THE ROLE OF AUGMENTED REALITY FACTORS ON REUSE INTENTION WITH AUTONOMOUS DETERMINATION AS MODERATING ROLE: AN EMPIRICAL STUDY IN HCM CITY

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Abstract

This study investigates the role of augmented reality (AR) applications in enhancing shopping experiences by examining the influence of AR features—interactivity, media richness, novelty, and the wow effect on perceived usefulness, which subsequently influences user satisfaction and impression. By focusing on a sample of customers in Vietnam, this research provides insights into the effectiveness of AR in a developing economy context, contrasting with existing studies predominantly centered on Western and advanced economies. The findings suggest that AR features significantly boost perceived usefulness, satisfaction, and impression, ultimately leading to higher reuse intention. This study contributes to the literature by integrating AR factors with established technology-related theories, offering a comprehensive understanding of AR's impact on e-commerce platforms, and highlighting the importance of user autonomy in technology adoption and continued use.

Key words: AR Vividness, AR Novelty, AR Interactivity, Word-of-mouth, Reuse Intention

JEL Code: M31, O31, O32.

Introduction

Augmented Reality (AR) is a prominent topic across various fields, known for its immersive and interactive experiences, especially in shopping applications. It has the potential to revolutionize shopping, attracting interest from professionals and stakeholders, particularly in e-commerce (Dargan et al., 2023).

With e-commerce growth and market saturation, business owners seek alternative methods to boost sales. They find engaging existing customers more cost-effective than acquiring new ones. AR helps in this endeavor by allowing customers to virtually try products before purchasing, enhancing customer retention and reducing return rates. Hence, this study aims to

contribute significantly to practical applications and scholarly work, providing insights and strategies for e-commerce development and AR implementation. Ultimately, the findings add to the knowledge base on AR in e-commerce, especially relevant for Vietnam, a developing country. Previous research has focused on industrialized nations and general AR reuse intentions, lacking a comprehensive examination of individual aspects. This research addresses the gaps by exploring the applicability of theories like Stimulus-Organism-Response (SOR), Technology Continuance Theory (TCT), telepresence theory, and the Unified Theory of Acceptance and Use of Technology (UTAUT) in Vietnam's e-commerce market. It confirms AR's impact on consumer engagement (Sinha & Srivastava, 2022) and offers a detailed analysis within Vietnam's context.

The study aims to provide firms with insights to integrate AR into their strategies, enhancing operations and customer retention. The results demonstrate the practicality of AR implementation, supporting the growth of Vietnam's e-commerce sector.

1. Theoretical background and hypothesis development

1.1 Stimulus – Organism – Response (SOR) Theory

The SOR model, developed by Mehrabian and Russell (1975), suggests that a stimulus (S) triggers an emotional response (O), which affects consumer behavior (R). Unlike previous studies on mobile shopping habits that relied on technology acceptance frameworks (e.g., Innovation Diffusion Theory, Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology), this study uses the SOR theory to explore how customer emotions influence behavior. The authors focus on sensory factors like interactivity, vividness, novelty, and the impact of mobile shopping, with emotional states, particularly autonomous determination, as mediators. The model posits that AR features in products create intense emotional states, leading to a greater inclination to use the app for future purchases.

1.2 Interactivity (INT)

Interactivity involves actively engaging with augmented reality by modifying its content and structure. It allows users to participate in the AR environment, enhancing the shopping experience. AR's interactive features enable real-time modification of virtual objects, improving user control and information relevance. Offering extensive customization options and autonomy boosts user satisfaction by meeting their expectations. User interaction in AR significantly enhances Perceived Usefulness, crucial for technology adoption (Wang, 2023).

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Interactivity is both a functional component and a catalyst for technology adoption, providing practical benefits to users. Based on these observations, we propose:

H1. AR apps interactivity has a significant upward effect on user's perceived usefulness.

1.3 Media Richness (MD)

Media richness, or "vividness," measures how well technology generates sensory data, impacting how product information is conveyed to consumers. Rich media reduces product ambiguity and improves communication, making it preferable for consumers. Integrating augmented reality (AR) into media richness offers an immersive sensory experience with products. High-quality product images and AR enhance media richness perception by providing informative cues and stimulating multiple senses. This aligns with the telepresence hypothesis and adds value to online shopping (Yoo, 2023). Therefore, the following hypotheses were formulated:

H2. AR apps vividness improves perceived usefulness.

1.4 Novelty (NVT)

Novel experiences that AR provides such as virtual furniture installation and virtual try-ons have been shown to enhance consumer motivation, performance, and perception, resulting in more favorable behavioral and psychological responses (Arghashi, 2022). It is suggested that users' expectations and expertise influence their engagement with AR applications, further emphasizing the role of AR in delivering individualized and immersive shopping interactions. The distinctiveness of AR apps fosters client engagement, stimulates curiosity, and delivers customized purchasing experiences, ultimately leading to greater user satisfaction through enhancing user's perceived usefulness. Therefore, it can be hypothesized that:

H3. AR apps novelty has a positive effect on user's Perceived Usefulness.

1.5 Wow-effect (WOW)

Awe is a positive emotional state linked to wonder and astonishment. It differs from other emotions like eagerness, amusement, attachment, love, and contentment. The "wow-effect" in augmented reality (AR) refers to user reactions of wonder. We hypothesize that exposure to immersive AR experiences will increase feelings of wonder, leading to strong amazement. This reaction can modify cognitive schemas, allowing individuals to see new

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opportunities and perspectives (Yaden et al., 2017). Such awe-inspiring encounters can promote positive cognitive and behavioral changes. Therefore:

H4. The Wow-effect of AR has a positive effect on user's Perceived Usefulness.

1.6 Perceived Usefulness (PU)

Perceived usefulness is the belief that using a system improves work performance. Customers find AR apps helpful when they enhance the purchasing process, provide detailed product views, and offer personalized recommendations. Satisfied users value the app's effectiveness and benefits. AR apps that lack practical benefits cause irritation and discontinuation. It is recognized that AR apps providing reliable and relevant product information meet practical demands and enhance satisfaction. Thus, we hypothesize:

H5a. PU affects user satisfaction with AR apps.

Perceived usefulness shapes users' perceptions of AR apps. Users view AR apps more favorably when they improve their purchasing experience. A positive user experience increases satisfaction and enhances overall impressions. Thus, users have favorable views of AR apps they find beneficial which lead to the following hypothesis:

H5b. PU improves impressions of AR apps.

Perceived usfulness influences future use of AR apps. It is noted that perceived advantages during initial use encourage frequent utilization. Positive experiences motivate continued use. Hsu et al. (2021) verified that AR apps offering dependable product information promote repeated usage which emphasize that PU significantly impacts reuse intention. Thus, we hypothesize:

H5c. PU facilitates reuse intention of AR apps.

1.7 Satisfaction (SAS)

Satisfaction is the convergence of user expectations and the actual benefits experienced. It arises when technology meets or exceeds expectations and plays a crucial role in post-adoption behavior. Satisfied users tend to have a positive opinion of the technology. This link is observed in various contexts, such as payment applications, mobile commerce, and mobile tourist applications. Therefore, we hypothesize:

H6a. Satisfaction (SAS) improves impressions of AR apps.

Cai et al. (2022) demonstrated a direct association between pleasure and the likelihood of reusing fitness apps. It is evident that positive experiences influence continued engagement

in mobile gaming. Satisfaction motivates ongoing use of mobile food ordering apps. Ultimately, satisfaction significantly influences the intention to continue using AR apps. Thus, we hypothesize:

H6b. Satisfaction (SAS) positively affects reuse intention (RI) of AR apps.

1.8 Impression (IMP)

An individual's affective response, positive or negative, towards a behavior is crucial in influencing their inclination to use technology. Research indicates that customers' impressions of technology predict their continued usage. Specifically, favorable perceptions of AR cosmetic apps can motivate future use (Daassi & Debbabi, 2021). Thus, users' repeated use of AR-integrated apps is directly affected by their impressions. Therefore, we recommend:

H7. Impression positively facilitates user's intention to reuse the app.

2.9 Autonomous determination (AD)

Autonomous determination, like motivation, develops within the customer's mind. It refers to the perceived relevance of a product based on needs, values, and interests. It reflects the significance of the product, the consumer's interest, and the depth of information sought before a decision (Liao, 2016). Studies have used this concept to explore online customer behavior, such as with grocery shopping apps and medical equipment. Customers exhibit varying levels of autonomous determination, which can intensify emotions and influence impulsive buying. Thus, autonomous determination may moderate the tendency to reuse the application. Therefore, we hypothesize:

H8a. Autonomous determination positively moderates the relationship between satisfaction and reuse intention.

H8b. Autonomous determination positively moderates the relationship between impression and reuse intention.

Fig. 1: Proposed model and results
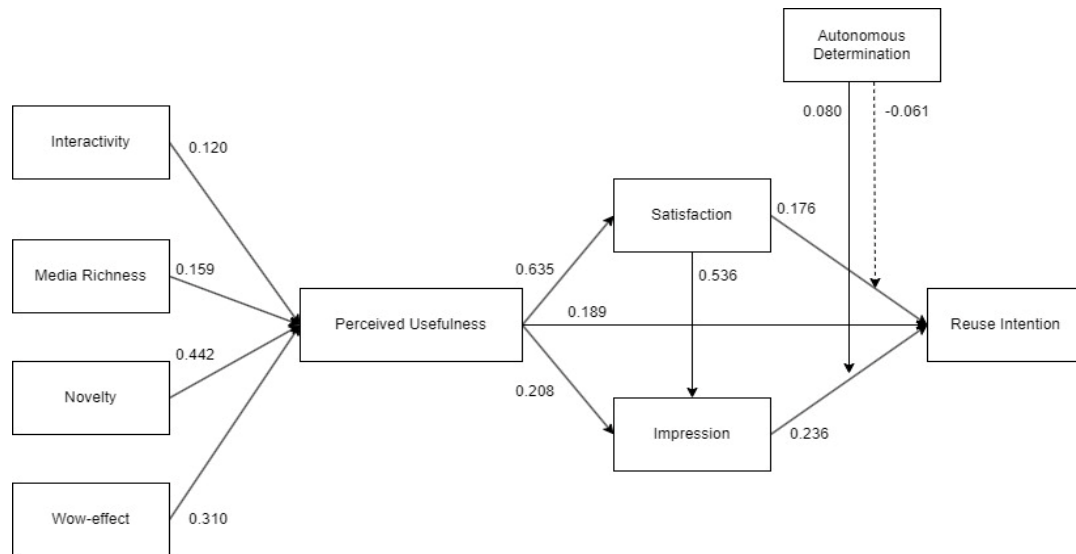
2. Methodology

2.1 Data collection and the sample

The data were collected from Shopee app users in Vietnam aged 18 and above. Shopee's AR technology allowed shoppers to digitally test makeup and accessories before purchasing. Data collection was done via an online Google Forms survey shared on social media and in groups focused on cosmetics and apparel. To verify that respondents used the Shopee app, the survey began with instructions on accessing the AR feature, followed by a filtering question to confirm usage. Participants unfamiliar with Shopee were excluded. After two months, 380 valid responses were obtained, ensuring the survey's reliability and generalizability (Hair et al., 2019).

2.3 Statistical methods

Data analysis used the Partial Least Squares Structural Equation Modeling (PLS-SEM) method with SmartPLS software to assess both inner and outer models. PLS-SEM was chosen for its extensive use in social sciences like organizational, strategic, and hospitality management. Hair et al. (2019) recommended PLS-SEM for testing theoretical frameworks, handling complex models with many constructs, and managing limited sample sizes, though it is effective with large samples as well.

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3. Results

3.1 Sample Characteristics

In this study, 74.3% of respondents were female, and 25.7% were male. Most participants were aged 18-27 (95.9%), with 3.2% aged 28-41, and 0.9% over 41. Recent transactions were made this week by 45.3%, last week by 35.4%, last month by 12.3%, 3 months ago by 5.8%, and 6 months ago by 1.2%. Regarding marital status, 231 were single, 97 married, and 2 divorced. Most respondents (98.6%) had bachelor's degrees, 1.4% had college degrees, and none had master's or doctoral degrees.

3.2 Measurements model results

Tab. 1: Path coefficients– direct and indirect effect results

Hypothesis	Relationship	Path coefficient	T-value	P-value	Decision
H1	INT -> PU	0.120	2.552	0.011	Supported
H2	MR -> PU	0.159	3.443	0.001	Supported
H3	NOV -> PU	0.442	8.637	0.000	Supported
H4	WOW -> PU	0.310	7.884	0.000	Supported
H5a	PU -> SAS	0.635	17.893	0.000	Supported
H5b	PU -> IMP	0.208	3.677	0.000	Supported
H5c	PU -> RI	0.189	4.035	0.000	Supported
H6a	SAS -> RI	0.176	3.387	0.001	Supported
H6b	SAS -> IMP	0.536	10.920	0.000	Supported
H7	IMP -> RI	0.236	4.766	0.000	Supported
H8a	AD x IMP -> RI	0.080	2.098	0.036	Supported
H8b	AD x SAS -> RI	-0.061	1.130	0.259	Rejected

Using a nonparametric bootstrapping method, hypotheses 1-4 showed all AR components (INT, MD, NOV, WOW) positively affected PU. NOV had the strongest impact on PU ($\beta = 0.442$, $p < 0.000$), followed by WOW ($\beta = 0.310$, $p < 0.000$), MD ($\beta = 0.159$, $p < 0.001$), and INT ($\beta = 0.120$, $p < 0.011$), confirming H1, H2, H3, and H4. Hypothesis 5 showed positive effects of perceived usefulness on satisfaction (SAS) ($\beta = 0.635$, $p < 0.000$), impression (IMP) ($\beta = 0.208$, $p < 0.000$), and reuse intention (RI) ($\beta = 0.189$, $p < 0.000$), confirming H5a, H5b, and H5c. Hypothesis 6 confirmed that SAS had a greater effect on IMP ($\beta = 0.536$, $p < 0.05$) than on RI ($\beta = 0.176$, $p < 0.001$), and there was a significant correlation between IMP and RI ($\beta = 0.236$, $p < 0.000$). Hypothesis 8 examined the mediating role of AD between IMP

and RI, and SAS and RI. SAS had a non-significant effect on RI through AD (β = -0.061, p = 0.259), while IMP positively affected RI (β = 0.080, p < 0.036), partially supporting H8.

Overall, NOV had the most significant impact on PU, followed by WOW. The path coefficients for SAS (β = 0.176) and IMP (β = 0.236) demonstrated their significant influence on RI. Figure 1 shows the path coefficients used in hypothesis testing.

4. Discussions, implications, and limitations

4.1 Discussion

This study investigates how AR factors—interactivity (INT), media richness (MD), novelty (NOV), and the wow effect (WOW)—affect perceived usefulness (PU) on e-commerce platforms like Shopee. It also explores the relationships between perceived value, satisfaction (SAS), attitude (IMP), and reuse intention (RI), and the mediating role of involvement (AD). The findings reveal that INT, MD, and NOV significantly enhance customers' perceived value. AR applications bridge the virtual-real world gap, improving user experience and shopping efficiency. INT enables customization, reducing information asymmetry. MD helps visualize products in context, lowering cognitive load. NOV introduces new features, boosting engagement and satisfaction (Habil, 2023). The WOW effect creates awe, positively impacting perceptions and satisfaction.

The study supports Ferreira et al. (2023) on PU's influence on SAS and RI. PU impacts perceptions via user contentment, especially in developing countries where new technologies are more impressive. Satisfaction with AR apps positively affect attitude and reuse, aligning with previous research. Contrary to Goel (2023), AD negatively impacts SAS and IMP, but in Vietnam, understanding the technology increases satisfaction and reuse. However, AD doesn't affect IMP, as a strong first impression directly leads to high reuse propensity.

4.2 Theoretical implications

This study makes significant theoretical contributions. First, while prior research has focused on AR in Western and advanced economies, little research has explored AR combined with established technology-related theories like Stimulus-Organism-Response (SOR), Technology Continuance Theory (TCT), telepresence theory, and the Unified Theory of Acceptance and Use of Technology (UTAUT) in Vietnamese e-commerce. This study substantiates these theories, showing how AR factors like interactivity, media richness, novelty, and the wow effect enhance perceived usefulness, satisfaction, impression, and reuse intention

in Vietnam. Moreover, this research introduces new considerations such as the wow effect and autonomous determination. The positive impact of the wow effect on perceived usefulness advances understanding of AR in a developing nation. It extends the existing theoretical framework by integrating AR factors, perceived usefulness, satisfaction, impression, and reuse intention into a comprehensive model.

Finally, the study highlights the pivotal role of autonomous determination in mediating the relationship between customers' impressions of the app and their reuse intention, emphasizing intrinsic motivation's importance. By examining AR factors and their influence on reuse intention among online shopping customers in Vietnam, this study addresses a notable gap, fostering cross-regional and cross-industry comparisons and opening potential avenues for future research.

4.3 Practical implications

The insights from this research hold significant implications for implementing augmented reality (AR) technologies, especially in emerging and developing economies where innovative business models leveraging new technologies like AR are on the rise. Managers overseeing AR implementation should focus on factors that resonate with customers, emphasizing active engagement and customization to meet individual needs. AR designers should prioritize enhancing interactivity and media richness by integrating features that allow users to edit, personalize, and engage with digital representations of products. Superior visual depictions are essential, as detailed, vibrant, and realistic visuals positively impact consumers' views of the technology. By effectively leveraging interactivity and media richness, along with the novelty and wow factor of AR, there is a higher probability of recurring user engagement.

AR developers should integrate unique stimuli that seamlessly blend virtual elements with the physical environment, enhancing the overall digital experience and fostering satisfaction and positive impressions among users. Retailers should prioritize the key factors identified in AR shopping experiences to bolster users' perceptions of AR apps and drive favorable outcomes in satisfaction, impression, and reuse intention.

By prioritizing practical benefits and user-friendly interfaces alongside AR-specific functionalities, developers can ensure effective utilization of AR apps, increasing the likelihood of sustained usage. This study also underscores the importance of autonomous determination in influencing the relationship between customer satisfaction and reuse intention, particularly

among frequent shoppers seeking practical applications of AR technology.

4.4 Limitations

The study has several limitations. Since it focuses on customers in Vietnam, the results cannot be generalized to other contexts. Future researchers should conduct experiments on the model and compare findings across different locations and sectors. This study only considered results-oriented, interpersonal, and cognitive competencies as independent variables; future research could explore other AR-related elements.

Data was gathered from diverse customers to represent how AR impacts Vietnamese customers. Further research should include control variables like internet usage habits and user interface languages. Future studies could also examine potential moderators, such as the need for physical contact and product type to determine their influence on customer reactions.

This study used PLS-fsQCA methods to uncover connections between AR app characteristics—interactivity, media richness, novelty, wow-effect, perceived usefulness, satisfaction, impression, and autonomous determination—in explaining reuse intentions. Future studies should consider alternative analytical approaches, such as preference analysis (e.g., discrete choice experiments or conjoint analysis), to identify specific AR app qualities that increase reuse intention.

Conclusion

The study underscores that interactivity, media richness, novelty, and the wow effect significantly enhance perceived usefulness and satisfaction, ultimately driving reuse intention. These AR factors create engaging, informative, and enjoyable user experiences, crucial for fostering long-term customer loyal usage in Vietnam's e-commerce sector. In addition, the study highlights the wow effect and autonomous determination, on customer perceptions and behaviors in Vietnam's e-commerce sector. These findings are distinct as they focus on a developing economy, demonstrating that AR can bridge technology gaps and meet customer expectations effectively. Businesses in Vietnam should leverage these AR features to enhance user experience and drive repeat engagement, setting a precedent for similar markets.

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