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The Impact of Augmented Reality (AR) Technology on Online Purchase Intention: Differences Between Generation Z and Millennials in Hanoi When Shopping for Cosmetic Products

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ABSTRACT: The present study evaluates the impact of augmented reality (AR) technology on online purchase intent in the cosmetics industry. At the same time, the study analyzes the differences in perceptions and attitudes between Gen Z and Millennials in Hanoi. The research integrates both qualitative and quantitative methodologies. The authors conducted direct surveys with two groups of participants, Gen Z and Millennials in Hanoi, who had prior experience using AR in cosmetic shopping. A total of 520 questionnaires were obtained from the survey, of which 475 valid responses were used for analysis. The SEM model was employed to analyze the collected data. The results of the study show that factors related to AR technology all positively influence intermediate variables and online purchase intent. Specifically, the perception of usefulness and ease of use has a positive effect on customer trust. Beliefs positively impact attitudes, and attitudes have a drive to purchase intentions. Factors such as interactivity, intuitiveness, and personalization of AR technology all contribute to improving consumers' awareness of product value and experience. The results also showed differences between the two groups of customers, with the impact of interactivity on sensory experience stronger among Millennials, while personalization had a greater impact on Gen Z. These findings offer important managerial implications for businesses in optimizing the use of AR technology in marketing, enhancing customer experience, fostering online purchase intention.

KEYWORDS: Augmented Reality (AR), Online Purchase Intention, Gen Z, Millennials, Cosmetics

1. INTRODUCTION

In the context of digital transformation, consumer behavior has shifted significantly from traditional shopping to online environments. E-commerce in Vietnam has grown rapidly and is increasingly recognized as a key element of the digital economy (Google et al., 2023). However, in the cosmetics sector, the lack of direct product experience remains a major barrier, increasing consumer uncertainty (Tran et al., 2025). Augmented reality (AR) is considered a promising solution to enhance online shopping experiences through virtual product trials. Prior studies suggest that AR can improve consumer perceptions and trust (Javornik, 2016). Existing research has primarily focused on general retail contexts, while its application in the cosmetics sector and generational differences between Generation Z and Millennials in developing markets like Vietnam have not been fully explored.

This study investigates the impact of AR on online purchase intention in the cosmetics sector and to analyze differences between Generation Z and Millennials in Hanoi. By employing SEM analysis via SPSS and AMOS on data from AR users, this study seeks to provide significant scholarly and practical significance. These findings offer a deeper look into buyer behavior in AR contexts, enabling businesses to enhance their

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digital marketing efficiency. The findings are expected to offer both theoretical and practical insights by deepening the understanding of consumer behavior in AR contexts and supporting firms in optimizing digital marketing strategies.

2. LITERATURE REVIEWS AND HYPOTHESIS DEVELOPMENT

2.1. Augmented Reality (AR)

Augmented Reality (AR) is an advanced technology that superimposes digital elements onto the real-world environment to create enhanced user experiences. Azuma (1997) defines AR systems by three essential features: the combination of real and virtual objects, real-time interaction, and accurate three-dimensional registration. From a mobile application perspective, Grubert and Grasset (2013) describe AR as a bridge that seamlessly integrates virtual information into the user's physical surroundings. In e-commerce, AR allows consumers to try products virtually within their actual environment, thereby reducing uncertainty - especially for experience-based items such as cosmetics. For Generation Z and Millennials, camera-enabled AR features have been shown to boost engagement, strengthen trust, and ultimately increase purchase intention.

2.2. E-commerce and Online Shopping

E-commerce involves the buying, selling, and exchange of goods, services, or information through digital platforms. Turban et al. (2018) emphasize that it includes not only transactions but also supporting activities such as customer service and after-sales support. Similarly, Fauska et al. (2013) regard e-commerce as all commercially oriented activities conducted via electronic channels. Within this domain, online shopping constitutes a major component of the business-to-consumer (B2C) model, referring to the process by which individuals search for and acquire products over the Internet (Kotler & Armstrong, 2018). From a consumer behavior viewpoint, van der Heijden et al. (2003) describe online shopping as a multi-stage journey encompassing information search, transaction execution, and post-purchase evaluation.

2.3. User Experience

User Experience (UX) encompasses the overall perceptions and responses that emerge from a person's interaction with a product, service, or system. It extends beyond interface design to cover functionality, usability, and emotional reactions throughout the entire usage process (Quaresma et al., 2022). A widely accepted definition states that UX comprises all emotions, beliefs, preferences, and behaviors arising before, during, and after interaction with a product or system (Ntoa, 2025). As a multidimensional construct, UX is shaped not only by ease of use but also by personal and emotional significance. In AR-assisted shopping environments, positive user experience is typically reflected in smooth operation, high realism, and enjoyable interaction (Hasenzahl et al., 2010).

2.4. Perceived Risk

Perceived risk represents a consumer's subjective assessment of potential negative outcomes associated with a purchase. Bauer (1960) argues that consumer behavior always involves uncertainty and that the decisive factor is not the objective risk but how individuals perceive it. In online settings, Featherman and Pavlou (2003) define perceived risk as the possibility of loss during electronic transactions. Because consumers cannot physically examine products, they frequently worry about quality, misleading information, and security issues. Consequently, perceived risk remains one of the most significant barriers to online purchase intention.

2.5. Trust in Technology/Product

Trust is the willingness of an individual to accept vulnerability based on positive expectations about another party's future actions (Mayer et al., 1995; Rousseau et al., 1998). Luhmann (2000) highlights that trust becomes especially critical in uncertain situations where outcomes cannot be fully controlled. In technology contexts, trust strongly predicts adoption intention and reduces hesitation. Wijoseno and Ariyanti (2017) further note that trust in technology reflects consumers' comfort level when using and transacting through a system. In AR-enabled online shopping, confidence in the technology's accuracy, reliability, and data security plays a decisive role in shaping both usage intention and purchase decisions.

2.6. Perceived Enjoyment

Perceived enjoyment refers to the pleasure and excitement users derive from interacting with a technology, irrespective of its practical benefits (Davis et al., 1992). This intrinsic emotional factor significantly influences technology adoption and sustained use. In AR applications, enjoyment arises mainly from immersive, real-time interactions such as virtual product trials, which extend engagement time (Jo & Park, 2023). Research shows that hedonic value can drive usage even when functional advantages are not immediately apparent. Pine and Gilmore (1998) also underscore the importance of emotional experiences in consumption. Therefore, perceived enjoyment serves as a powerful driver of user interaction and purchase intention in e-commerce.

2.7. Attitude toward Using AR

Attitude toward using AR denotes consumers' overall positive or negative evaluation of the technology in an online shopping context (Venkatesh & Davis, 2000). It functions as a key mediating variable that affects technology acceptance and actual behavior. A favorable attitude tends to develop when users perceive AR as helpful for decision-making and when it provides vivid, interactive experiences (Pavlou, 2003). Ease of use and intuitive design further enhance satisfaction, while immersive features and system reliability reinforce positive evaluations (Wijoseno & Ariyanti, 2017). As a result, attitude toward AR becomes a major determinant of both usage intention and purchasing behavior.

2.8. Online Purchase Intention

Online Purchase Intention (OPI) indicates the strength of a consumer's willingness to complete a transaction on digital platforms (Pavlou, 2003). It serves as a reliable predictor of future buying behavior. Studies consistently show that OPI is shaped by trust, perceived risk, convenience, and user experience (Wijoseno & Ariyanti, 2017). When integrated with AR, purchase intention is further strengthened through virtual try-on features and interactive experiences. By enhancing trust and enjoyment, AR helps convert positive digital interactions into actual purchase decisions, particularly among Generation Z and Millennials.

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2.9. Research Model and Hypothesis Development

2.9.1. Augmented Reality (AR) Characteristics and the Cognitive System

Within the Technology Acceptance Model (TAM) framework (Davis, 1989), the core attributes of AR - novelty, visuality, interactivity, and personalization - act as primary independent variables that shape users' cognitive and emotional responses (McLean & Wilson, 2019). These characteristics do not affect behavior directly but operate through three key cognitive mediators: perceived ease of use (PEOU), perceived usefulness (PU), and perceived enjoyment (PE). Perceived ease of use refers to the belief that using AR requires minimal effort (Davis, 1989). Intuitive interfaces, real-time face scanning, and automatic adjustments in cosmetic applications reduce technical barriers. Therefore:

H1a, b, c, d: *Novelty, visuality, interactivity, and personalization of AR positively influence perceived ease of use (PEOU).*

Perceived usefulness reflects the extent to which AR is believed to improve shopping efficiency and decision quality.

Virtual try-ons on the user's own face reduce uncertainty more effectively than static images. Thus:

H2a, b, c, d: *Novelty, visuality, interactivity, and personalization of AR positively influence perceived usefulness (PU).*

Perceived enjoyment captures the hedonic value generated by AR. Novelty sparks curiosity, visual richness provides aesthetic pleasure, interactivity creates a gamified experience, and personalization makes the interaction deeply engaging. Accordingly:

H3a, b, c, d: *Novelty, visuality, interactivity, and personalization of AR positively influence perceived enjoyment (PE).*

2.9.2. Relationships Between Cognitive Factors and Trust

Trust acts as a vital mediator between cognitive perceptions of AR and consumer attitudes. Smooth and intuitive operation (high PEOU), demonstrated practical value (high PU), and enjoyable experiences (high PE) all contribute to building confidence in the technology. The following hypotheses are proposed:

H4: *Perceived ease of use (PEOU) positively influences trust in AR technology.*

H5: *Perceived usefulness (PU) positively influences trust in AR technology.*

H6: *Perceived enjoyment (PE) positively influences trust in AR technology.*

2.9.3. Impacts on Attitude toward AR

According to the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), attitudes are formed through underlying beliefs. Trust developed from useful and enjoyable AR experiences fosters a favorable overall evaluation of the technology. Conversely, the Theory of Perceived Risk (Bauer, 1967) indicates that concerns about data privacy and simulation accuracy can create resistance. Therefore:

H7: *Trust positively influences attitude toward using AR.*

H8: *Perceived risk negatively influences attitude toward using AR.*

2.9.4. Purchase Intention and the Moderating Role of Generation

Drawing on the Theory of Planned Behavior (TPB) (Ajzen, 1991), behavioral intention is the most immediate predictor of actual behavior, with attitude serving as its primary driver. A positive attitude supported by trust and low perceived risk is expected to increase online purchase intention:

H9: *Attitude toward using AR positively influences online purchase intention.*

Finally, generational cohort is included as a moderating variable. Because Generation Z and Millennials differ in digital fluency and consumption patterns, the strength of the attitude–purchase intention relationship is anticipated to vary between the two groups (Lissitsa & Kol, 2016). Thus:

H10: *Generational cohort (Gen Z versus Millennials) moderates the relationship between attitude toward AR and online purchase intention.*

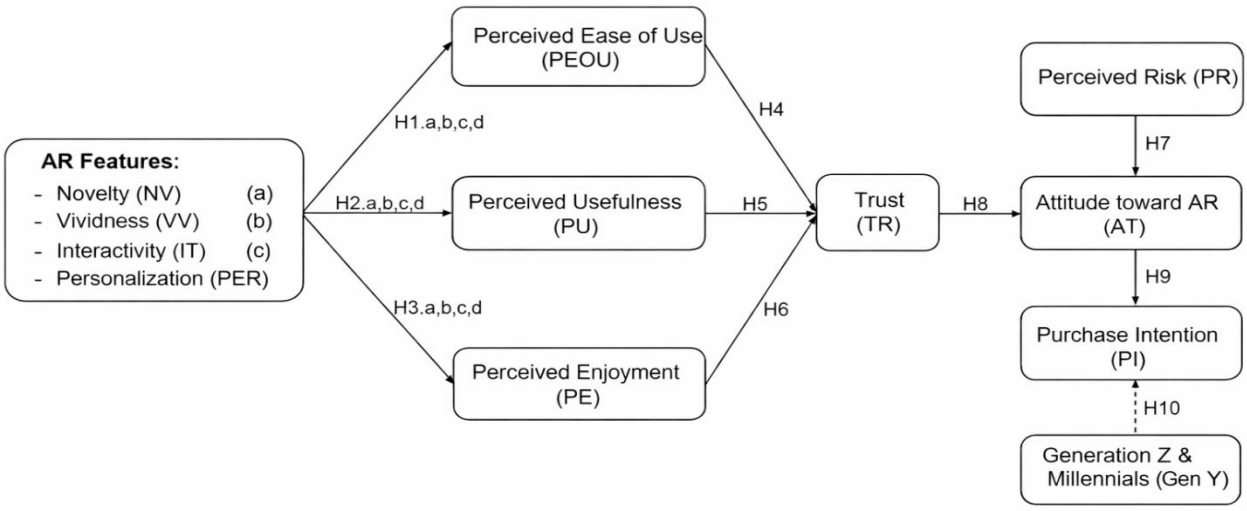


Figure 1: Proposed research model.
Source: Author's own work

3. RESEARCH METHOD

This study was conducted using a mixed-method approach, combining both qualitative and quantitative perspectives. To begin with, the qualitative stage focused on reviewing and integrating insights from previously published materials, such as academic studies, journal articles, and other relevant sources. These references provided the foundation for building the research model and designing the measurement scales.

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For the quantitative part, data were gathered through an online survey carried out from November 2025 to April 2026. In total, 520 responses were collected, and after screening, 475 were considered suitable for further analysis. The dataset was then processed using SPSS and AMOS. A range of statistical techniques was applied, including Cronbach's Alpha to assess reliability, along with Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM). These methods were used to explore and validate the relationships among the variables in the proposed model.

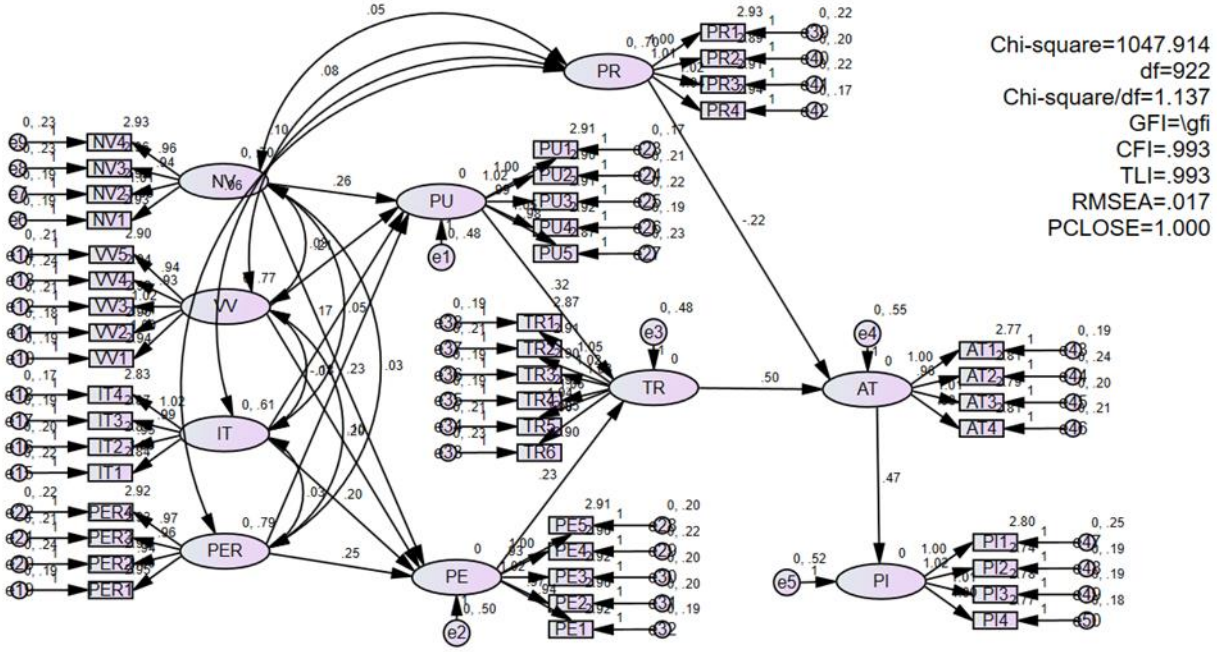


Figure 2: SEM model used to analyze the relationships between variables based on the research model.

4. RESULTS

The demographic characteristics of the sample were dominated by female participants, accounting for 61.1% of the total, while university students made up the largest occupational group at 57.3%. In terms of generational distribution, Generation Z and Generation Y (Millennials) represented 50.4% and 48.5% of the respondents, respectively.

Exploratory Factor Analysis (EFA) was conducted using Principal Axis Factoring with Promax rotation. Following the initial run, the Perceived Ease of Use (PEOU) construct was removed due to factor loadings below the 0.5 threshold. The final EFA on the remaining 46 items produced a KMO value of 0.899 (above 0.5) and a statistically significant Bartlett's Test of Sphericity ($p = 0.000$), confirming the data's suitability for factor analysis. Moreover, the extracted factors explained more than 50% of the total variance, indicating that the 11-factor solution adequately captured the underlying structure of the data.

Next, Confirmatory Factor Analysis (CFA) was performed to evaluate the fit of the measurement model to the empirical data. The results demonstrated an excellent overall fit, with key indices meeting or exceeding recommended thresholds: $\chi^2/df = 1.061$ (below 3), GFI = 0.921 (above 0.9), CFI = 0.997 (above 0.95), TLI = 0.997 (above 0.95), RMSEA = 0.011 (below 0.06), and PCLOSE = 1.000 (above 0.05). These values collectively confirm that the proposed measurement model is both appropriate and highly valid.

Structural Equation Modeling (SEM) was subsequently applied to test the hypothesized relationships. All direct and indirect paths proved statistically significant at the 0.001 level. Standardized path coefficients revealed that Attitude toward AR (AT) exerted the strongest direct positive effect on Online Purchase Intention (PI) with a value of 0.483. Trust (TR) showed a substantial positive influence on Attitude (0.455), whereas Perceived Risk (PR) had a significant negative impact (-0.212). Further indirect effect analysis highlighted the critical mediating roles of Perceived Usefulness (PU), Perceived Enjoyment (PE), Trust, and Attitude in transmitting the influence of AR characteristics to purchase intention.

Finally, multi-group analysis was carried out to examine the moderating effect of generational cohort. Although the majority of structural relationships remained consistent across groups, statistically significant differences ($z > 1.96$) emerged in two paths: the effect of Interactivity (IT) on Perceived Enjoyment (PE) was stronger among Millennials (Gen Y) at 0.310, while the effect of Personalization (PER) on Perceived Enjoyment was markedly higher for Generation Z at 0.357.

5. DISCUSSION

The empirical findings of this study offer a detailed picture of the mechanisms through which Augmented Reality (AR) features influence online purchase intentions among cosmetic consumers in Hanoi, while also revealing notable generational differences. Structural Equation Modeling (SEM) results confirm that the core technological attributes - novelty, visuality, interactivity, and personalization - form the primary building blocks that shape both cognitive and emotional responses in the consumer journey. Importantly, the removal of Perceived Ease of Use (PEOU) from the final model, due to its insignificant factor loadings, indicates that for digitally native groups such as Generation Z and Millennials, basic usability has become a taken-for-granted expectation rather than a distinctive driver of trust or attitude formation.

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The analysis underscores that Perceived Usefulness (PU) and Perceived Enjoyment (PE) function as the two central forces behind consumer trust (TR). In the cosmetics sector - a high-involvement category where visual and tactile precision are critical - AR's virtual try-on capability directly addresses the uncertainty inherent in online purchasing. When users recognize that the technology helps them accurately assess color, texture, and fit, their confidence in the system's reliability increases substantially. At the same time, the entertaining and gamified nature of AR interactions generates positive emotional responses that further reinforce trust. These results suggest that effective AR deployment in e-commerce must strike a careful balance between functional precision and engaging user experience to guide consumers from initial exploration toward a deeper sense of brand trust.

In addition, the study confirms the pivotal mediating role of Attitude toward AR (AT) in the pathway leading to Online Purchase Intention (PI). While trust acts as a strong catalyst for developing favorable attitudes, Perceived Risk (PR) functions as a significant psychological barrier. The negative influence of risk - largely driven by concerns over data privacy and possible mismatches between virtual simulations and actual products - continues to hinder adoption. This implies that even the most advanced AR features may lose effectiveness unless companies proactively address consumers' fears regarding biometric security and rendering accuracy through transparent communication and robust safeguards.

One of the most valuable contributions of this research is the identification of generational moderation. Multi-group analysis shows that although the overall structural paths to purchase intention are largely consistent, the relative importance of specific AR attributes differs markedly between cohorts. Millennials (Gen Y) respond more strongly to Interactivity, viewing AR primarily as a practical tool that enhances decision efficiency and option exploration. In contrast, Generation Z places greater emphasis on Personalization, reflecting their preference for self-expression and highly individualized experiences. These generational distinctions highlight that a uniform AR strategy is unlikely to succeed; instead, brands operating in the competitive Hanoi market should tailor their digital solutions - prioritizing functional control and efficiency for Millennials while focusing on creative, identity-driven customization for Gen Z - to optimize conversion rates.

6. CONCLUSIONS AND RESEARCH CONTRIBUTION

This study draws on survey data collected from Generation Z and Millennial consumers in Hanoi who have prior experience with augmented reality (AR) applications in online cosmetic shopping. The empirical results indicate that the core AR attributes - novelty, visuality, interactivity, and personalization - exert significant positive effects on both perceived usefulness and perceived enjoyment. In contrast, perceived ease of use (PEOU) did not demonstrate a meaningful impact and was therefore excluded from the final model. Nevertheless, these technological features collectively play a substantial role in fostering consumer trust.

The findings further reveal that trust serves as a strong positive driver of consumers' attitudes toward AR, whereas perceived risk exerts a significant negative influence. In turn, both trust and attitude emerge as key determinants of online purchase intention. These relationships highlight the central mediating mechanisms through which AR technology shapes consumer behavior in the cosmetics sector.

From a managerial perspective, the study offers several practical implications for e-commerce platforms and cosmetic brands. First, developers should prioritize enhancing the accuracy, interactivity, and personalization of AR features to deliver more realistic and engaging virtual try-on experiences. Second, building a transparent and trustworthy online environment is essential for strengthening consumer confidence. Third, AR interfaces should be designed to be visually appealing and user-friendly, thereby increasing immersion and satisfaction. Fourth, integrating user-generated content and authentic customer reviews can help alleviate uncertainty and reinforce credibility. Finally, robust measures to protect data privacy and ensure information security are critical, as these factors directly affect users' willingness to adopt the technology.

In summary, the effective implementation of AR technology can substantially improve customer experience and elevate online purchase intention. By tailoring AR strategies to the distinct preferences of Generation Z and Millennials, businesses operating in Vietnam's competitive digital marketplace can achieve greater engagement and conversion rates.

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