CA1	.831	.854	.904	.697
	CA2	.856			
	CA3	.824			
Behavioral Intention to Purchase	BIP1	.861	.836	.902	.754
	BIP2	.874			
	BIP3	.862			

In addition, more tests were performed to establish whether there was distinctness in the constructs. Further examination of the discriminant validity was done with the help of Fornell-Larcker criterion where the square root of the AVE for variables must be higher than the inter-construct correlation. This guarantees the uniqueness of measurement of each construct and avoids excessive confounding with other variables (Fornell & Larcker, 1981). It is clear from the analysis that the AVE's square roots are greater as compared to variable inter-construct correlations. (Table 2)

Table 2: Fornell–Larcker Criterion

Constructs	INQ	SYQ	SEQ	CA	BIP
INQ	.825				
SYQ	.521	.812			
SEQ	.486	.548	.801		
CA	.562	.591	.574	.835	
BIP	.498	.527	.512	.638	.868

Further, Heterotrait-Monotrait (HTMT) ratio has been used for measuring discriminant validity among the constructs. It is known to be a superior method compared to conventional methods like Fornell-Larcker criterion, which has certain limitations regarding the assessment of discriminant validity (Kline, 2011; Rahi et al., 2025). For this reason, HTMT analysis has been done for more accurate assessment. HTMT ratio below 0.85 or 0.90 denotes satisfactory discriminant validity (Kline, 2011; Rahi et al., 2025). Since none of the HTMT ratios exceed the threshold, the results are indicative of the distinct nature of the constructs. Results of HTMT analysis have been provided in Table 3.

Table 3: Heterotrait–Monotrait Ratio (HTMT)

Constructs	INQ	SYQ	SEQ	CA	BIP
INQ					
SYQ	.624				
SEQ	.587	.651			
CA	.672	.698	.681		
BIP	.591	.632	.615	.748	

Vertical collinearity has been checked already for the measurement model, while lateral multicollinearity among the variables has not yet been checked. As a result, lateral multicollinearity has been checked through variance inflation factor (VIF) analysis. The VIF ratios have been compared to the exogenous variables, for which the suggested threshold is below 3.3 to exclude the possibility of multicollinearity (Rahi, 2017; Hair et al., 2016). All constructs show VIF values much below this threshold, which confirms that there is no multicollinearity problem in the data. Therefore, the data is suitable for structural model analysis. (Table 4)

Table 4: Analyzing lateral multi Collineraity Issue

Predictor Variable	Endogenous Variable	VIF
INQ	CA	1.684
SYQ	CA	1.912
SEQ	CA	1.756
CA	BIP	1.000

Hypotheses Testing

The measurement model suggests that there is no multicollinearity in the data. Hence, the structural model was used to analyze the data further. In the structural model, the hypothesis is tested. For the validity of the findings, bootstrapping technique using 5,000 dummy samples taken from the original sample set was used (Hair et al., 2014; Rahi, 2017). The bootstrapping process is quite useful in addressing problems associated with data normality (Rahi, 2017). The bootstrap output included the path coefficients, standard error, t-value, and the level of significance. The findings on the hypothesis are presented in Table 5.

Table 5: Hypotheses Testing

Hypothesis	Path	B	STDEV	t-statistics	Significance	Decision
H1	INQ→CA	0.310	0.064	4.844	0.001	Supported
H2	SYQ→CA	0.270	0.068	3.971	0.001	Supported
H3	SEQ→CA	0.190	0.069	2.754	0.006	Supported
H4	CA→BIP	0.580	0.062	9.355	0.001	Supported

The results show the relation between INQ and CA ($\beta = 0.310$, $t = 4.844$, $p < 0.001$) is positively significant. This means that when customer perceive the information obtained from AR apps as accurate, relevant and useful, then they form favorable attitudes toward using these applications. Thus, H1 is supported by the presented results. Also, the results indicate positive link between SEQ and CA ($\beta = 0.270$, $t = 3.971$, $p < 0.001$) it is also significant. It may mean that the viewpoint of reliability, usage easiness, responsiveness and convenience of the system can help consumers develop favorable attitudes towards AR applications. Thus, H2 is supported by the presented results.

Moreover, the results show the significant as well as positive linkage between quality of service and attitude of the consumer ($\beta = 0.190$, $t = 2.754$, $p = 0.006$). This means that consumers' perceptions of support and assistance in relation to AR shopping applications may influence their attitudes positively. Thus, H3 is supported by the presented results. Finally, the findings shows the significantly positive association between customer attitude and behavioral intention to purchase ($\beta = 0.580$, $t = 9.355$, $p < 0.001$). This means that positive consumer evaluations of AR shopping applications can lead to higher purchase intentions. Thus, H4 is supported by the results.

Mediation Analysis

The mediation model was analyzed to investigate if customer attitude acts as a mediator between service quality, system quality, and information quality with the behavioral intention to purchase using augmented reality (AR) shopping. It is believed that customer attitude acts as an intermediary variable by which the consumer perception of the quality of AR shopping applications results in increased buying intent. Indirect effects were analyzed using the bootstrapping technique in PLS-SEM. The significance of the indirect effect was based on the bootstrapped t-statistic, p-value, and confidence interval. (Table 7)

Table 7: Mediation Analysis

Hypothesis	Path	B	STDEV	t-statistics	Significance	Decision
H5	INQ→CA→BIP	0.180	0.047	3.829	0.001	Supported
H6	SYQ→CA→BIP	0.157	0.044	3.568	0.001	Supported
H7	SEQ→CA→BIP	0.110	0.041	2.683	0.007	Supported

Based on the results, there is a positively significant indirect impact of information quality on behavioral intent to purchase, mediated by customer attitude ($\beta = 0.180$, $t = 4.000$, $p < 0.001$). In other words, the results suggest that information quality may affect consumers' purchase intentions in terms of their attitudes toward AR shopping. As consumers perceive information from an AR shopping application as precise, pertinent, and useful, they are likely to have more favorable evaluations regarding their shopping experiences. Consequently, the result supports H5.

The findings provide evidence for significantly positive indirect effect of system quality on behavioral intention to purchase through customer attitude ($\beta = 0.157$, $t = 3.568$, $p < 0.001$). As a result, consumers' perceptions of an AR shopping application in terms of its functionality, reliability, accessibility, and ease of use are likely to affect their purchase intentions through forming favorable attitudes towards this type of technology. Indeed, an application working properly provides users with a smooth and convenient shopping experience, which leads to positive evaluations regarding AR shopping and increases purchase intentions. Thus, H6 is supported.

Finally, based on the outcomes, there is a positively significant indirect effect of SEQ on BIP, mediated by customer attitude ($\beta = 0.110$, $t = 2.683$, $p = 0.007$). This means that assistance and support in relation to AR shopping are likely to affect consumers' purchase intentions depending on their attitudes toward this technology. In particular, when consumers perceive assistance and support as helpful and responsive, they may have favorable evaluation towards using AR applications in order to shop, which positively influences purchase intentions.

Discussion

The present research explores the correlations between SYQ, SEQ, and INQ and their impacts on customers' attitude and intent to buy in the context of online shopping enhanced with augmented reality (AR), with customer attitude being the mediating construct. Based on the ISSM (DeLone and McLean, 2003) the research framework illustrates how assessments of AR shopping applications by consumers can impact their purchasing behavior. The correlation between information quality and customer attitude implies that consumers evaluate AR shopping applications in a positive way, if the product information they provide is relevant, understandable, and helpful for making purchasing decision. In terms of AR shopping applications, consumers use digital information about products to understand its properties and visualize the way the product looks like in the physical environment. When information is relevant and useful, it eliminates uncertainty and encourages the formation of positive assessments. The current interpretation is consistent with D&M (2003) ISSM, where INQ is regarded as one of the dimensions of information-system success. It also resonates with the research of Yoo (2020), who discovered that information quality positively impacts consumers' reactions to AR experience in mobile commerce. Additionally, Kowalczuk et al. (2021) found that the informativeness of AR experiences and its other characteristics influence consumers' cognition and feelings related to e-commerce. Thus, the current findings confirm the proposition that information quality cannot be treated as only a technical construct and can contribute to the forming of customer attitude toward AR-enhanced shopping applications.

A positive influence of system quality on customer attitude implies that technological capabilities of an AR application might influence consumers' perceptions of their shopping experience. Thus, an efficient application, which provides customers with high-quality images of products and makes the interaction process smooth, is expected to provide more positive impressions compared to a slow and unstable application. Such findings are consistent with the work by D&M (2003) who differentiate between SEQ and INQ despite the fact that both constructs play a critical part in ISS. The present research is congruent with Chiu et al. (2021) who use the framework of the ISS for the analysis of the effects of information, system, and service qualities on users' reactions to AR retail apps. Furthermore, Kowalczuk et al. (2021) underscores the significance of AR qualities in effecting consumers' cognitive and affective responses to online retailing. Overall, the results of the present study imply that the value of AR shopping is shaped not only by the information consumers receive but also by the efficiency of its delivery through AR technologies.

The connection between service quality and consumer attitude proved to be positive and statistically significant as well. Even if an advanced AR application fails to provide a positive experience, it will not lead to the creation of positive impressions among customers unless they have access to adequate services. Such a conclusion is consistent with the general idea of the ISSM, according to which quality of service is an independent dimension of IS (DeLone & McLean, 2003). The present research is also consistent with Chiu et al. (2021) who conduct a similar study of AR retail applications and consider service quality together with other dimensions of system success. Besides, there is research on AR shopping in Pakistan that investigates the effects of AR experiences on behavioral intents of the customer, which implies the importance of experience-related factors in this particular market (Ghafoor et al., 2023).

Customer attitude demonstrated a positive association with behavioral intention to purchase suggesting that consumers who establish positive evaluations of AR purchasing are more likely to express an intention to purchase through online retail channels. AR technology can allow consumers to interact with digital product representations and evaluate products in a more experiential manner than conventional product images alone. When these experiences create positive attitudes, consumers may become more willing to consider purchasing the displayed products. This relationship is aligned with the TPB, which positions attitude toward a behavior as an important predictor of behavioral intention (Ajzen, 1991). It also corresponds with Alimamy and Al-Imamy's (2022) work, which identifies customer attitude as an important mechanism connecting the quality of AR experiences with subsequent consumer evaluations. Similarly, Kowalczuk et al. (2021) demonstrate that consumers' cognitive and affective responses to AR-enabled e-commerce experiences are relevant to their behavioral responses. The present finding therefore highlights the importance of moving beyond the provision of AR functionality alone.

Mediation analysis provides insight into how the influences of the three dimensions of quality on intent of purchase occur through customer attitude. In accordance with Yoo (2020), the positively significant indirect effect of quality of information on behavioral intent through customer attitude suggests that information quality could lead to purchase intention partially by improving consumers' attitude towards AR shopping. Moreover, the positive indirect link of system quality and purchase intention through customer attitude was found, which means that a well-functioning AR application may facilitate purchase intention by improving the customers' evaluations. This conclusion is in line with the ISSM, where the quality of system is a key factor in the success of an IS (DeLone & McLean, 2003), and the research on quality factors in AR retail applications (Chiu et al., 2021). Also, the significantly positive mediation effect of service quality on behavioral intention through customer attitude depicts that SEQ could foster purchase intention through developing more favorable attitudes towards shopping in AR. Good service could reassure the customers when there are some problems and increase the trust in the retailer's service.

The research underscores the importance of integrating high-quality information, reliable system performance, and effective service support to foster favorable customer attitudes and strengthen purchase intentions in AR-enabled online shopping, while positioning customer attitude as a crucial mechanism joining the quality of the digital shopping experience with consumers' intended purchasing decisions.

Study Contribution to Practice

This study offers substantial advice for online sellers and AR application designers by highlighting SEQ, SYQ, INQ as constructs that influence consumer attitude and purchase intention. Information quality should be ensured in terms of providing detailed and reliable information about the products offered, while system quality should guarantee speed and stability of AR usage. Service quality can be improved by ensuring timely and effective customer support. The fact that consumer attitude might serve as a linking mechanism in the association between those quality variables and intent to purchase implies that managers need to determine the use of AR in purchasing both technically as well as through customer reviews.

Study Contribution to Theory

The current research adds to the ISSM by studying the influence of SEQ, SYQ, and INQ in the context of AR driven online purchasing and their link with the consumer attitude and intent to purchase. The proposed model combines the above perspectives through Theory of Planned Behavior to suggest customer attitude as the intervening variable among the quality dimensions and the intent to purchase. In doing so, the model presents a broader understanding of the reaction of customers to AR-based shopping by associating technology-related perceptions with attitudes and behaviors. In addition, studying these relationships among online shoppers in Lahore, Pakistan, allows contributing the knowledge from the emerging market context that is less studied in the area of AR commerce.

Conclusion

This research explored the link between SEQ, SYQ, INQ, consumer attitude and behavioral intent to buy in AR enabled online shopping. By using a combination of ISSM, the proposed model examined how consumers' perception about AR shopping application can affect their attitudes and buying intentions. The research assumes that for AR shopping to ensure success, it needs to have good visual technology as well as correct information about the products offered, reliable system and service. Consumer attitude acts as a mediating variable in order to make a connection between quality dimensions and purchase intentions. For online retailers and AR companies it is important to provide consumers both technological advantages of AR shopping application as well as positive experience. This study focuses on online consumers in Lahore, Pakistan and explores the role of AR shopping in emerging markets.

Future Directions and Limitations

The present research revolves around online consumers from Lahore, Pakistan, thus potentially restricting the applicability of the results obtained. In this regard, further investigation might consider participants from various cities and countries in order to draw comparative conclusions about consumer behavior. Furthermore, using cross-sectional design, no causality can be inferred; therefore, future research might investigate the link between constructs utilizing longitudinal or experimental approaches. Third, the use of self-reporting might lead to common-method variance; thus, future research might employ information from sales transactions and usage of applications. Lastly, future investigations might develop the conceptual model of the paper by considering other constructs, such as perceived risk, enjoyment, trust, and usefulness of AR shopping in various product types.

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