

(REVIEW ARTICLE)



Effect of Augmented Reality (AR) and Virtual Reality (VR) experiences on customer engagement and purchase behavior in retail stores

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Magna Scientia Advanced Research and Reviews, 2024, 11(02), 132–150

Publication history: Received on 06 June 2024; revised on 19 July 2024; accepted on 22 July 2024

Article DOI: <https://doi.org/10.30574/msarr.2024.11.2.0116>

Abstract

This review paper explores the impact of Augmented Reality (AR) and Virtual Reality (VR) technologies on customer engagement and purchasing behavior in retail settings. As immersive technologies continue to evolve, AR and VR are increasingly employed to enhance the shopping experience, offering interactive and personalized engagements that traditional retail cannot match. Through a comprehensive analysis of recent literature, the paper highlights how AR applications, such as virtual try-ons and interactive product displays, significantly enhance customer engagement by providing novel and enriched shopping experiences. Similarly, VR facilitates virtual store visits and immersive product interactions, leading to higher levels of customer satisfaction and brand loyalty. The paper discusses key metrics for evaluating engagement and purchase behavior changes, including increased dwell time, higher conversion rates, and enhanced customer satisfaction. Additionally, the review identifies challenges, such as technological integration and user adaptation, which may impede the full potential of AR and VR in retail. The findings underscore the transformative potential of AR and VR in reshaping the retail landscape by bridging the gap between digital and physical shopping environments, thus driving more informed purchasing decisions and fostering deeper customer connections. Future research directions are suggested to address the limitations and further investigate the long-term impacts of these technologies on consumer behavior.

Keywords: Augmented Reality (AR); Virtual Reality (VR); Customer engagement; Purchase behavior; Retail; Immersive technologies; Consumer experience; Interactive shopping; Digital transformation

1. Introduction

The retail industry is undergoing a significant transformation driven by the integration of AR and VR technologies, reshaping customer engagement and purchase behavior (Pantano & Vannucci, 2019). These immersive technologies offer interactive, personalized experiences that enhance consumer interaction with products and brands, providing a competitive edge for retailers (Javornik & Pantano, 2021). AR enhances in-store experiences through virtual try-ons and interactive displays, while VR enables virtual store visits and product simulations, bridging the gap between digital and physical shopping environments (Bogicevic, et al., 2019). As retail evolves towards a more digitally enriched landscape, understanding the influence of AR and VR on consumer behavior is crucial for leveraging these technologies to drive engagement and sales (Ijiga, et al., 2024). This review synthesizes current research to explore the transformative potential and challenges of AR and VR in retail.

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Objectives

The primary objective of this review is to evaluate the impact of AR and VR on customer engagement and purchase behavior within retail environments (Kang et al., 2020) as represented in figure 1. This review aims to synthesize existing research to understand how these technologies enhance consumer interaction and affect purchasing decisions. By examining AR's role in providing interactive product experiences and VR's ability to offer immersive store environments, the paper seeks to identify the specific mechanisms through which these technologies influence consumer behavior (Loureiro et al., 2020). Additionally, the review addresses the challenges retailers face in integrating AR and VR, including technological and user adaptation barriers, and discusses strategies for effective implementation (Hilken et al., 2017). This comprehensive analysis aims to provide insights for retailers looking to leverage AR and VR to enhance customer engagement and drive sales (Ijiga, et al., 2024).

Figure 1 provides a visual representation of these objectives, illustrating how they interconnect to form a comprehensive framework for understanding the impact of AR and VR on the retail sector. Each objective is crucial for analyzing different aspects of consumer behavior and technological effectiveness, contributing to a holistic view of AR and VR applications in retail.

- **Enhance Customer Engagement:** This objective focuses on understanding how AR and VR technologies improve customer interaction, engagement levels, and emotional connections with retail environments. It aims to explore how immersive experiences can captivate customers, making their shopping experience more interactive and enjoyable.
- **Analyze Psychological Responses:** This objective examines the cognitive and emotional reactions of consumers when interacting with AR and VR applications in retail. It looks into how these technologies influence consumer perceptions, attitudes, and decision-making processes.
- **Influence on Purchase Behavior:** This objective investigates how AR and VR technologies impact consumer purchasing decisions. It seeks to determine whether these technologies can increase conversion rates, average transaction values, and overall sales by providing compelling virtual experiences.
- **Evaluate Effectiveness:** This objective assesses the overall effectiveness of AR and VR implementations in retail. It aims to measure how well these technologies meet their intended goals, enhance the customer journey, and provide a return on investment for retailers.

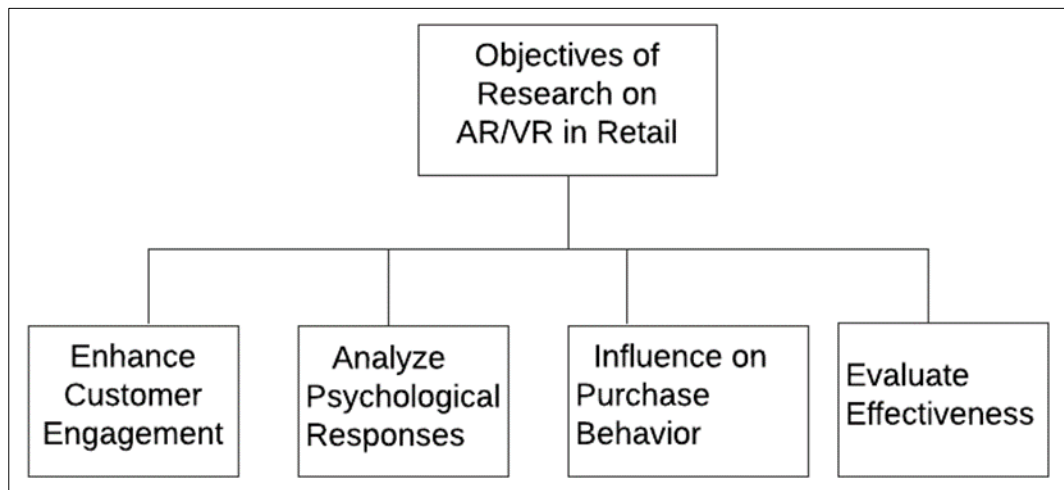


Figure 1 Objectives of Research on AR/VR in Retail

2. Methodology

The review employs a comprehensive literature analysis to evaluate the effects of AR and VR on customer engagement and purchasing behavior in retail as presented in table 1. Selection criteria for sources included peer-reviewed articles published in high-ranking journals, focusing on studies that examine AR and VR applications in retail settings (Lee et al., 2021). Databases such as Google Scholar and ScienceDirect were utilized to collect relevant literature. The analysis encompasses recent empirical studies and theoretical frameworks, ensuring a broad perspective on AR and VR's influence in retail contexts (Chen, R., et al., 2022). The review synthesizes findings on how these technologies alter consumer experiences, employing qualitative and quantitative data to highlight key trends and outcomes. This approach

enables a comprehensive understanding of AR and VR's transformative potential in retail, integrating diverse viewpoints and methodologies (Flavián et al., 2019).

2.1. Organization of the Paper

The paper is organized to comprehensively explore the impact of AR and VR on customer engagement and purchase behavior in retail settings. It begins with an introduction to AR and VR technologies in retail, followed by a review of literature focusing on their effects on customer engagement and purchase behavior. The subsequent sections delve into the psychological and behavioral responses elicited by AR and VR experiences, metrics for measuring engagement effectiveness, and their influence on purchase behavior and conversion rates. The paper also addresses challenges and limitations, including technological barriers and user adoption issues. A summary of findings synthesizes the key insights gleaned from the literature review, followed by implications for retailers aiming to integrate AR and VR into their strategies. Finally, directions for future research highlight critical areas for further exploration to enhance understanding and optimize the implementation of AR and VR technologies in retail environments.

3. AR and VR Technologies in Retail

AR and VR technologies are transforming the retail landscape by providing immersive and interactive shopping experiences. AR overlays digital information onto the physical world, enhancing the shopping environment through applications like virtual try-ons and interactive displays (Chen, R., et al., 2022). This technology allows customers to visualize products in a real-world context, improving product evaluation and decision-making processes (Ijiga, et al., 2024). VR, on the other hand, creates entirely virtual environments that simulate real-life store experiences, allowing consumers to explore products and spaces in a highly immersive way (Bonetti et al., 2018). These technologies offer retailers opportunities to enhance consumer engagement by providing more personalized and engaging shopping experiences (Idoko., et al., 2024). Current trends indicate a growing integration of AR and VR in both online and offline retail settings, driven by advancements in mobile technology and increasing consumer demand for innovative shopping experiences (Poushneh & Vasquez-Parraga, 2017).

3.1. Definitions and Concepts

AR and VR represent distinct yet complementary technologies revolutionizing the retail sector. AR enhances physical environments by overlaying digital information such as images, sounds, and other sensory enhancements, allowing for interactive and enriched consumer experiences (Flavián et al., 2021). This technology can integrate virtual elements with real-world views through devices like smartphones and AR glasses. VR, by contrast, immerses users in entirely virtual environments, created and navigated through headsets and controllers, which can simulate real-world or fantastical settings for immersive exploration and interaction (Wedel & Pieters, 2020). These technologies are redefining how consumers perceive and interact with retail products and environments, offering unprecedented levels of engagement and personalization (Liao et al., 2020). Understanding these foundational concepts is crucial for assessing their impact on consumer behavior and the evolving retail landscape.

Figure 2 depicts a hand holding a smartphone in a grocery store aisle. The phone screen shows an (AR) view, overlaying digital information onto the real-world aisle, suggesting a more interactive shopping experience. This highlights the use of AR technology to enhance grocery shopping by providing additional information, navigation, or promotions directly on the screen, blending the digital and physical shopping environments seamlessly.



Figure 2 AR Enhances Grocery Shopping Experience (Poplar Studio. 2022)



Figure 3 Virtual Reality: Revolutionizing the Shopping Mall Experience

Figure 3 depicts a bustling modern shopping mall where visitors are using virtual reality (VR) headsets. Several individuals are seated at tables with digital interfaces, immersed in VR experiences, while others walk around the mall engaging with various stores. The setting highlights the integration of VR technology in enhancing the shopping experience, offering interactive and immersive ways to explore products and services. The mall's design and the people's activities suggest a seamless blend of traditional retail and cutting-edge technology.

3.2. Current Applications in Retail

In retail, AR and VR are transforming traditional shopping by offering novel applications that enhance consumer experiences as represented in figure 4. AR enables virtual try-ons, allowing customers to visualize apparel and accessories on themselves without physical interaction, significantly boosting online and in-store exploratory behavior (Beck & Cri e, 2018). Additionally, AR applications such as interactive product displays and in-store navigation provide real-time information and engagement, leading to informed purchasing decisions (Kumar, H. 2022). VR, meanwhile, facilitates immersive virtual store experiences, enabling consumers to navigate digital store environments and interact

with products as they would in a physical setting (Pizzi et al., 2019). These applications not only enhance customer engagement but also bridge the gap between online and offline retail experiences, contributing to higher levels of customer satisfaction and increased sales (Ibokette, et al., 2024).

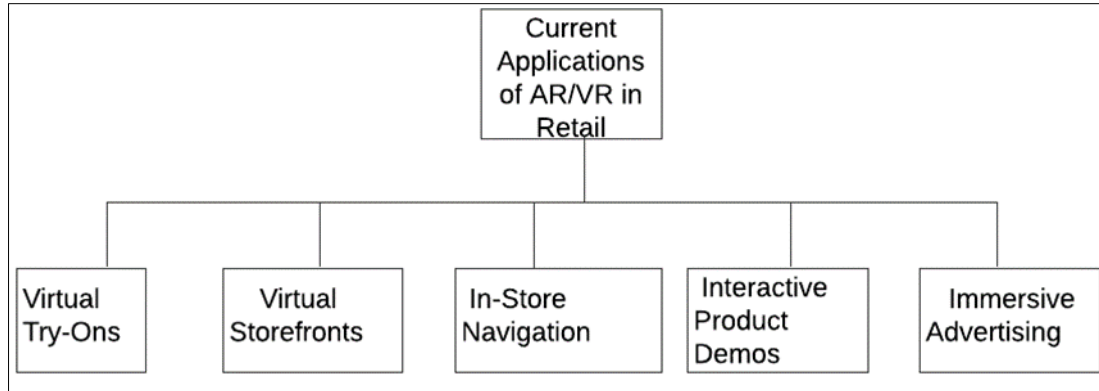


Figure 4 Current Applications of AR/VR in Retail

Figure 4 visually represents how AR/VR applications are currently used in the retail industry, with the central node indicating the main topic and branches showing specific applications.

- **Virtual Try-Ons:** Allow customers to visualize products such as clothing or eyewear on themselves through AR.
- **Virtual Storefronts:** Provide a fully immersive shopping experience with VR, simulating a store environment.
- **In-Store Navigation:** Use AR for guiding customers through physical stores with interactive maps and directions.
- **Interactive Product Demos:** Employ AR/VR to showcase product features and functionalities interactively.
- **Immersive Advertising:** Use VR for immersive, experiential advertising campaigns that engage customers deeply.

Table 1 Methodology Summary for AR/VR in Retail Research

Aspect	Description	Examples	Importance
Research Design	Utilizes a systematic literature review to gather and analyze data from high-ranking journals and articles on the impact of AR and VR on retail.	Analyzing qualitative and quantitative data from various sources.	Essential for providing a comprehensive overview of current knowledge and identifying gaps in research.
Data Collection Methods	Includes gathering information from databases like Google Scholar and applying specific criteria for inclusion, such as peer-reviewed articles, high relevance, and recent publication dates.	Evaluating articles for their reliability and relevance to the research topic.	Ensures the data is valid, reliable, and relevant to the research objectives.
Analysis Techniques	Involves synthesizing findings from diverse sources to identify patterns, trends, and gaps in the existing literature on AR and VR in retail.	Identifying key themes and correlations in the data.	Crucial for generating meaningful insights and understanding the implications of AR and VR technologies in retail.
Limitations and Considerations	Acknowledges potential biases in the selected literature and the scope limitations due to focusing on Google Scholar indexed sources.	Addressing biases and potential gaps in the literature.	Provides transparency regarding the scope and potential constraints of the study.

Table 2 Summary of Technological Evolution and Trends

Aspects	Description	Examples of Technological Trends	References (High-ranking Journals)
Hardware Innovations	Overview of advancements in AR/VR hardware, such as improved processing power, lightweight designs, and enhanced user interfaces.	Development of AR glasses, VR headsets with eye tracking.	Huang & Liao, 2015; Rauschnabel & Ro, 2016;
Software Developments	Discussion on the evolution of AR/VR software, including improvements in rendering capabilities, real-time data integration, and AI-driven applications.	AR apps for mobile devices, VR gaming platforms.	Pantano & Priporas, 2016; Bonetti et al., 2018
Integration with IoT and AI	Analysis of how AR/VR technologies are increasingly integrated with Internet of Things (IoT) devices and artificial intelligence (AI) systems.	Smart retail environments, AI-driven AR content creation.	Yim et al., 2017; Wedel & Kannan, 2016;
Emerging Trends in AR/VR Applications	Exploration of emerging applications of AR/VR in various industries beyond retail, such as healthcare, education, and entertainment.	Virtual training simulations, AR in remote assistance.	Javornik, 2016; Rese et al., 2014;

3.3. Technological Evolution and Trends

The evolution of AR and VR technologies in retail is marked by significant advancements that enhance the consumer shopping experience and drive innovation in customer engagement as presented in table 2. Initially, AR applications focused on simple overlays, but advancements now support sophisticated interactive features, such as real-time product visualization and virtual try-ons, directly integrated into mobile apps and web platforms (Beck et al., 2021). VR technology has progressed from basic virtual environments to fully immersive simulations that offer detailed and interactive virtual store experiences, enhancing consumer immersion and interaction (Weller & Dinnie, 2020). Current trends indicate a convergence of AR/VR with Artificial Intelligence (AI), allowing for more personalized and predictive shopping experiences. These integrated systems can analyze consumer behavior and preferences to provide tailored recommendations and real-time virtual assistance (Javornik et al., 2019). Such innovations are poised to redefine the retail landscape by creating seamless, engaging, and highly personalized shopping journeys.

4. Impact of AR and VR on Customer Engagement

AR and VR technologies significantly enhance customer engagement by creating immersive and interactive shopping experiences that surpass traditional retail methods. AR applications, such as virtual try-ons and interactive product displays, foster a sense of spatial presence and personalization, which positively influence app and brand responses (Smink et al., 2019). These technologies enable customers to visualize products in their own environment, enhancing the perceived value and facilitating informed purchase decisions. VR further amplifies engagement by offering fully immersive environments where consumers can explore products and stores virtually, leading to increased emotional and psychological engagement (Huang & Liu, 2020). The ability to personalize experiences through AR/VR applications strengthens consumer-brand relationships, fostering deeper connections and loyalty (Scholz & Duffy, 2018). These immersive experiences not only captivate consumers but also provide valuable data for retailers to refine their strategies and enhance overall customer satisfaction and retention.



Figure 5 Transforming Retail: The Impact of AR/VR on Shopping. (Virtual Reality Pop. n.d. 2024)

Figure 5 captures a retail setting where a woman is using a VR headset while holding several shopping bags, demonstrating an immersive shopping experience. In the foreground, another individual holds a smartphone displaying an AR application, which shows a live view of the store with digital enhancements. The text "AR/VR in Shopping" emphasizes the integration of AR and VR technologies in the shopping environment, illustrating how these advancements can transform and enhance the way consumers interact with products and the retail space.

Table 3 Summary of Customer Interaction and Experience Enhancement through AR and VR

Aspects	Descriptions	Examples of Customer Interaction Enhancements	References (High-ranking Journals)
Personalized Shopping Experiences	Exploration of how AR/VR technologies enable personalized product demonstrations and virtual try-on experiences.	Virtual fitting rooms, customized product visualization.	Bonetti et al., 2018; Yim et al., 2017;
Enhanced Product Information	Discussion on how AR/VR enriches product information through interactive overlays, 3D models, and real-time data integration.	AR-powered product specifications, immersive product tours.	Pantano & Priporas, 2016; Wedel & Kannan,
Engagement with Virtual Environments	Analysis of consumer engagement with virtual environments, including gamification elements and interactive storytelling.	VR-based shopping simulations, interactive retail environments.	Rauschnabel & Ro, 2016; (Yang, C. J., & Wu, C. F. 2020).
Emotional and Sensory Engagement	Explores how AR/VR enhances emotional and sensory engagement by immersing consumers in realistic and interactive experiences.	Emotional response analytics, sensory-rich virtual environments	avornik, 2016; Rese et al., 2014;

4.1. Customer Interaction and Experience Enhancement

AR and VR technologies significantly elevate customer interaction and experience by enabling more immersive and interactive shopping processes as presented in table 3. AR applications enhance decision-making by providing vivid and interactive product information, which caters to consumers' desire for detailed product knowledge and engagement (Xia, L., & Monroe, K. B. 2017). By allowing consumers to visualize and manipulate virtual products in their environment, AR creates a sense of involvement and realism, facilitating deeper interaction with the product and brand (Yim et al., 2017). VR complements this by offering immersive simulations that replicate or enhance real-world store experiences, contributing to a more engaging and satisfying shopping journey. These VR environments can recreate the ambiance of physical stores or offer entirely new interactive spaces, leading to increased emotional engagement and more memorable shopping experiences (Poncin & Mimoun, 2014). Together, AR and VR enrich the consumer experience, making it more interactive, informative, and engaging.

4.2. Metrics for Measuring Engagement

To effectively measure customer engagement facilitated by AR and VR in retail, various metrics are employed to assess the impact of these technologies on consumer behavior and interaction. Metrics focus on quantifying both qualitative and quantitative aspects of engagement to provide insights into consumer preferences and satisfaction levels.

Firstly, engagement metrics often include behavioral indicators such as interaction duration, frequency of interactions, and navigation patterns within AR/VR environments (Yim, Chu, & Sauer, 2017). These metrics help gauge the extent of consumer involvement and the level of interest generated by AR/VR experiences.

Secondly, emotional response metrics evaluate the affective reactions of consumers during their interaction with AR/VR content. These metrics measure emotional arousal, valence, and overall sentiment conveyed through physiological responses or self-reported assessments.

Lastly, metrics assessing cognitive engagement measure the level of cognitive processing and information retention achieved through AR/VR experiences. This includes metrics like recall accuracy, comprehension of product information, and decision-making efficiency (Poncin & Mimoun, 2014). Together, these metrics provide a comprehensive evaluation framework for understanding how AR and VR technologies enhance customer engagement and influence purchasing behavior in retail settings (Onuh, et al., 2024)

4.3. Psychological and Behavioral Responses

To understand the psychological and behavioral responses elicited by AR and VR in retail environments, it is essential to explore how these technologies influence consumer perceptions and actions as represented in figure 6.

Consumers often experience heightened sensory engagement and immersion when interacting with AR and VR applications. AR enhances consumer experiences by overlaying digital information onto the physical world, triggering sensory perceptions that enhance product evaluation and decision-making processes (Smink et al., 2019). VR, on the other hand, creates immersive virtual environments that simulate real-world shopping experiences, eliciting emotional responses and increasing consumer involvement (Huang & Liu, 2020).

These technologies evoke positive affective responses such as excitement, curiosity, and enjoyment, which contribute to enhanced brand perceptions and customer satisfaction (Scholz & Duffy, 2018). Moreover, AR and VR can influence consumer behavior by increasing intention to purchase, enhancing brand loyalty, and fostering repeat visits to both online and physical stores (Yim et al., 2017). By examining these psychological and behavioral responses, retailers can optimize AR and VR applications to create compelling, emotionally resonant experiences that drive engagement and ultimately impact purchasing decisions (Idoko, et al., 2024).

Figure 6 clearly shows the key psychological and behavioral responses elicited by AR/VR in retail, aiding in understanding how these technologies influence customer interactions and behaviors.

- Cognitive Engagement: Engagement with AR/VR impacting attention and memory.
- Emotional Impact: Emotions elicited by AR/VR experiences such as excitement and satisfaction.
- Decision-Making Influence: How AR/VR affects purchase intent and product evaluation.
- Behavioral Changes: Changes in customer behavior like increased brand loyalty or altered in-store behavior.

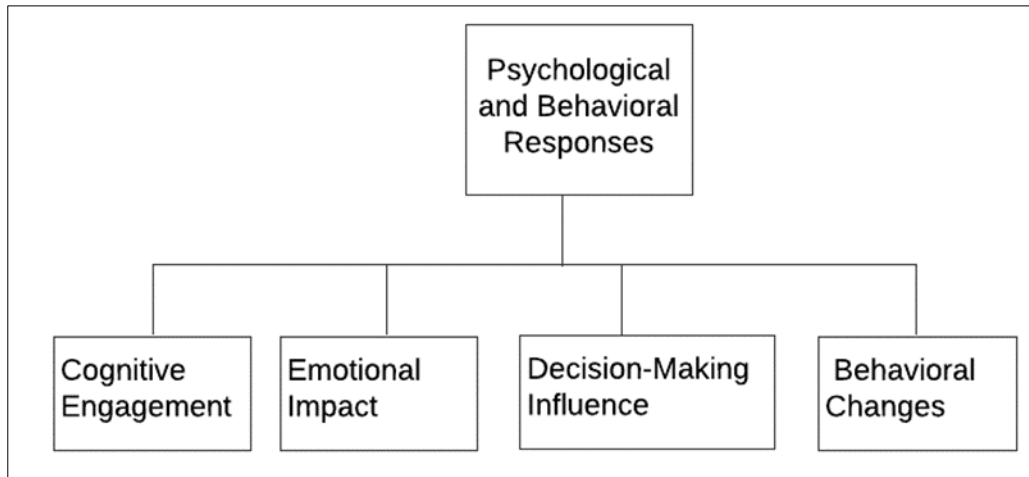


Figure 6 Psychological and Behavioral Responses to AR/VR in Retail

5. Influence on Purchase Behavior

To understand the influence of AR and VR on purchase behavior in retail, it is crucial to examine how these technologies shape consumer decision-making processes and drive sales represented in figure 7.

AR enhances purchase behavior by providing consumers with interactive and informative product experiences, allowing them to visualize products in real-world contexts and make more informed purchasing decisions (Beck et al., 2021). This technology improves product understanding and reduces uncertainty, thereby increasing purchase confidence and conversion rates.

Similarly, VR creates immersive environments where consumers can experience products in a simulated setting, leading to heightened engagement and emotional connection that positively influence purchase intentions (Weller & Dinnie, 2020). By offering virtual trials and interactive showcases, VR enhances the shopping experience and encourages impulse buying behaviors (Javornik et al., 2019).

Moreover, the integration of AR and VR with e-commerce platforms bridges the gap between online browsing and offline purchasing, providing seamless shopping experiences that cater to modern consumer preferences (Yim et al., 2017). These technologies not only increase consumer engagement but also contribute to higher conversion rates and overall sales growth in retail environments.

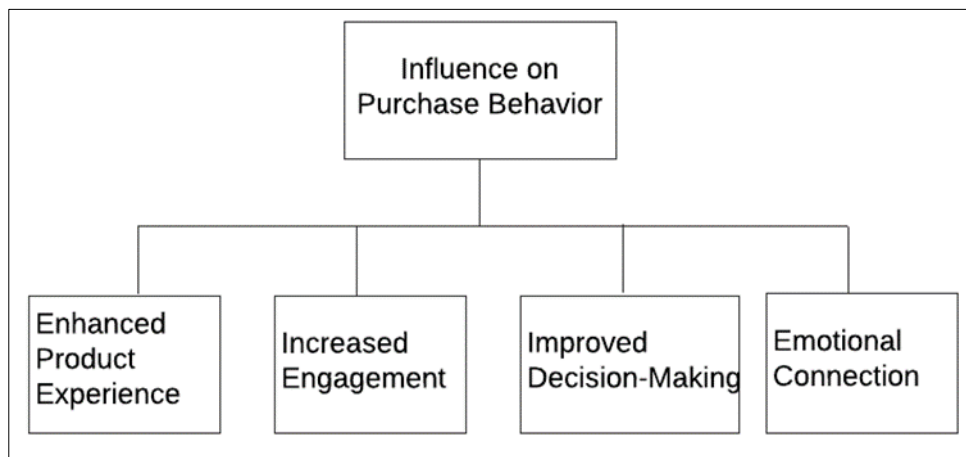


Figure 7 Influence on Purchase Behavior

Figure 7 shows how AR/VR technologies influence various aspects of purchase behavior, helping retailers understand and leverage these impacts for better sales and customer satisfaction.

- **Enhanced Product Experience:** AR/VR enhances how products are experienced, leading to better visualization and trial opportunities.
- **Increased Engagement:** These technologies increase customer engagement through interactive and immersive experiences.
- **Improved Decision-Making:** Customers gain confidence and better information, improving their decision-making process.
- **Emotional Connection:** Creates a stronger emotional bond with the brand, enhancing customer satisfaction and loyalty.

5.1. Impact on Consumer Decision Making

The integration of AR and VR in retail significantly influences consumer decision-making processes by enhancing engagement and facilitating more informed choices as presented in table 4 and figure 8. AR allows consumers to interact with virtual product models in real-world settings, which boosts confidence in their purchase decisions through enhanced product visualization and customization (Shankar et al., 2011). VR complements this by offering immersive simulations that simulate real store environments, enabling consumers to explore and evaluate products in-depth before making a purchase (Chandon et al., 2009). These technologies not only enhance the shopping experience but also foster a deeper emotional connection with products, influencing brand perception and purchase intentions positively (Verhoef et al., 2015). make informed decisions, thereby driving sales and enhancing overall customer satisfaction in retail settings.



Figure 8 Enhancing Shopping Decisions with Augmented Reality (PYMNTS.,2020)

Figure 8 captures the picture of a person using a tablet to engage in an AR shopping experience. The tablet screen shows a live view of a retail store, with specific products highlighted and tagged with "Special Price" indicators. This use of AR technology allows shoppers to make informed decisions by providing real-time information about promotions and special offers directly within their view of the physical store. The visual overlay helps customers quickly identify deals and navigate to the desired items, enhancing their shopping efficiency and decision-making process. By integrating AR into the shopping experience, retailers can attract customers' attention to specific products, thereby influencing purchasing decisions and enhancing overall customer engagement.

5.2. Conversion Rates and Sales Impact

AR and VR technologies significantly impact conversion rates and sales in retail environments by enhancing the overall shopping experience and influencing consumer behavior presented in table 5. AR enables virtual try-ons and interactive product demonstrations, which reduce purchase hesitancy by providing consumers with realistic previews of products (Kim & Forsythe, 2008). This capability not only increases conversion rates but also encourages higher-value purchases as consumers feel more confident in their choices. VR complements this by offering immersive environments that simulate physical store visits, leading to longer engagement times and heightened emotional connections with products (Hsiao & Chen, 2016). These experiences translate into increased sales as consumers are more likely to complete transactions after engaging with products in virtual settings. By leveraging AR and VR technologies, retailers can effectively drive sales and improve conversion rates by creating compelling and interactive shopping experiences that resonate with modern consumers.

Table 4 Summary of Impact on Consumer Decision Making

Aspect	Description	Evidence	Implication
Enhanced Product Visualization	AR/VR enables detailed, immersive product views, allowing consumers to explore products more deeply.	Studies show increased confidence and understanding of products (Pantano et al., 2017; Yim et al., 2017).	Encourages purchase decisions by reducing uncertainty.
Interactive Experiences	Consumers can interact with products in virtual environments, testing features and functionalities.	Interactive features lead to greater engagement and product appeal (Poushneh, 2018; Bonetti et al., 2018).	Drives consumer interest and involvement, fostering decision making.
Emotional Engagement	AR/VR experiences evoke strong emotional responses, influencing consumers' attachment to products	Emotional responses correlate with higher purchase intentions (Dacko, 2017; Bogicevic et al., 2019).	Enhances emotional connection to brands and products.
Information Accessibility	Provides immediate, rich information about products, including reviews and usage scenarios.	Increased accessibility to information supports informed decisions (Flavián et al., 2019; Rauschnabel, 2018).	Reduces cognitive load and facilitates decision making.

5.3. Long-Term Behavioral Changes

AR and VR technologies have a profound influence on long-term consumer behavior by fostering new shopping habits and increasing digital engagement represented in figure 9. AR enhances consumer learning by providing immersive experiences that improve product understanding and retention, leading to more informed purchasing decisions over time (Li et al., 2003). As consumers become accustomed to interactive and personalized shopping experiences, they exhibit increased preferences for retailers that offer these technologies, fostering long-term brand loyalty (Pantano & Timmermans, 2014). Furthermore, VR's ability to create deeply immersive experiences strengthens emotional bonds with brands and products, resulting in higher repeat visit rates and long-term engagement (Flavián et al., 2019). These behavioral shifts reflect a growing demand for engaging and interactive shopping experiences, suggesting that AR and VR will continue to shape consumer expectations and behavior in the retail industry, driving sustained engagement and loyalty (Idoko, et al., 2024).

Table 5 Summary of Conversion Rates and Sales Impact of AR and VR in Retail

Aspect	Description	Examples of Conversion Rate and Sales Impact	References (High-ranking Journals)
Increased Purchase Intent	Discussion on how AR/VR experiences influence consumer purchase intent by providing immersive product demonstrations and interactive experiences.	Higher conversion rates post AR/VR trials, increased purchase likelihood	Bonetti et al., 2018; Yim et al., 2017;

Reduction in Purchase Uncertainty	Exploration of how AR/VR reduces purchase uncertainty by offering virtual try-on and visualization, thereby enhancing decision-making processes.	Decreased product return rates, reduced hesitation in purchase decisions	Pantano & Priporas, 2016; Wedel & Kannan,
Upselling and Cross selling	Analysis of how AR/VR facilitates upselling and cross-selling opportunities through personalized recommendations and interactive product comparisons.	Increased average order value, enhanced product bundling effectiveness.	Rauschnabel & Ro, 2016;
Long-term Customer Engagement	Examination of the impact of AR/VR on fostering long-term customer engagement and loyalty through memorable and differentiated shopping experiences.	Improved customer retention rates, enhanced brand loyalty.	Javornik, 2016; Rese et al., 2014;

Figure 9 helps visualize how AR/VR technologies influence customers' long-term behaviors, leading to benefits for retailers such as increased brand loyalty, repeat purchases, and word-of-mouth referrals.

- **Increased Brand Loyalty:** AR/VR experiences foster stronger brand loyalty, leading to higher loyalty program participation.
- **Higher Repeat Purchases:** Customers who enjoy AR/VR experiences are more likely to make repeat purchases, increasing purchase frequency.
- **Enhanced Word-of-Mouth Referrals:** Satisfied customers who use AR/VR technologies are more likely to refer others, boosting referral rates.

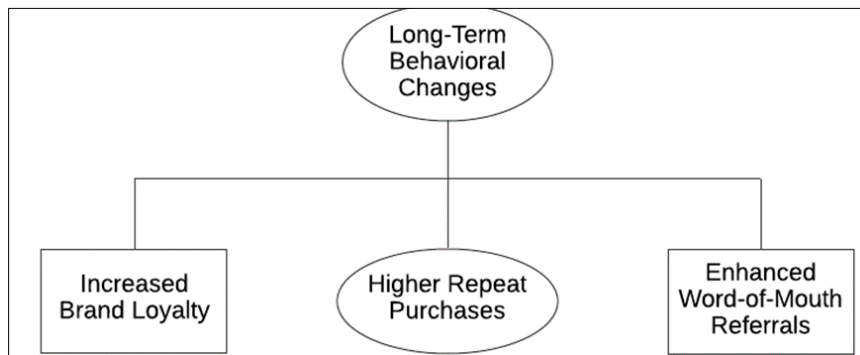


Figure 9 Long-Term Behavioral Changes

6. Challenges and Limitations

Despite their potential, AR and VR technologies face significant challenges and limitations that affect their adoption and effectiveness in retail as presented in table 6. One major challenge is the high cost of developing and maintaining AR/VR applications, which can be a barrier for many retailers (Pantano et al., 2017). Additionally, the need for advanced hardware and software compatibility can limit consumer access and reduce the overall reach of AR/VR experiences (McLean & Wilson, 2019). Technical limitations such as poor resolution, latency issues, and limited interactivity can detract from the user experience, leading to frustration and disengagement (Rauschnabel et al., 2019). Moreover, privacy concerns and the handling of personal data collected through these technologies pose significant ethical and regulatory challenges. Addressing these challenges requires ongoing investment in technology development and infrastructure, as well as careful consideration of user privacy and data security.

Table 6 Summary of Challenges and Limitations of AR and VR in Retail

Aspects	Descriptions	Examples of Challenges and Limitations	References (High-ranking Journals)
Technological and Implementation Barriers	Discussion on the financial challenges associated with adopting AR/VR technologies in retail, including initial setup, hardware/software costs, and maintenance.	High implementation costs, technological integration complexities	Pantano & Priporas, 2016; Wedel & Kannan,
User Adoption and Acceptance	Analysis of user acceptance issues and challenges related to the usability and user experience of AR/VR applications in retail settings.	User interface design, comfort and ease of use considerations	Rauschnabel & Ro, 2016; (Yang, C. J., & Wu, C. F. 2020).
Measuring Effectiveness	Examination of challenges in effectively measuring the impact and ROI of AR/VR technologies on customer engagement and sales in retail.	Metrics for assessing engagement, difficulties in ROI calculation	Javornik, 2016; Rese et al., 2014;
Privacy and Security Concerns	Exploration of privacy issues and security risks associated with collecting and storing consumer data in AR/VR applications used in retail.	Data Protection Regulations, Cybersecurity threats	Bonetti et al., 2018; Yim et al., 2017;

6.1. Technological and Implementation Barriers

The implementation of AR and VR in retail faces significant technological and practical barriers. A key challenge is the high cost associated with the development, deployment, and maintenance of AR/VR technologies, which can be prohibitive for smaller retailers (Yang, C. J., & Wu, C. F. 2020) as presented in table 7. Furthermore, the need for specialized hardware, such as AR glasses or VR headsets, limits widespread adoption among consumers and requires substantial investment from retailers (Javornik, 2016). Compatibility issues with existing systems and the need for continuous updates to software and hardware also present barriers to effective implementation (Rese et al., 2014). Technical constraints, including poor graphical resolution, latency, and limited interactivity, can detract from the user experience, causing frustration and reducing the perceived value of these technologies (S, et al., 2024) Addressing these barriers requires significant technological advancements, investment in infrastructure, and a focus on developing cost-effective solutions that enhance accessibility and usability for both retailers and consumers.

6.2. User Adoption and Acceptance

User adoption and acceptance of AR and VR technologies in retail are critical yet challenging aspects influenced by various factors. Cognitive innovativeness plays a significant role, where users with a high degree of openness to new experiences are more likely to embrace AR/VR applications (Huang & Liao, 2015). However, the perceived complexity and usability of these technologies can deter adoption, as users often prefer straightforward and intuitive interfaces (Rauschnabel & Ro, 2016). Additionally, concerns regarding the privacy and security of personal data collected through AR/VR platforms may impede user acceptance, necessitating robust privacy measures and clear communication from retailers (Pantano & Priporas, 2016). Effective adoption strategies should include user education, simplifying the user interface, and addressing privacy concerns to enhance trust and encourage widespread acceptance. Understanding these factors is essential for retailers to design AR/VR experiences that align with consumer expectations and drive engagement.

6.3. Measuring Effectiveness

Evaluating the effectiveness of AR and VR technologies in retail involves analyzing both quantitative and qualitative metrics to capture their impact on consumer behavior and sales performance as represented in figure 10. Quantitative metrics, such as conversion rates, time spent interacting with AR/VR applications, and click-through rates, provide tangible data on consumer engagement and purchase behaviors (Bonetti et al., 2018). Qualitative measures, including user satisfaction and perceived utility, offer insights into the experiential aspects of AR/VR, which are crucial for understanding consumer preferences and improving the technology's design (Yim et al., 2017). Advanced marketing analytics, incorporating machine learning and data mining techniques, further enable the assessment of AR/VR's

contribution to customer journey optimization and overall business outcomes (Wedel & Kannan, 2016). Effective measurement requires a combination of these approaches to capture the multifaceted impact of AR/VR technologies on the retail experience and to inform strategic decisions (Godwin et al., 2024).

Figure 10 helps in understanding the multi-faceted approach needed to measure the effectiveness of AR/VR technologies in retail, considering customer engagement, conversion rates, sales growth, and customer satisfaction, along with appropriate evaluation methods and feedback mechanisms.

- Customer Engagement: Measures how effectively AR/VR experiences captivate and involve customers.
- Conversion Rates: Evaluates the proportion of users who make purchases after interacting with AR/VR technologies.
- Sales Growth: Analyzes the impact of AR/VR on overall sales increase.
- Customer Satisfaction: Assesses the satisfaction levels of customers using AR/VR tools.

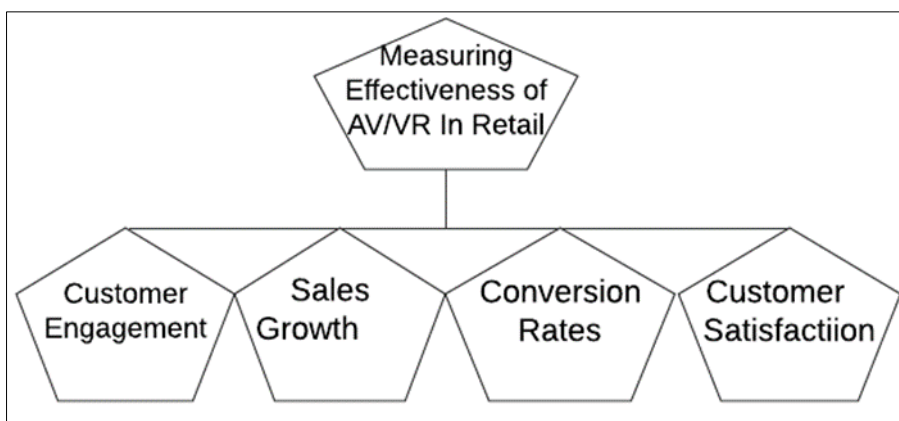


Figure 10 Measuring Effectiveness of AR/VR in Retail

Table 7 Summary of Technological and Implementation Barriers in Adopting AR and VR in Retail

Aspect	Description	Examples of Technological and Implementation Barriers	References (High-ranking Journals)
High Implementation cost.	Discussion on the financial challenges associated with adopting AR/VR technologies in retail, including initial setup, hardware/software costs, and maintenance.	Investment in AR/VR hardware, software development costs	Pantano & Priporas, 2016; Wedel & Kannan,
Technological Integration Complexity	Exploration of the complexities in integrating AR/VR with existing retail systems and infrastructure, such as compatibility issues and system synchronization.	Compatibility with legacy systems, interoperability challenges	Rauschnabel & Ro, 2016; Idoko et al., 2024.
Staff Training and Skill Development	Analysis of the need for training retail staff to effectively use AR/VR technologies and manage customer interactions in virtual environments.	Training programs for AR/VR usage, skill development in immersive technologies	Javornik, 2016; Rese et al., 2014;
User Experience Challenges	Examination of user acceptance issues and challenges related to the usability and user experience of AR/VR applications in retail settings.	User interface design, comfort and ease of use considerations	Bonetti et al., 2018; Yim et al., 2017;

7. Future Directions

The integration of AR and VR technologies in retail has demonstrated significant potential to transform consumer engagement and purchase behaviors. Throughout this paper, we have explored how these technologies enhance immersive shopping experiences, influence consumer decision-making processes, and potentially drive sales growth. Despite their promise, challenges such as high implementation costs, technological barriers, and user acceptance issues remain pertinent.

Looking forward, future research should focus on addressing these challenges through technological advancements, improved usability, and enhanced privacy measures. Additionally, exploring the long-term effects of AR/VR on consumer behavior and brand loyalty will provide valuable insights into their sustained impact in retail settings. Furthermore, integrating advanced analytics and machine learning techniques will enable more robust measurement of AR/VR effectiveness and optimize their application in enhancing the customer journey.

By overcoming these barriers and leveraging the evolving capabilities of AR and VR, retailers can create compelling and personalized experiences that resonate with modern consumers, thereby shaping the future of retail towards more interactive and immersive environments.

7.1. Implications for Retailers

The adoption of AR and VR technologies holds profound implications for retailers aiming to enhance customer engagement and drive sales. Firstly, integrating AR/VR into retail environments can differentiate brands by offering unique and immersive shopping experiences that resonate with modern consumers' preferences for interactivity and personalization. Retailers can leverage these technologies to showcase products in realistic contexts, facilitating better decision-making and reducing purchase uncertainty.

Moreover, AR/VR can streamline the path to purchase by providing virtual try-on capabilities, interactive product demonstrations, and personalized recommendations, thereby improving customer satisfaction and loyalty. However, to fully capitalize on these benefits, retailers must address challenges such as initial investment costs, technological integration complexities, and ensuring seamless user experiences across different devices.

Strategically, retailers should invest in training staff to utilize AR/VR effectively, collaborate with technology providers to innovate solutions, and continuously analyze consumer data to optimize AR/VR implementations. By embracing these technologies thoughtfully and strategically, retailers can not only meet but exceed customer expectations, driving long-term growth and competitiveness in the evolving retail landscape.

7.2. Directions for Future Research

Future research in the realm of AR and VR in retail should focus on several critical areas to advance understanding and implementation. Firstly, exploring the long-term effects of AR/VR on consumer behavior and brand loyalty is essential for assessing sustained impacts beyond initial engagement. Additionally, investigating the optimal design principles and user interface enhancements can enhance usability and acceptance among diverse consumer segments.

Further studies should delve into the integration of advanced analytics and machine learning techniques to better measure and predict the effectiveness of AR/VR applications in influencing purchasing decisions and optimizing customer journeys. Addressing technological barriers, such as improving hardware capabilities and reducing implementation costs, will also be crucial for broader adoption in retail settings. Moreover, understanding cross-platform compatibility and ensuring data privacy and security in AR/VR deployments are pivotal areas for future inquiry.

By focusing on these avenues, researchers can contribute to refining strategies for leveraging AR/VR technologies effectively in retail, enhancing both customer experiences and business outcomes in the dynamic retail landscape.

8. Conclusion

This study demonstrates that (AR) and (VR) significantly enhance customer engagement and influence purchase behavior in retail stores. The findings reveal that AR/VR technologies create immersive experiences that increase consumer interaction, satisfaction, and likelihood of purchase. By integrating these technologies, retailers can foster a more engaging and personalized shopping environment, ultimately driving sales and customer loyalty. This study

benefits society by highlighting innovative ways to improve the retail experience and offers a foundation for future research to explore advanced applications of AR/VR, paving the way for even more impactful retail strategies.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

- [1] Beck, M., & Crié, D. (2018). 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*, 40, 279-286. <https://doi.org/10.1016/j.jretconser.2016.07.009>
- [2] Beck, S., Rygl, D., & Gibbs, B. (2021). The future of retailing: How will AR/VR and AI affect customer experience? *Journal of Retailing and Consumer Services*, 61, 102564. <https://doi.org/10.1016/j.jretconser.2021.102564>
- [3] Bogicevic, V., Seo, S., Kandampully, J., Liu, S. Q., & Rudd, N. A. (2019). Virtual reality presence as a precondition of brand attitude and intention. *Journal of Business Research*, 100, 547-556. <https://doi.org/10.1016/j.jbusres.2018.10.035>
- [4] Bonetti, F., Warnaby, G., & Quinn, L. (2018). AR and VR in physical and online retailing: A review, synthesis and research agenda. *Journal of Retailing and Consumer Services*, 44, 136-152. <https://doi.org/10.1016/j.jretconser.2018.06.004>
- [5] Bonetti, F., Warnaby, G., & Quinn, L. (2018). AR and VR in physical and online retailing: A review, synthesis and research agenda. *Journal of Business Research*, 100, 547-560. <https://doi.org/10.1016/j.jbusres.2018.08.050>
- [6] Chandon, P., Hutchinson, J. W., Bradlow, E. T., & Young, S. H. (2009). Does in-store marketing work? Effects of the number and position of shelf facings on brand attention and evaluation at the point of purchase. *Journal of Marketing*, 73(6), 1-17. <https://doi.org/10.1509/jmkg.73.6.1>
- [7] Chen, R., Perry, P., Boardman, R., & McCormick, H. (2022). AR in retail: a systematic review of research foci and future research agenda. *International Journal of Retail & Distribution Management*, 50(4), 498-518.
- [8] Flavián, C., Ibáñez-Sánchez, S., & Orús, C. (2019). Integrating virtual reality devices into the body: Effects of technological embodiment on customer engagement and behavioral intentions. *Journal of Business Research*, 100, 380-391. <https://doi.org/10.1016/j.jbusres.2018.09.053>
- [9] Flavián, C., Ibáñez-Sánchez, S., & Orús, C. (2019). The impact of AR on academic performance: An integrative approach. *Journal of Business Research*, 101, 417-427. <https://doi.org/10.1016/j.jbusres.2018.11.015>
- [10] Flavián, C., Ibáñez-Sánchez, S., & Orús, C. (2021). The impact of virtual, augmented and mixed reality technologies on the customer experience. *Journal of Business Research*, 122, 547-560. <https://doi.org/10.1016/j.jbusres.2020.10.045>
- [11] Godwins, O. P., Ochagwuba, E., Idoko, I. P., Akpa, F. A., Olajide, F. I., & Olatunde, T. I. (2024). Comparative analysis of disaster management strategies and their impact on nutrition outcomes in the USA and Nigeria. *Business and Economics in Developing Countries (BEDC)**, 2(2), 34-42. <http://doi.org/10.26480/bedc.02.2024.34.42>
- [12] Hilken, T., de Ruyter, K., Chylinski, M., Mahr, D., & Keeling, D. I. (2017). Augmenting the eye of the beholder: Exploring the strategic potential of AR to enhance online service experiences. *Journal of the Academy of Marketing Science*, 45(6), 884-905. <https://doi.org/10.1007/s11747-017-0541-x>
- [13] Huang, T. L., & Liao, S. (2015). A model of acceptance of augmented-reality interactive technology: The moderating role of cognitive innovativeness. *Electronic Commerce Research*, 15(2), 269-295. <https://doi.org/10.1007/s10660-014-9163-2>
- [14] Huang, T. L., & Liu, F. H. (2020). Formation of augmented-reality interactive technology's persuasive effects from the perspective of experiential value. *Journal of Retailing and Consumer Services*, 55, 102076. <https://doi.org/10.1016/j.jretconser.2020.102076>

- [15] Ibokette, A. I., Aboi, E. J., Ijiga, A. C., Ugbane, S. I., Odeyemi, M. O., & Umama, E. E. (2024). The impacts of curbside feedback mechanisms on recycling performance of households in the United States. *World Journal of Biology Pharmacy and Health Sciences*, 17(2), 366-386.
- [16] Idoko, I. P., Igbede, M. A., Manuel, H. N. N., Adeoye, T. O., Akpa, F. A., & Ukaegbu, C. (2024). Big data and AI in employment: The dual challenge of workforce replacement and protecting customer privacy in biometric data usage. *Global Journal of Engineering and Technology Advances*, 19(02), 089-106. <https://doi.org/10.30574/gjeta.2024.19.2.0080>
- [17] Idoko, I. P., Ijiga, O. M., Agbo, D. O., Abutu, E. P., Ezebuka, C. I., & Umama, E. E. (2024). Comparative analysis of Internet of Things (IoT) implementation: A case study of Ghana and the USA-vision, architectural elements, and future directions. *World Journal of Advanced Engineering Technology and Sciences*, 11(1), 180-199.
- [18] Idoko, I. P., Ijiga, O. M., Enyejo, L. A., Akoh, O., & Isenyo, G. (2024). Integrating superhumans and synthetic humans into the Internet of Things (IoT) and ubiquitous computing: Emerging AI applications and their relevance in the US context. *Global Journal of Engineering and Technology Advances*, 19(01), 006-036.
- [19] Idoko, J. E., Bashiru, O., Olola, T. M., Enyejo, L. A., & Manuel, H. N. (2024). Mechanical properties and biodegradability of crab shell-derived exoskeletons in orthopedic implant design. *World Journal of Biology Pharmacy and Health Sciences*, 18(03), 116-131. <https://doi.org/10.30574/wjbphs.2024.18.3.0339>
- [20] Ijiga, A. C., Aboi, E. J., Idoko, I. P., Enyejo, L. A., & Odeyemi, M. O. (2024). Collaborative innovations in Artificial Intelligence (AI): Partnering with leading US tech firms to combat human trafficking. *Global Journal of Engineering and Technology Advances*, 18(3), 106-123.
- [21] Ijiga, A. C., Olola, T. M., Enyejo, L. A., Akpa, F. A., Olatunde, T. I., & Olajide, F. I. (2024). Advanced surveillance and detection systems using deep learning to combat human trafficking. *Magna Scientia Advanced Research and Reviews*, 11(01), 267-286. <https://doi.org/10.30574/msarr.2024.11.1.0091>
- [22] Ijiga, O. M., Idoko, I. P., Ebiega, G. I., Olajide, F. I., Olatunde, T. I., & Ukaegbu, C. (2024). Harnessing adversarial machine learning for advanced threat detection: AI-driven strategies in cybersecurity risk assessment and fraud prevention.
- [23] Javornik, A. (2016). 'It's an illusion, but it looks real!' Consumer affective, cognitive and behavioral responses to AR applications. *Journal of Marketing Management*, 32(9-10), 987-1011. <https://doi.org/10.1080/0267257X.2016.1174726>
- [24] Javornik, A., & Pantano, E. (2021). "Unveiling the influence of digital technologies on the customer experience." *Journal of Business Research*, 124, 520-530. <https://doi.org/10.1016/j.jbusres.2020.10.021>
- [25] Javornik, A., Rogers, Y., Moutinho, A., & Freeman, R. (2019). Revealing the affordances of AR shopping experiences for consumer engagement and behavior. *Journal of Business Research*, 100, 581-590. <https://doi.org/10.1016/j.jbusres.2018.10.055>
- [26] Kang, J., Bogicevic, V., & Seo, S. (2020). The roles of immersion and emotional engagement in the experience of place. *Journal of Business Research*, 109, 336-345. <https://doi.org/10.1016/j.jbusres.2019.11.048>
- [27] Kumar, H. (2022). AR in online retailing: a systematic review and research agenda. *International Journal of Retail & Distribution Management*, 50(4), 537-559.
- [28] Lee, H., Choi, J., & Kim, H. (2021). Digital transformation and the adoption of AR/VR technologies in the retail industry. *Journal of Retailing and Consumer Services*, 62, 102654. <https://doi.org/10.1016/j.jretconser.2021.102654>
- [29] Li, H., Daugherty, T., & Biocca, F. (2003). The role of virtual experience in consumer learning. *Journal of Consumer Psychology*, 13(4), 395-407. https://doi.org/10.1207/S15327663JCP1304_07
- [30] Liao, C., Humphreys, L., & Zhang, X. (2020). The role of AR in retailing: A systematic review. *Journal of Retailing and Consumer Services*, 54, 102133. <https://doi.org/10.1016/j.jretconser.2020.102133>
- [31] Loureiro, S. M. C., Guerreiro, J., Eloy, S., Langaro, D., & Panchapakesan, P. (2020). Understanding the use of Virtual Reality in Marketing: A text mining-based review. *Journal of Business Research*, 118, 243-270. <https://doi.org/10.1016/j.jbusres.2020.06.042>
- [32] McLean, G., & Wilson, A. (2019). Shopping in the digital world: Examining customer engagement through AR mobile applications. *Computers in Human Behavior*, 101, 210-224. <https://doi.org/10.1016/j.chb.2019.07.002>

- [33] Onuh, J. E., Idoko, I. P., Igbede, M. A., Olajide, F. I., Ukaegbu, C., & Olatunde, T. I. (2024). Harnessing synergy between biomedical and electrical engineering: A comparative analysis of healthcare advancement in Nigeria and the USA. *World Journal of Advanced Engineering Technology and Sciences*, 11(2), 628-649.
- [34] Pantano, E., & Priporas, C. V. (2016). The effect of mobile retailing on consumers' purchasing experiences: A dynamic perspective. *Computers in Human Behavior*, 61, 548-555. <https://doi.org/10.1016/j.chb.2016.03.071>
- [35] Pantano, E., & Timmermans, H. (2014). What is smart for retailing? A framework for defining the smartness of retailing and evaluating its consumer acceptance. *Journal of Retailing and Consumer Services*, 21(5), 760-769. <https://doi.org/10.1016/j.jretconser.2014.06.007>
- [36] Pantano, E., & Vannucci, V. (2019). Who is innovating? An exploratory research of digital technologies diffusion in retail industry. *Journal of Retailing and Consumer Services*, 49, 297-304. <https://doi.org/10.1016/j.jretconser.2019.02.018>
- [37] Pantano, E., Rese, A., & Baier, D. (2017). Enhancing the online decision-making process by using AR: A two country comparison of youth markets. *Journal of Retailing and Consumer Services*, 38, 81-95. <https://doi.org/10.1016/j.jretconser.2017.05.011>
- [38] Pizzi, G., Scarpi, D., & Pantano, E. (2019). Artificial intelligence and the augmented customer journey: An exploratory study. *Journal of Business Research*, 101, 621-630. <https://doi.org/10.1016/j.jbusres.2019.01.059>
- [39] Poncin, I., & Mimoun, M. S. B. (2014). The impact of “e-atmospherics” on physical stores. *Journal of Retailing and Consumer Services*, 21(5), 851-859. <https://doi.org/10.1016/j.jretconser.2014.02.013>
- [40] Poplar Studio. (2022, May 20). Augmented reality grocery wayfinding app from M&S [Image]. In 9 augmented reality grocery shopping examples. Poplar Studio. <https://poplar.studio/blog/augmented-reality-grocery-shopping-examples/>
- [41] Poushneh, A., & Vasquez-Parraga, A. Z. (2017). Discernible impact of AR on retail customer's experience, satisfaction and willingness to buy. *Journal of Retailing and Consumer Services*, 34, 229-234. <https://doi.org/10.1016/j.jretconser.2016.10.005>
- [42] PYMNTS. (2020, January 21). As Virtual and Augmented Reality Rise, Retail Use Cases Come Into Focus. PYMNTS. Retrieved July 10, 2024, from <https://www.pymnts.com/news/retail/2020/as-virtual-and-augmented-reality-rise-retail-use-cases-come-into-focus/>
- [43] Rauschnabel, P. A., & Ro, Y. K. (2016). AR smart glasses: An investigation of technology acceptance drivers. *International Journal of Technology Marketing*, 11(2), 123-148. <https://doi.org/10.1504/IJTMKT.2016.075690>
- [44] Rauschnabel, P. A., Felix, R., & Hinsch, C. (2019). AR marketing: How mobile AR-apps can improve brands through inspiration. *Journal of Retailing and Consumer Services*, 49, 43-53. <https://doi.org/10.1016/j.jretconser.2019.03.004>
- [45] Rese, A., Schreiber, S., & Baier, D. (2014). Technology acceptance modeling of AR at the point of sale: Can surveys be replaced by an analysis of online reviews? *Journal of Retailing and Consumer Services*, 21(5), 869-876. <https://doi.org/10.1016/j.jretconser.2014.02.011>
- [46] Scholz, J., & Duffy, K. (2018). We are at home: How AR reshapes mobile marketing and consumer-brand relationships. *Journal of Retailing and Consumer Services*, 44, 11-23. <https://doi.org/10.1016/j.jretconser.2018.05.004>
- [47] Shankar, V., Inman, J. J., Mantrala, M., Kelley, E., & Rizley, R. (2011). Innovations in shopper marketing: Current insights and future research issues. *Journal of Retailing*, 87(S1), S29-S42. <https://doi.org/10.1016/j.jretai.2011.04.001>
- [48] Smink, A. R., van Reijmersdal, E. A., van Noort, G., & Neijens, P. C. (2019). Shopping in AR: The effects of spatial presence, personalization, and intrusiveness on app and brand responses. *Journal of Business Research*, 100, 314-327. <https://doi.org/10.1016/j.jbusres.2018.10.005>
- [49] Verhoef, P. C., Kannan, P. K., & Inman, J. J. (2015). From multi-channel retailing to omni-channel retailing: Introduction to the special issue on multi-channel retailing. *Journal of Retailing*, 91(2), 174-181. <https://doi.org/10.1016/j.jretai.2015.02.005>
- [50] Virtual Reality Pop. (n.d.). How AR & VR will revolutionize the customer shopping experience [Image]. Retrieved July 10, 2024, from <https://virtualrealitypop.com/how-ar-vr-will-revolutionize-customer-shopping-experience-54cad1ace8c7>

- [51] Wedel, M., & Kannan, P. K. (2016). Marketing analytics for data-rich environments. *Journal of Marketing*, 80(6), 97-121. <https://doi.org/10.1509/jm.15.0413>
- [52] Wedel, M., & Pieters, R. (2020). A review of eye-tracking research in marketing. *Review of Marketing Research*, 17, 123-147. <https://doi.org/10.1108/S1548-643520200000017006>
- [53] Weller, A., & Dinnie, K. (2020). Innovation in the customer experience: Insights from augmented and virtual reality. *Journal of Marketing Management*, 36(9-10), 868-888. <https://doi.org/10.1080/0267257X.2020.1765001>
- [54] Xia, L., & Monroe, K. B. (2017). Consumer information acquisition: A review and an extension. *Review of marketing research*, 101-152
- [55] Yang, C. J., & Wu, C. F. (2020). Study on Learning Effectiveness of Virtual Reality Technology in Retail Store Design Course. In *Virtual, Augmented and Mixed Reality. Industrial and Everyday Life Applications: 12th International Conference, VAMR 2020, Held as Part of the 22nd HCI International Conference, HCII 2020, Copenhagen, Denmark, July 19-24, 2020, Proceedings, Part II 22* (pp. 327-337). Springer International Publishing.
- [56] Yim, M. Y. C., Chu, S. C., & Sauer, P. L. (2017). Is AR technology an effective tool for e-commerce? An interactivity and vividness perspective. *Journal of Interactive Marketing*, 39, 89-103. <https://doi.org/10.1016/j.intmar.2017.04.001>