

# Bridging Technology and Consumer Experience: The Role of Augmented Reality and Perceived Usefulness in Digital Retailing

Magesh Kumar\*, Oshma Rosette Pinto, Supriya R, Rashmi BH

School of Business and Management, Christ University, Bangalore, Karnataka, India.

\*Corresponding Author's Email: mageshcyp@gmail.com

## Abstract

The advent of Augmented Reality (AR) has sparked an interest in the capability of redesigning the experiences of consumers. This paper examines the effects of AR on Consumer Experience (CE) and the mediator of Perceived Usefulness (PU). The study utilizes the Technology Acceptance Model (TAM) to identify the conceptual model based on the Structural Equation Modelling (SEM) with the data obtained in the sample of 311 participants. The results indicate that Augmented Reality has great power over Consumer Experience as elements such as engagement in Augmented Reality inspire a realistic effect on users. The results indicate that Perceived Usefulness plays a minor moderating role in the relationship between Augmented Reality and Consumer Experience, which suggests that the idea of perceived usefulness should be understood even in the environment full of technologies. Therefore, the research contributes to the existing body of literature because it combines AR experience with the main TAM concepts and offers a feasible justification of PU as an enabler in models of consumer experiences driven by technologies. Basically, the findings suggest that to maximize the effect of AR, creators and sellers should not only emphasize on engaging design but also relate the practical utility of the AR tools to the users by encouraging user interaction and awareness.

**Keywords:** Augmented Reality, Consumer Experience, Immersive Technology, Perceived Usefulness, Structural Equation Modelling, Technology Acceptance Model.

## Introduction

The rapid development of digital technologies has immensely changed the consumer experiences and how people communicate with products, services and brands. One of these technological inventions, the Augmented Reality (AR) has turned out to be an effective tool that combines virtual components into real-life settings to produce an interactive and immersive experience (1). Existing technologies like head-mounted displays and sophisticated AR devices would allow visualizing the environment in real-time and engaging with the environment, which redesigns customer interactions and company-customer relations (2). A wide usage of AR has been adopted in industries such as retail, education, health, tourism and entertainment sectors because of its capability of bridging the physical and virtual worlds. As an example, in retail AR enables customers to see the product in 3D prior to purchase, will make decisions and be more satisfied with them (3), whereas in education and tourism AR will improve experiential learning and exploration (4). In addition to the functional

advantages, AR activates emotional reactions through immersive, new and fun experiences affecting the satisfaction, loyalty and purchase intentions (5). Nonetheless, its usage has a few setbacks including high implementation cost, limitations of the devices, challenges in integration and whether there is a payoff (6). As a result, it is also necessary to comprehend the factors that affect the adoption of AR and its effects on consumer experience (7). Most of the current literature has been focused on the technological features and little has been done on the experiential features like immersion, interactivity and perceived usefulness (8). Towards this gap, the current paper analyzes how AR influences consumer experience and the mediating variable of Perceived Usefulness (PU) (9). Based on the Technology Acceptance Model (TAM), the study demonstrates the role of PU in creating user engagement, satisfaction and intention to act, which provides an excellent theoretical framework and practical implications of employing AR as a

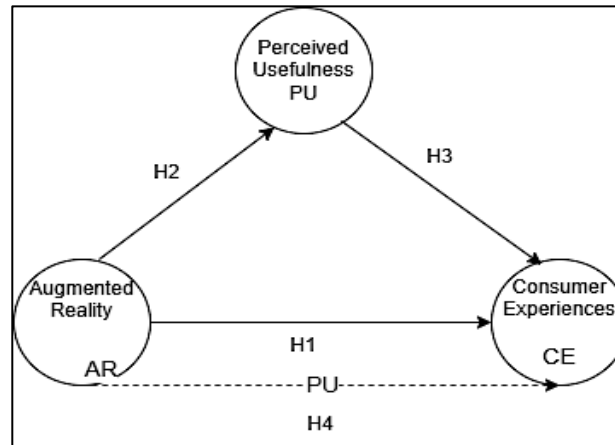
This is an Open Access article distributed under the terms of the Creative Commons Attribution CC BY license (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted reuse, distribution and reproduction in any medium, provided the original work is properly cited.

(Received 23<sup>rd</sup> November 2025; Accepted 21<sup>st</sup> April 2026; Published 28<sup>th</sup> April 2026)

strategic tool that boosts customer experience and competitive advantage in the organizations, as depicted in the conceptual framework in Figure 1 (10).

AR applications allow the establishment of interactive spaces that contribute to Consumer Experience (CE) through the amplification of feelings and prolonged engagement (11). Nevertheless, the use of AR is not only effective when it comes to engagement but perceptions of its advantages as well. Therefore, the relationship

between AR and CE is postulated to go through Perceived Usefulness (PU) to translate technological interaction into significance. Cognitive and emotional response is a manifestation of consumer experience in the interaction with the brand (12) and AR can enhance such responses with interactive elements that enhance the process of evaluation and participation. Virtual try-ons and product simulations are some of the tools used in retail to minimize purchase risk and maximize decision-making confidence.



**Figure 1:** Conceptual Model

The usefulness of AR can also be connected to its capacity to generate immersive experiences, which are realistic and more likely to increase brand awareness, emotional attachment and purchase desire than traditional marketing can (13). AR facilitates satisfaction and loyalty by integrating hands-on pleasure and tangible advantages such as a better understanding of products (14). It also tackles the issue of e-commerce by visualization and online trials and makes it more satisfying (15). Finally, the usage of AR can be seen as relying on the perceived usefulness and useability (16).

**H1:** Augmented Reality has a positive and direct influence on Consumer Experience

### Role of Perceived Usefulness

One of the fundamental constructs of the Technology Acceptance Model (TAM) is Perceived Usefulness (PU) which is a crucial part of technology adoption as it indicates that users believe that a system improves the performance or experience (17). PU has a major impact on satisfaction and behavioural intentions in digital environments including AR, AI, e-learning, e-commerce and mobile apps. As an example, the virtual try-on feature of AR enhances satisfaction and purchase intention when it is perceived to be

helpful (18). PU is also a factor that relates to trust and ease of use and makes the engagement stronger (19, 20). The use of e-commerce, mobile health and social media further proves that PU influences the use intentions and satisfaction (21, 22). Therefore, PU is an important mediating variable between system attributes and technology acceptance.

**H2:** Augmented Reality has a positive and direct influence on Perceived Usefulness

**H3:** Perceived Usefulness has a positive and direct influence on Consumer Experience

### Perceived Usefulness of AR and CE

The engagement and behavioural results of the consumer are greatly influenced by technological innovations and changing marketing strategies. The virtual worlds like AR and AI increase interaction, visual appeal and long-term brand relations (23), whereas personalised digital experience leads to increased satisfaction and long-term trust (24). Virtual try-on solutions help minimize uncertainty about the purchases (25) and gamification improves the engagement rate (26). Advertisement that is emotionally connecting enhances brand associations and buying choices (27). Social media marketing that are based on

influencing the audience and sustainability-oriented branding also affect the intention to trust and purchase (28). Nevertheless, there is still a gap in the long-term effect of AR on consumer attitudes and choices since perceived usefulness is an intermediary factor between engagements and can also be influenced by novelty and cognitive overload (29).

**H4:** Perceived Usefulness mediates the relationship between Augmented Reality and Consumer experience.

This paper pays attention to three constructs, which include: Augmented Reality (AR), Perceived Usefulness (PU) and Consumer Experience (CE). AR combines digital factors and physical reality (30), PU is the attitude toward usefulness of technology and CE is the attitude towards interaction expressed psychologically and emotionally. These constructs are stimulus, evaluation and experiential outcome respectively (31).

### Research Gap

Augmented Reality (AR) has received much research interest due to its capacity to drive consumer interaction and engagement. Previous research points to its effects on experience in terms of enjoyment, involvement and participation. Nevertheless, there is a significant gap as to the mediating role of Perceived Usefulness (PU) in between AR and consumer experience. Even though Technology Acceptance Model has recognized PU as a critical factor in technology adoption (32), its importance in the AR setting has not been sufficiently studied. The already present studies are very much concentrated on the direct effects of AR, which ignore the indirect effects of PU. In this study, PU as an engagement, satisfaction and retention moderator is thus reviewed.

### Methodology

The current study focuses on the relationship between Augmented Reality (AR) and Consumer Experiences (CE), where perceived usefulness acts as the mediator.

### Research Design and Sampling

A cross-sectional quantitative research design was adopted to collect primary data using a structured questionnaire. The cross-sectional quantitative research design is deemed appropriate, as the objective of the study is to examine the relationship between AR exposure and Consumer

experiences through perceived usefulness, which serves as a mediator rather than establishing temporal causality (33). The mediation effects can be efficiently tested using the cross-sectional data through structural equation modelling and the Hayes Process Model.

The experimental design was not adopted because it does not aim to influence AR exposure or to generate treatment or control groups. As an alternative, it investigates naturally arising user perception based on earlier experiences and AR mechanisms. The longitudinal design is not considered necessary as the paradigms under examination are AR exposure, Perceived Usefulness and Consumer experiences, which are perception-based variables that can be scaled at a single point in time.

Around 311 respondents with prior experience across platforms such as retail, e-commerce and social media who use AR applications have been added to the study. The purposive sampling method is used to confirm that the respondents are well-versed with AR technologies.

### Data Collection and Measures

The survey is constructed on three key aspects: exposure to AR, Perceived Usefulness (PU) and Consumer Experience (CE).

The AR exposure was analysed based on usage frequency, awareness and perceived effectiveness. PU was evaluated based on ideas derived from the TAM model, while CE was assessed using engagement, involvement and satisfaction. All constructs are evaluated with a point Likert scale technique (1 = Strongly Disagree to 5 = Strongly Agree).

### Data Analysis Techniques

After data collection, an initial screening was performed to exclude missing values and outliers. To assess the direct and indirect associations, Structural Equation Modelling was conducted. Hayes Process Model (Model-4) was employed to test the mediation effects. The reliability and validity were evaluated using Cronach's alpha and factor analysis.

This approach provided a robust evaluation of how AR exposure affects consumer behaviour through perceived usefulness, ensuring meaningful insights for technical implementation and experiential factors in the adoption of AR mechanisms.

## Results

The Descriptive Statistics from Table 1 Experiences (CE) and Perceived Usefulness

demonstrate an association between Augmented Reality (AR), Consumer (PU).

**Table 1:** Descriptive Statistics

Measures	AR	CE	PU
N	311	311	311
Mean	2.35	2.32	3.17
Standard deviation	0.944	0.997	0.705

Note: AR=Augmented Reality; CE=Consumer Experiences; PU= Perceived Usefulness

The mean score for AR is 2.35, indicating a relatively low to moderate level of agreement among participants regarding their interactions with augmented reality. This suggests that respondents do not strongly perceive AR as enhancing their personal or emotional experiences (34). Similarly, the mean score for Consumer Experience (CE) is 2.32, reflecting a weak inclination toward enhanced engagement, rather than a firm or definitive relationship.

In contrast, the mean score for Perceived Usefulness (PU) is 3.17, indicating a slightly positive perception of AR's effectiveness. The standard deviation for PU [0.705] is lower than that for AR [0.944] and CE [0.997], suggesting greater consistency in responses, whereas AR and CE exhibit relatively higher variability among participants.

**Table 2:** T-test Results

Variable		Statistic	df	p
AR	Student's t	1.811	309	0.071
CE	Student's t	1.851	309	0.065
PU	Student's t	-0.415	309	0.679

Note: AR=Augmented Reality; CE=Consumer Experiences; PU= Perceived Usefulness

**Table 3:** Group Descriptive Results

Variable	Group	N	Mean	Median	SD	SE
AR	1	101	2.49	2.20	1.006	0.1001
	2	210	2.28	2.00	0.907	0.0626
CE	1	101	2.47	2.00	1.061	0.1055
	2	210	2.24	2.00	0.959	0.0662
PU	1	101	3.14	3.00	0.820	0.0816
	2	210	3.18	3.20	0.643	0.0444

Note: AR=Augmented Reality; CE=Consumer Experiences; PU= Perceived Usefulness. Group 1=Male; Group 2= Female

The t-test in Table 2 evaluates whether there are significant differences in the mean scores for Augmented Reality (AR), Consumer Experiences (CE) and Perceived Usefulness (PU) between males [1] and females [2]. The AR Score for males (M = 2.49, SD = 1.006) was slightly higher than for females (M = 2.28, SD = 0.907). Equally, the t-test result (t = 1.811, p = 0.071) requires that this variance is statistically not substantial at the 0.05 level (35). This suggests that both genders experience augmented reality with no significant gender-based differences in AR engagement.

Table 3 of the group descriptive result explains that the CE scores for males (M = 2.47, SD = 1.061) are slightly higher than those for females (M = 2.24, SD = 0.959). The t-value (t = 1.851, p = 0.065) requires that, though the variance is close to

marginal, it still does not meet the standard yardstick. The PU scores of males (M = 3.14, SD = 0.820) and females (M = 3.18, SD = 0.643) are closer to each other. The t-test result (t = -0.415, p = 0.679) exhibited that there is no substantial difference between the two groups, signifying that both genders recognize the practicality of AR features similarly (36). Overall, the outcomes from AR and CE indicate that male scores are higher than female scores, but the differences are not substantial. The finding of AR's perceived usefulness (PU) is reliable across genders. Results of one-way ANOVA (Welch's test) from Table 4 determine that household income has a substantial impact on both Augmented Reality (AR) engagement and Consumer Experiences (CE), but not on Perceived Usefulness (PU).

**Table 4:** One-Way ANOVA (Welch's test)

Variable	F	df1	df2	p
AR	11.01	4	57.8	<0.001
CE	13.20	4	60.6	<0.001
PU	1.79	4	57.0	0.144

**Note:** AR=Augmented Reality; CE=Consumer Experiences; PU= Perceived Usefulness

**Table 5:** Exploratory Factor Analysis

Variable	Factor			Uniqueness
	1	2	3	
AR1	0.752			0.290
AR2	0.556			0.425
AR3			0.526	0.566
AR4	0.866			0.170
AR5				0.664
CE1	0.564		0.593	0.321
CE2			0.671	0.402
CE3	0.837			0.199
CE4	0.912			0.104
CE5				0.503
PU1		0.814		0.307
PU2		0.882		0.210
PU3		0.836		0.298
PU4	0.866			0.181
PU5		0.768		0.400

**Note:** AR=Augmented Reality; CE=Consumer Experiences; PU= Perceived Usefulness.

The Exploratory Factor Analysis (EFA) is conducted using the principal axis factor method with varimax rotation as shown in Table 5. Based on the EFA, factor loadings  $\geq 0.50$  are considered significant predictors of the construct. Factor 1 with items AR1, AR2, AR4, CE3 and CE4 exhibits strong loadings [ $>0.7$ ]. Factor 2 is associated mainly with PU, as indicated by PU1, PU2, PU3 and PU5, all of which have loadings exceeding 0.75,

confirming a robust Perceived Usefulness construct (37). Factor 3 captures the shared variance of specific AR and CE items, including CE1, CE2 and AR3. The distinctiveness values fall within standard ranges, with most items showing adequate clarifying power for their respective factors. The lack of cross-loadings emphasizes the uniqueness of the paradigms, ensuring discriminant validity.

**Table 6:** Factor Statistics Summary

Factor	SS Loadings	% of Variance	Cumulative %
1	4.94	32.9	32.9
2	3.19	21.2	54.1
3	1.84	12.3	66.4

The factor statistics summary from Table 6 discloses that the three extracted factors jointly account for 66.4% of the total variance, indicating a satisfactory level of concept exemplification. Factor 1 accounts for the largest share of variance (32.9%), underscoring its leading role in capturing the dataset's unpredictability, likely reflecting Augmented Reality (AR) and Consumer Experience (CE). Factor 2 accounts for 21.2% of the variance and is primarily associated with

Perceived Usefulness (PU), underscoring its importance within the constructed framework. Factor 3 accounts for 12.3% and captures a smaller yet meaningful portion of the variance, potentially improving the distinction between CE and AR fundamentals (38). The cumulative variance surpassing 60% meets the acceptable threshold for exploratory factor analysis, confirming the model's adequacy in representing the latent constructs.

**Table 7:** Bartlett's Test of Sphericity

$\chi^2$	df	p
3597	105	<.001

Bartlett's Test of Sphericity from Table 7 is significant ( $\chi^2 = 3597$ ,  $DF = 105$ ,  $p < .001$ ), specifying that the correlation matrix differs from an identity matrix. This confirms the dataset's suitability for factor analysis. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy value is 0.921, establishing excellent appropriateness for

factor analysis. The MSA values for all individual items surpass the standard benchmark of 0.7, with the majority exceeding 0.9, demonstrating strong intercorrelations among the variables. This confirms the dataset's suitability for factor analysis.

**Table 8:** Confirmatory Factor Estimates

Factor	Indicator	Estimate	SE	Z	p	Stand. Estimate
AR	AR1	1.030	0.0575	17.9	<.001	0.831
	AR2	0.877	0.0644	13.6	<.001	0.686
	AR3	1.075	0.0510	21.1	<.001	0.917
	AR4	1.111	0.0543	20.5	<.001	0.902
	AR5	1.178	0.0541	21.8	<.001	0.933
	AR6	1.165	0.0564	20.7	<.001	0.907
PU	PU1	0.798	0.0447	17.8	<.001	0.841
	PU2	0.766	0.0381	20.1	<.001	0.911
	PU3	0.690	0.0414	16.7	<.001	0.810
	PU4	0.681	0.0446	15.3	<.001	0.766
CE	CE1	1.028	0.0569	18.1	<.001	0.873
	CE2	0.949	0.0696	13.6	<.001	0.711
	CE3	0.771	0.0644	12.0	<.001	0.645

**Note:** AR=Augmented Reality; CE=Consumer Experiences; PU= Perceived Usefulness.

The results of the Confirmatory Factor Analysis (CFA) are illustrated in Table 8. Based on the CFA, factor loadings  $\geq 0.50$  are considered important predictors of the construct. Thus, all factor loadings are significant ( $p < .001$ ), indicating strong relationships between the latent constructs and their corresponding indicators. For the Augmented Reality (AR) factor, standardized loadings range from 0.686 (AR2) to 0.933 (AR5), signifying that AR5 and AR3 exhibit the resilient associations with the construct. The relatively lower loading of AR2 [0.686] remains above the acceptable threshold, underlining its contribution to the factor. For the Perceived Usefulness (PU) factor, standardized estimates range from 0.766 (PU4) to 0.911 (PU2), with PU2 contributing the

most. The loadings specify that all items reliably measure the PU construct. Regarding Consumer Experience (CE), standardized loadings vary between 0.645 (CE3) and 0.873 (CE1), recommending that CE1 is the most demonstrative indicator of the construct, while CE3 shows a weaker but still acceptable association.

For convergent validity, factor loadings above 0.50 are generally considered acceptable, while loadings above 0.70 indicate strong convergent validity. Overall, the high standardized loadings [ $>0.60$ ] across all factors confirm strong convergent validity, indicating that the measurement model adequately captures the underlying constructs of Augmented Reality, Perceived Usefulness and Consumer Experience.

**Table 9:** Reliability Statistics of Constructs

Variable	$\alpha$	$\omega_1$	$\omega_2$	$\omega_3$	AVE
Augmented Reality	0.945	0.946	0.946	0.947	0.748
Consumer Experience	0.786	0.786	0.786	0.781	0.554
Perceived Usefulness	0.900	0.900	0.900	0.898	0.693

**Note:**  $\alpha$  indicates Cronbach's alpha;  $\omega_1, \omega_2, \omega_3$  = Composite reliability; AVE= Average Variance Extracted.

The model's internal steadiness and convergent validity Table 9 were evaluated using Cronbach's alpha ( $\alpha$ ), composite reliability ( $\omega$ ) and Average Variance Extracted (AVE). All three variables, Augmented Reality (AR), Consumer Experience (CE) and Perceived Usefulness (PU), showed the fitness towards strong consistency. Cronbach's alpha values ( $\alpha > 0.70$ ) indicate good internal

reliability among the models constructs (39). In the study, AR ( $\alpha = 0.945$ ), CE ( $\alpha = 0.786$ ) and PU ( $\alpha = 0.900$ ) all exceeded the suggested benchmark of 0.70, demonstrating strong internal reliability. Further, the composite reliability coefficients ( $\omega_1$  to  $\omega_3$ ) for all variables are approximately identical and are above 0.70, supporting the dependability of the variables.

Convergent validity was studied through the Average Variance Extracted (AVE). The AVE values for AR (0.748), PU (0.693) and CE (0.554) all exceed the 0.50 threshold. It showed that the respective factors accounted for more than 50% of

the variance in each variable. These outcomes confirm that the model variables exhibit adequate convergent validity, warranting their inclusion in the structural model.

**Table 10:** Discriminant Validity

Variable	Augmented Reality	Consumer Experience	Perceived Usefulness
AR	1.000	0.851	0.192
CE	0.851	1.000	0.284
PU	0.192	0.284	1.000

**Table 11:** Chi-square Test

Label	X <sup>2</sup>	Df	p
User Model	184	62	<.001
Baseline Model	3332	78	<.001

The Discriminant validity was measured using the Heterotrait-Monotrait Ratio of Correlations (HTMT). All HTMT values from Table 10 fall within the acceptable limits, supporting the uniqueness of the structural constructs. The HTMT value between Augmented Reality (AR) and Consumer Experience (CE) is 0.851, which meets the conventional critical value of  $\leq 0.85$ , representing acceptable discriminant validity. The values between AR and Perceived Usefulness (PU) are 0.192 and C, E and PU are 0.284, which are well below the critical value, confirming strong empirical evidence. These outcomes show that AR, CE and PU are theoretically and statistically divergent, satisfying the benchmarks for discriminant validity in the structural model.

Theoretically, Augmented Reality is a direct antecedent for the variable consumer experience and hence a strong correlation between the constructs is expected. AR includes technical features such as virtual manipulation, computer-mediated reality and spatial computing that enhance the information (40). In comparison, the Consumer Experience refers to the emotional and psychological aspects, such as commitment and engagement that arise from communicating with

the stimulus. As a result, despite the theoretical understanding, the ideas remain unique both theoretically and practically.

The Chi-Square test in Table 11 shows a significant difference between the user model (chi-square = 184, df = 62) and the baseline model (chi-square = 3332, df = 78), with both models having p-values less than 0.001. However, the considerable chi-square values indicated that the model does not fit perfectly, a common finding with large samples and one that must be evaluated in conjunction with comparative fit indices. To assess the chi-square statistic's responsiveness, a chi-square likelihood ratio, also known as the relative chi-square, was calculated. The chi-square likelihood ratio value is 2.97, which falls below the benchmark of 5.0, indicating a good model fit. When the chi-square is significant, this ratio is a suitable indicator of model accuracy.

These results recommend that the assumed structural model delivered a considerably enhanced fit to the data than the null model, assisting the validity of the projected association between Augmented Reality (AR), Perceived Usefulness (PU) and Consumer Experience (CE).

**Table 12:** Fit Indices

SRMR	RMSEA	95% Confidence Intervals		RMSEA p
		Lower	Upper	
0.049	0.079	0.066	0.093	<.001
Additional fit indices				
				Model
Comparative Fit Index (CFI)				0.963
Tucker-Lewis Index (TLI)				0.953
Bentler-Bonett Non-normed Fit Index (NNFI)				0.953
Relative No centrality Index (RNI)				0.963
Bentler-Bonett Normed Fit Index (NFI)				0.945
Bollen's Relative Fit Index (RFI)				0.931

Bollen's Incremental Fit Index (IFI)	0.963
Parsimony Normed Fit Index (PNFI)	0.751

The goodness-of-fit model in Table 12 was calculated using various indices that assess the overall fit of the fundamental model. The results of the Root Mean Square Error Approximation (RMSEA) showed 0.079, with a 90% confidence interval of 0.066 to 0.093 and a p-value of less than 0.001, which falls below the benchmark of 0.08, suggesting a reasonable approximation error in the population (41).

The calculated value of the Standardized Root Mean Square Residual (SRMR) was 0.049, which is

less than the suggested value of 0.08, which represents a good fit between the assumed model and the data used for observation. The calculated Comparative Fit Index (CFI) was 0.0963 and the Tucker-Lewis Index (TLI) was 0.0953, both surpassing the 0.90 cut-off and providing a more rigorous benchmark of 0.95, indicating a sturdy comparative fit. Further, both the Normal Fit Index (NFI) of 0.945 and the Incremental Fit Index (IFI) of 0.963 offered additional evidence of good model fit.

**Table 13: Results of R<sup>2</sup>**

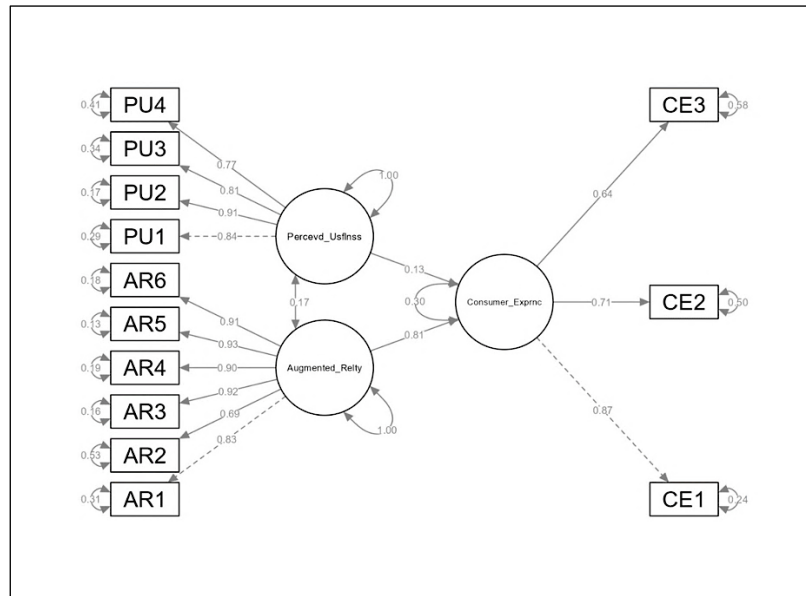
Variable	R <sup>2</sup>
Consumer Experience	0.7040
Perceived Usefulness	0.0299

The R<sup>2</sup> values in Table 13 indicate the percentage of variance in the endogenous constructs explained by the model's explanatory variables. The coefficient of determination (R<sup>2</sup>) of Consumer Experience (CE) is 0.704. It recommends that 70.4% of the variance in CE is accounted for by the combined effects of Augmented Reality (AR) and Perceived Usefulness (PU). This characterizes the model's extensive explanatory power and its hypothetical robustness. The R<sup>2</sup> for Perceived Usefulness (PU) is 0.0299, indicating that AR explains 2.99% of the variance in PU. This replicates a reasonably weak effect; it suggests that additional unmeasured variables beyond AR influence PU, or that the effect of AR on PU is slightly varied. However, the considerable intervening role of PU, irrespective of its low R<sup>2</sup>, can still be hypothetically meaningful, particularly in partial mediation models.

Prior technology adoption literature has shown systematically that PU is determined by several antecedents, such as ease of use, social influences,

facilitating environments and experience (42). Therefore, the relatively low R<sup>2</sup> highlights the multidimensional nature of PU and suggests that several additional theoretical predictors are needed in future studies to increase the model's explanatory power.

The SEM model indicated a strong association between the latent variables as illustrated in Table 14. Augmented reality (AR) has a considerable effect on consumer experience (CE), with an estimated effect size of 0.805. A standardized estimate of  $\beta = 0.807$  indicates that, among all variables, AR has the most significant standardized effect. The value  $z = 14.64$  and the p-value  $< 0.001$  show that the results achieved are substantial, demonstrating a strong relationship that suggests increased interaction with AR features leads to an improved consumer experience. The 95% confidence interval of 0.6975 to 0.913 indicates high meticulousness and a robust positive impact. Figure 2 depicts the path analysis among the latent constructs.



**Figure 2: Path Analysis of the Estimates**

**Table 14: Parameter Estimates**

Dependent	Predictor	Estimate	SE	95% Confidence Intervals		$\beta$	z	p
				Lower	Upper			
Consumer Experience	Augmented Reality	0.805	0.0550	0.6975	0.913	0.807	14.64	<.001
Consumer Experience	Perceived Usefulness	0.166	0.0569	0.0547	0.278	0.129	2.92	0.003
Perceived Usefulness	Augmented Reality	0.134	0.0468	0.0422	0.226	0.173	2.86	0.004

Perceived Usefulness (PU) has a considerable positive effect on Consumer Experience, with an estimate of 0.166. Although  $\beta = 0.129$  indicates that PU is not the strongest variable compared to AR, it still supports the determination of consumer experience. The value of  $z = 2.92$  and the  $p$ -value  $< 0.003$  offer robust support for the relationship. The PU develops the consumer experience by supporting the perceived value and effectiveness of technology.

This suggests that when consumers discover that applications of AR are beneficial, consumer experiences are significantly influenced, consistent

with earlier literature that highlights the importance of effectiveness in a technology-enriched service environment (43). Further, the AR has a considerable effect on PU, with a moderately strong  $\beta = 0.173$ , indicating that the AR improves not only the experience but also the consumer's insight into technology use. The value of  $z = 2.86$  and the  $p$ -value  $< 0.004$  indicate a significant effect and provide an overall analysis indicating that AR is an essential factor that enhances users' perceived accessibility to technology by inducing adoption and sustained engagement.

**Table 15: Mediation Estimates**

Effect	Label	Estimate	SE	95% Confidence Interval		Z	p	% Mediation
				Lower	Upper			
<b>Indirect:</b> AR → PU → CE	a × b	0.0194	0.0103	0.00163	0.0421	1.87	0.061	2.81
<b>Direct:</b> AR → CE	c	0.6707	0.031	0.60985	0.7315	21.65	<0.001	97.19
<b>Total</b>	c + a × b	0.69	0.0281	0.63386	0.7448	24.57	<0.001	100

Note: The estimates are calculated by the bootstrapping method using 5000 samples at a 95% Confidence Interval. AR=Augmented Reality; CE=Consumer Experiences; PU= Perceived Usefulness

Mediation analysis from Table 15 was conducted to examine whether Perceived Usefulness mediates the relationship between Augmented Reality and Consumer experience. The mediation was tested using Hayes' PROCESS Model 4 with bootstrap (5000 resamples) and 95% bias-corrected confidence intervals.

The indirect effect of Augmented Reality on Consumer Experience through Perceived Usefulness was positive, with a value of 0.0194, but was not statistically significant at the 5% level ( $p = .061$ ), indicating a very weak partial mediation at the 10% level of significance. Although the 95% bootstrap confidence interval (LL = 0.00163, UL = 0.0421) was close to zero, the marginal  $p$ -value shows that the mediation is weakly supported.

The direct effect was positive and highly significant ( $b = 0.6707$ ,  $p < .001$ ), as was the total effect ( $b = 0.6900$ ,  $p < .001$ ) and suggests that the relationship is mainly a direct rather than mediated relationship. The findings support earlier studies that recommend that the captivating features of AR can autonomously promote consumer experiences and that their observed utility together strengthens this effect.

## Discussion

The study examined the impact of Augmented Reality (AR) on Consumer Experience (CE), through Perceived Usefulness (PU) acting as a mediating factor. Results of one-way ANOVA (Welch's test) determine that household income has a substantial impact on both Augmented Reality (AR) engagement and Consumer Experiences (CE), but not on Perceived Usefulness (PU).

The findings reveal that AR significantly improves consumer experiences, with perceived usefulness acting as a mediator. The direct effect of AR and CE is significant, suggesting that AR features such as communicative graphics, longitudinal responsiveness and instantaneous feedback noticeably enhance user engagement and experience (44). This finding is supported by earlier research emphasizing that AR delivers vibrancy and engagement that encourage perceptive and expressive consumer reactions (45). The media provided by AR help consumers preview products and services more persuasively, thereby enriching satisfaction and decision-making (46). While AR exhibited a resilient direct effect, its influence on PU was relatively strong, as indicated by a lower  $R^2$

value. This suggests that while AR is perceived as appealing, its practical efficacy is not consistently acknowledged, perhaps due to diverse levels of E-literacy or unfamiliarity with the technology (47). Notwithstanding this, PU explicitly endorsed CE, affirming its intervening role and aligning with the beliefs of the Technology Acceptance Model (TAM), which emphasizes that perceived usefulness is an essential factor in user satisfaction and decision-making (48).

The crucial indirect effect of AR on CE by PU highlights the prominence of perceptive assessments in the pragmatic process. Even when users find AR engaging or innovative, their overall experience is also shaped by the technology's apparent realism and significance. This dual pathway is satisfying and practical, supporting the emergent view that AR technologies operate at the intersection of technological recognition and realistic value formation. From an abstract perspective, this study adds to the literature by integrating AR experience with primary TAM theories, providing practical support for PU as a facilitator in technology-driven consumer experience models. The results recommend that to maximize the impact of AR, creators and sellers must not only highlight captivating design but also connect the practical effectiveness of AR tools to users by promoting both user engagement and recognition.

## Theoretical and Practical Implications

This study offers significant contributions to both academic theory and managerial practice by examining how Augmented Reality (AR) affects Consumer Experience (CE) through the mediating role of Perceived Usefulness (PU). Given the usefulness and ease of use of the Technology Acceptance Model (TAM), the research builds on existing theory by situating PU within an engaging, captivating and interactive technology framework. While TAM has traditionally been applied to illuminate adoption behaviour in functional systems, this study demonstrates its relevance in reality and in a practical experiential framework such as AR, where both emotional connection and perceived effectiveness play pivotal roles.

The findings confirm that PU partially mediates the relationship between AR and CE, indicating that perceptual appraisals of usefulness remain central to user understanding, even in technology-rich settings. This highlights prior arguments that

evolving technologies must not only entertain but also support consumers in making decisions that help in enduring value relevant and beneficial. Also, the study supports the evolving outlook that consumer experience is a multi-dimensional paradigm influenced by both practical and emotional factors, positioning PU as a vital bridge between emotionally engaging and intuitive experiences (49).

From a practical standpoint, the study offers actionable perceptions for marketers, experienced designers and AR developers. The direct impact of AR on CE underscores the importance of incorporating interactive, realistic and tailored elements into AR platforms to foster engagement. But the weaker yet substantial path from AR to PU recommends that companies must educate and guide users on how AR applications can provide tangible value, such as increasing product understanding, reducing uncertainty, or improving convenience. For industries such as retail, tourism, real estate and education, where AR is increasingly used, this study commends striking a balance between captivating visual appeal and perceived usefulness to drive both implementation and satisfaction.

## Conclusion

This study found that the impact of Augmented Reality (AR) on Consumer Experience (CE) through Perceived Usefulness (PU) served as an intermediary factor. The outcomes indicate that AR significantly enriches the consumer experience through PU, supporting a partial mediation effect. These outcomes contribute to the growing dialogue on captivating technologies by integrating insights from Technology Acceptance Theory into empirical findings in digital settings. The study focuses on how, while AR is intrinsically appealing, its perceived usefulness also plays an essential role in shaping consumers' overall assessments of the experience.

Despite the valuable awareness, the research has definite limitations. First, the study is entirely focused on cross-sectional analysis using self-report data, which may be vulnerable to bias. Future studies could engage longitudinal or experimental designs to track user engagement and perceived worth over time. Second, the study's perspective was limited to demographics and cross-sectional. The applications of AR in

industries like fashion, healthcare and education offer a diverse range of acceptance and practicality, suggesting the need for sectoral assessment. Third, the comparatively low  $R^2$  for PU shows that other perceptible or circumstantial dynamics, such as usability, satisfaction, or faith, can enhance the conceptual framework.

Moreover, cultural and demographic multiplicity in technology use brings a significant opportunity for future research. Investigating how age, e-literacy and regional modifications have a substantial effect on AR and PU is a comprehensive guide for practitioners. Researchers could also cultivate the model by integrating emerging paradigms, such as technological apprehension, customization and sustainability sensitivities, into AR features. In conclusion, this study emphasizes the role of AR as both a practical amplifier and an efficient facilitator, suggesting that the most effective AR practices strike a balance between intense interactivity and seamless value. As AR technologies continue to advance, scholars and practitioners must remain attuned to the vibrant ways consumers engage with and assign meaning to these engaging tools.

## Abbreviations

CFI: Comparative Fit Index, IFI: Incremental Fit Index, NFI: Normal Fit Index, SEM: Structural Equation Modelling, SRMR: Standardized Root Mean Square Residual, TAM: Technology Acceptance Model, TLI: Tucker-Lewis Index.

## Acknowledgment

The authors would like to extend their gratitude to the users of Augmented Reality technology for their valuable time in completing the survey.

## Author Contributions

Magesh Kumar: conceptualization, data analysis, supervision, Oshma Rosette Pinto: data collection, constructed and validated the research questionnaire, general formatting, references, Supriya R: literature review, introduction, conclusion, Rashmi BH: abstract, results, figures and tables.

## Conflict of Interest

All authors declare that they have no conflicts of interest related to the publication of this research work.

## Data Availability

Data are available from the corresponding author upon reasonable request.

## Declaration of Artificial Intelligence (AI) Assistance

The authors declare that they did not use AI assisted tools (ChatGPT, Gemini) during the writing process.

## Ethics Approval

Not applicable.

## Funding

The authors declare they did not receive any financial assistance.

## References

- Chen SC, Chou TH, Hongsuchon T, Ruangkanjanases A, Kittikowit S, Lee TC. The mediation effect of marketing activities toward augmented reality: the perspective of extended customer experience. *Journal of Hospitality and Tourism Technology*. 2022 Jun 10;13(3):461-80. <https://doi.org/10.1108/JHTT-03-2021-0093>
- Rauschnabel PA, Babin BJ, Tom Dieck MC, Krey N, Jung T. What is augmented reality marketing? Its definition, complexity and future. *Journal of business research*. 2022 Mar 1;142:1140-50. <https://doi.org/10.1016/j.jbusres.2021.12.084>
- McLean G, Wilson A. Shopping in the digital world: Examining customer engagement through augmented reality mobile applications. *Computers in human behavior*. 2019 Dec 1;101:210-24. <https://doi.org/10.1016/j.chb.2019.07.002>
- Hilken T, De Ruyter K, Chylinski M, Mahr D, Keeling DI. Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences. *Journal of the Academy of Marketing Science*. 2017 Nov;45(6):884-905. <https://doi.org/10.1007/s11747-017-0541-x>
- Javornik A. Augmented reality: Research agenda for studying the impact of its media characteristics on consumer behaviour. *Journal of Retailing and Consumer Services*. 2016 May 1;30:252-61. <https://doi.org/10.1016/j.jretconser.2016.02.004>
- Garzón J, Pavón J, Baldiris S. Systematic review and meta-analysis of augmented reality in educational settings. *Virtual reality*. 2019 Dec;23(4):447-59. <https://doi.org/10.1007/s10055-019-00379-9>
- Tsai TH, Lin WY, Chang YS, Chang PC, Lee MY. Technology anxiety and resistance to change behavioral study of a wearable cardiac warming system using an extended TAM for older adults. *PloS one*. 2020 Jan 13;15(1):e0227270. <https://doi.org/10.1371/journal.pone.0227270>
- Beck M, Crié D. I virtually try it... I want it! Virtual Fitting Room: A tool to increase on-line and off-line exploratory behavior, patronage and purchase intentions. *Journal of Retailing and Consumer Services*. 2018 Jan 1;40:279-86. <https://doi.org/10.1016/j.jretconser.2016.08.006>
- Scholz J, Duffy K. We Are at home: How augmented reality reshapes mobile marketing and consumer-brand relationships. *Journal of Retailing and Consumer Services*. 2018; 44:11-23. <https://doi.org/10.1016/j.jretconser.2018.05.004>
- Yim MY, Chu SC, Sauer PL. Is augmented reality technology an effective tool for e-commerce? An interactivity and vividness perspective. *Journal of interactive marketing*. 2017 Aug;39(1):89-103. <https://doi.org/10.1016/j.intmar.2017.04.001>
- Rauschnabel PA, Felix R, Hinsch C. Augmented reality marketing: How mobile AR-apps can improve brands through inspiration. *Journal of Retailing and Consumer Services*. 2019 Jul 1;49:43-53. <https://doi.org/10.1016/j.jretconser.2019.03.004>
- Flavián C, Ibáñez-Sánchez S, Orús C. The impact of virtual, augmented and mixed reality technologies on the customer experience. *Journal of business research*. 2019 Jul 1;100:547-60. <https://doi.org/10.1016/j.jbusres.2018.10.050>
- Berman B, Pollack D. Strategies for the successful implementation of augmented reality. *Business Horizons*. 2021 Sep 1;64(5):621-30. <https://doi.org/10.1016/j.bushor.2021.02.027>
- Rese A, Baier D, Geyer-Schulz A, Schreiber S. How augmented reality apps are accepted by consumers: A comparative analysis using scales and opinions. *Technological Forecasting and Social Change*. 2017 Nov 1;124:306-19. <https://doi.org/10.1016/j.techfore.2016.10.010>
- Poushneh A. Augmented reality in retail: A trade-off between user's control of access to personal information and augmentation quality. *Journal of Retailing and Consumer Services*. 2018 Mar 1;41:169-76. <https://doi.org/10.1016/j.jretconser.2017.12.010>
- Romano B, Sands S, Pallant JI. Virtual shopping: segmenting consumer attitudes towards augmented reality as a shopping tool. *International Journal of Retail & Distribution Management*. 2022 Aug 30;50(10):1221-37. <https://doi.org/10.1108/IJRDM-10-2021-0493>
- Lemon KN, Verhoef PC. Understanding customer experience throughout the customer journey. *Journal of marketing*. 2016 Nov;80(6):69-96. <https://doi.org/10.1509/jm.15.0420>
- Qin H, Osatuyi B, Xu L. How mobile augmented reality applications affect continuous use and purchase intentions: a cognition-affect-conation perspective. *Journal of Retailing and Consumer Services*. 2021 Nov 1;63:102680. <https://doi.org/10.1016/j.jretconser.2021.102680>
- Orús C, Ibáñez-Sánchez S, Flavián C. Enhancing the customer experience with virtual and augmented reality: The impact of content and device type. *International Journal of Hospitality Management*. 2021 Sep 1;98:103019. <https://doi.org/10.1016/j.ijhm.2021.103019>
- Chylinski M, Heller J, Hilken T, Keeling DI, Mahr D, de Ruyter K. Augmented reality marketing: A technology-enabled approach to situated customer

- experience. *Australasian Marketing Journal*. 2020 Nov;28(4):374-84.  
<https://doi.org/10.1016/j.ausmj.2020.04.004>
21. Heller J, Chylinski M, de Ruyter K, Mahr D, Keeling DI. Touching the untouchable: Exploring multi-sensory augmented reality in the context of online retailing. *Journal of Retailing*. 2019 Dec 1;95(4):219-34.  
<https://doi.org/10.1016/j.jretai.2019.10.008>
  22. Trivedi J, Kasilingam D, Arora P, Soni S. The effect of augmented reality in mobile applications on consumers' online impulse purchase intention: The mediating role of perceived value. *Journal of Consumer Behaviour*. 2022 Jul;21(4):896-908.  
<https://doi.org/10.1002/cb.2047>
  23. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*. 1981 Feb;18(1):39-50.  
<https://doi.org/10.1177/002224378101800104>
  24. Venkatesh V, Davis FD. A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*. 2000 Feb;46(2):186-204.  
<https://doi.org/10.1287/mnsc.46.2.186.11926>
  25. Browne MW, Cudeck R. Alternative ways of assessing model fit. *Sociological methods & research*. 1992 Nov;21(2):230-58.  
<https://doi.org/10.1177/0049124192021002005>
  26. Negm E. The impact of augmented reality on consumer behavior: a focus on value development, leading to brand engagement and purchase intention. *Management & Sustainability: An Arab Review*. 2025 Apr 24;4(2):320-41.  
<https://doi.org/10.1108/MSAR-08-2023-0044>
  27. Baytar F, Chung T, Shin E. Evaluating garments in augmented reality when shopping online. *Journal of Fashion Marketing and Management: An International Journal*. 2020 Oct 26;24(4):667-83.  
<https://doi.org/10.1108/JFMM-05-2018-0077>
  28. Habil SG, El-Deeb S, El-Bassiouny N. The metaverse era: leveraging augmented reality in the creation of novel customer experience. *Management & Sustainability: An Arab Review*. 2024 Jan 3;3(1):1-5.  
<https://doi.org/10.1108/MSAR-10-2022-0051>
  29. Kim JH, Kim M, Park M, Yoo J. How interactivity and vividness influence consumer virtual reality shopping experience: the mediating role of telepresence. *Journal of Research in Interactive Marketing*. 2021 Jul 15;15(3):502-25.  
<https://doi.org/10.1108/JRIM-07-2020-0148>
  30. Hoffmann S, Joerß T, Mai R, Akbar P. Augmented reality-delivered product information at the point of sale: when information controllability backfires. *Journal of the Academy of Marketing Science*. 2022 Jul;50(4):743-76.  
<https://doi.org/10.1007/s11747-022-00855-w>
  31. Arghashi V. Shopping with augmented reality: How wow-effect changes the equations!. *Electronic Commerce Research and Applications*. 2022 Jul 1; 54:101166.  
<https://doi.org/10.1016/j.elerap.2022.101166>
  32. Kim J, Forsythe S. Adoption of virtual try-on technology for online apparel shopping. *Journal of interactive marketing*. 2008 Jan 1;22(2):45-59.  
<https://doi.org/10.1002/dir.20113>
  33. Hair JF, Black WC, Babin BJ anderson RE, Tatham RL. *Multivariate data analysis (8th ed)*. Pearson Prentice Hall, Harlow; 2018. ISBN:9781473756557  
<https://www.cengage.com/c/ebook-multivariate-data-analysis-8e-hair-babin-anderson/9781473756557/>
  34. Hu LT, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: A multidisciplinary journal*. 1999 Jan 1;6(1):1-55.  
<https://doi.org/10.1080/10705519909540118>
  35. Schermelleh-Engel K, Moosbrugger H, Müller H. Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of psychological research online*. 2003 May 25;8(2):23-74.  
<https://psycnet.apa.org/record/2003-08119-003>
  36. Azuma RT. A survey of augmented reality. *Presence: teleoperators & virtual environments*. 1997 Aug 1;6(4):355-85.  
<https://doi.org/10.1162/pres.1997.6.4.355>
  37. Brakus JJ, Schmitt BH, Zarantonello L. Brand experience: what is it? How is it measured? Does it affect loyalty?. *Journal of marketing*. 2009 May; 73(3):52-68.  
<https://doi.org/10.1509/jmkg.73.3.052>
  38. Sarstedt M, Ringle CM, Hair JF. *Partial Least Squares Structural Equation Modelling*. Handbook of Market Research 2021 Dec 3; 587-632. Cham: Springer International Publishing.  
[https://doi.org/10.1007/978-3-319-57413-4\\_15](https://doi.org/10.1007/978-3-319-57413-4_15)
  39. Hayes AF. *Introduction to mediation, moderation and conditional process analysis: A regression-based approach*. Guilford publications; 2017 Oct 30. ISBN 9781462549030  
<https://www.scirp.org/reference/referencespapers?referenceid=3016713>
  40. Preacher KJ, Kelley K. Effect size measures for mediation models: quantitative strategies for communicating indirect effects. *Psychological methods*. 2011 Jun;16(2):93.  
<https://psycnet.apa.org/doi/10.1037/a0022658>
  41. Davis FD. Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology. *MIS quarterly*. 1989 Sep 1;13(3):319-40.  
<https://doi.org/10.2307/249008>
  42. Zhao X, Lynch Jr JG, Chen Q. Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of consumer research*. 2010 Aug 1;37(2):197-206.  
<https://doi.org/10.1086/651257>
  43. Henseler J, Ringle CM, Sarstedt M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science*. 2015 Jan;43(1):115-35.  
<https://doi.org/10.1007/s11747-014-0403-8>
  44. Ambika A, Jain V, Belk R, Kasilingam D, Krishna R. The Role of Augmented Reality Experiences in Consumers' Purchase Intention Toward New Products. *Journal of Consumer Behaviour*. 2025 Mar;24(2):799-819.

- <https://doi.org/10.1002/cb.2435>
45. Costa A, Marozzo V, Abbate T. Consumers' attitudes toward virtual try-on technology: an extended TAM model. *International Journal of Retail & Distribution Management*. 2025 Dec 15;53(13):184-99. <https://doi.org/10.1108/IJRDM-01-2025-0060>
46. Kim TH, Im H. Can augmented reality impact your self-perceptions? The malleability of the self and brand relationships in augmented reality try-on services. *Journal of Consumer Behaviour*. 2024 Jul;23(4):1623-37. <https://doi.org/10.1002/cb.2296>
47. Mollet J, Chen Y. Does AR virtual try-on boost online apparel purchase intentions? An integration of TAM, IDT, FIT perception and body esteem. *Young Consumers*. 2025 May 6;26(3):385-402. <https://doi.org/10.1108/YC-08-2024-2196>
48. Sekri K, Bouzaabia O, Rzem H, Juárez-Varón D. Effects of virtual try-on technology as an innovative e-commerce tool on consumers' online purchase intentions. *European Journal of Innovation Management*. 2025 Oct 28;28(8):4041-60. <https://doi.org/10.1108/EJIM-05-2024-0516>
49. Behl A, Nigam A, Vrontis D. Guest editorial overview: 'Mapping the future of consumer behaviour using disruptive technologies'. *Journal of Consumer Behaviour*. 2024 Jul;23(4):1854-8. <https://doi.org/10.1002/cb.2309>

**How to Cite:** Kumar M, Pinto OR, Supriya R, Rashmi BH. Bridging Technology and Consumer Experience: The Role of Augmented Reality and Perceived Usefulness in Digital Retailing. *Int Res J Multidiscip Scope*. 2026; 7(2): 1697-1710. DOI: 10.47857/irjms.2026.v07i02.09365