AI-Driven AR/VR in E-Commerce: Exploring Consumer Engagement, Impulse Buying and Sustainability

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Abstract

Artificial intelligence (AI)-powered augmented reality (AR) and virtual reality (VR) represent a strong integration of AI and immersive technologies aimed at producing highly engaging, interactive, and personalised consumer experiences. This combination has transformative potential for e-commerce platforms since AI-enhanced AR/VR allows for deeper customer involvement via features such as interactive try-ons, virtual product presentations, and personalised recommendations. These experiences increase hedonic value by providing emotional and sensory satisfaction, which improves engagement and encourages spontaneous purchasing behaviours. Using consumer behaviour theories and the Stimulus-Organism-Response (S-O-R) paradigm, this article investigates how AI-driven AR/VR not only increases customer engagement but also encourages unplanned, spontaneous purchases, which are aided by lower perceived risk due to realistic product visualisations. In addition to impulse buying, this study examines the sustainability implications of AI-driven AR/VR, arguing that accurate and immersive product visualisations reduce product returns and promote eco-conscious purchasing. These outcomes are also influenced by key factors such as environmental knowledge and mobile shopping attitude, with consumers with greater environmental knowledge preferring sustainable options and those with higher mobile shopping propensity responding more positively to AR/VR-enabled impulse triggers.AI-powered AR/VR leads to more sustainable e-commerce practices by combining the benefits of hedonic value, perceived risk reduction, and sustainable engagement tactics. This study offers useful insights for businesses looking to responsibly implement AI-driven AR/VR solutions, promote informed, long-term consumer engagement, and give a strategic framework for integrating AI and immersive technology into online commerce.

Keywords: *AI – Driven AR/VR, Impulse buying, Consumer engagement, Sustainable Purchase Decisions*

Introduction

In the realm of Digital Marketing, AI significantly impacts marketers by allowing them to gather and analyse large volumes of data, enabling more informed decisions for their campaigns. AI algorithms enable predictions of consumer behavour, personalised advertising, and optimized website content for search engines (G, 2023). The E commerce platform is experiencing a transformative shift due to the integration of AI- powered Augmented Reality (AR) and Virtual Reality (VR) technologies, which are redefining customer engagement and influencing purchase behaviours. These immersive

tools offer interactive, personalized experiences that deepen consumer engagement with products and brands, giving businesses a distinct competitive advantage. AR enhances in-store shopping through virtual try-ons and interactive displays, while VR enables virtual store visits and product simulations, bridging the digital and physical shopping realms. As commerce continues to adopt a digitally enriched landscape, understanding the impact of AR and VR on consumer behaviour is essential for leveraging these technologies to boost engagement and drive sales (Joy Onma Enyejo et al., 2024). Augmented reality and virtual reality serves as a powerful tool for product presentation, effectively meeting consumers' desire for a tactile experience. Augmented Reality (AR), known for delivering a richer multi-sensory experience than many other technologies, is shown to enhance hedonic value. Furthermore, AR's ability to dynamically contextualize content has been found to provoke impulse behaviour (H. Kumar & Srivastava, 2022). By offering immersive and interactive experiences, AR/VR not drive innovation but also offer effective strategies for sustainable growth. Online VR stores are gaining recognition for their potential to support eco-friendliness by offering a store experience comparable to physical locations, without the need for physical resources (Won et al., 2024). These technologies enable highly accurate, immersive product visualizations that allow customers to interact with products virtually, mimicking the experience of viewing and trying items in person. By offering a clear and realistic understanding of products before purchase, AR/VR reduces uncertainty and minimizes the likelihood of dissatisfaction, thus lowering return rates. Moreover, the ability of AR/VR to enhance informed purchasing decisions supports consumers in making choices that align with sustainability values, ultimately fostering a culture of responsible consumption.

This study provides valuable insights for businesses seeking to harness AI-driven AR/VR in e-commerce to enhance consumer engagement, manage impulse buying, and promote sustainable shopping practices. By integrating AI and immersive technology, companies can create a more interactive, informed shopping experience that not only meets consumer needs but also aligns with eco-conscious goals. This framework offers a strategic approach for businesses to implement AI-driven AR/VR solutions that foster long-term customer relationships while supporting responsible and sustainable retail practices.

Literature Review

AI- POWERED AR/VR

Artificial intelligence (AI) has emerged as a disruptive force, transforming industries and

reshaping business practices. Its integration has brought substantial benefits to different functional areas within organizations, with marketing experiencing a particularly strong positive impact. AI technologies have equipped marketers with powerful tools and insights, enabling unprecedented efficiency, personalization, and data-driven strategic decisions for campaigns (V. Kumar et al., 2024). AI – powered Augmented Reality (AR) and Virtual Reality (VR) have the potential to enhance overlooked areas in online marketing and introduce innovative ways of presenting products and services to consumers. Augmented reality (AR) is the technology that overlays digital content onto real-world objects. Virtual reality, or VR, can be defined as the application of computer technology to generate an interactive, three-dimensional environment where objects appear to have spatial presence (Silvestru et al., 2021) Virtual Reality (VR) and Augmented Reality (AR) have emerged as transformative tools in digital marketing, providing unique opportunities for immersive brand experiences. These technologies have revolutionized consumer engagement by allowing brands to go beyond traditional limits, build stronger connections, and achieve new heights of interaction (Gupta & Bansal, 2022).

Consumer Engagement

Consumer engagement (CE), defined as the investment of a consumer's resources in their interactions with a product, has gained recognition in recent years as a crucial indicator of business performance. Research indicates that engaged consumers demonstrate higher psychological and behavioral outcomes, enhancing a company's competitive advantage (Hollebeek et al., 2024). AI-powered AR and VR have become essential resources for improving consumer engagement and satisfaction. These smart systems are capable of addressing customer inquiries, offering product suggestions, and assisting with purchases, providing immediate support and convenience at all hours (Tadimarri et al., n.d.2024) Augmented Reality (AR) can spark curiosity in customers by allowing them to visualize products in their own environment and try on clothing. This can be done either in-store or online. By providing interactive experiences, businesses can effectively increase brand awareness, enhance marketing efforts, and encourage customer loyalty. Virtual realities and experiences transport consumers to new locations and foster engaging interactions with other VR users. By utilizing data and machine learning algorithms to anticipate consumer needs, predictive analytics generates personalized suggestions and offers in real-time for actions or events. By analyzing data and predicting future trends, businesses can make shopping messages and experiences more relevant and engaging for consumers (Bajeja Associate Professor, 2024)

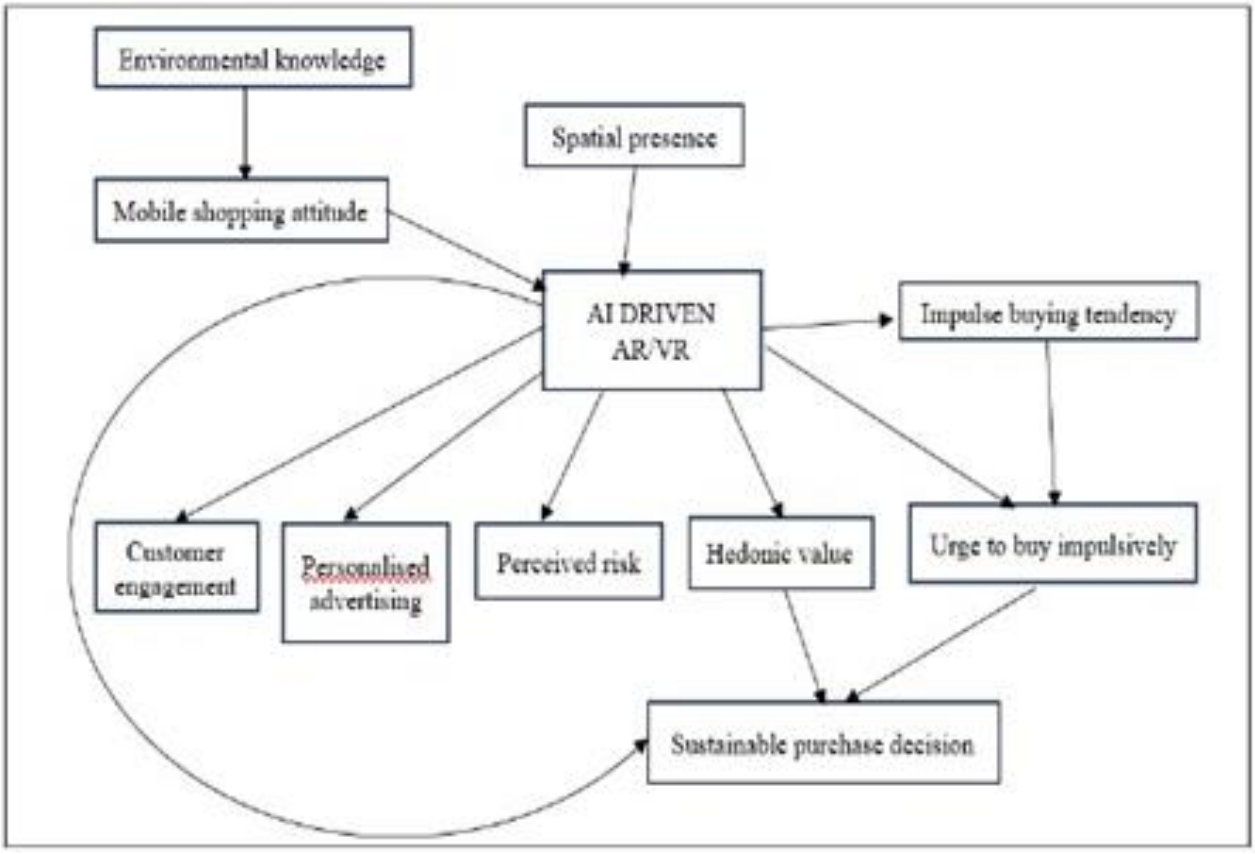
Impulse Buying

Impulse buying is characterized as an unplanned purchase triggered by exposure to a stimulus, leading to an immediate decision. Shoppers often engage in impulse buying when influenced by external cues, which evoke feelings of pleasure or stimulate desire. Additionally, both utilitarian and hedonic factors are key drivers of impulse behaviour. Most research employs the SOR (Stimulus-Organism-Response) framework to analyse this behaviour, it validates the impact of personalized social media advertising on Superfluous Unplanned Purchases (SUPD) by systematically integrating impulsive urges and contextual factors (Zafar et al., 2021). Augmented Reality (AR) has been shown to create a richer multi-sensory experience compared to other technologies, enhancing hedonic value. Furthermore, the dynamic contextualization offered by AR encourages impulsive behaviour. Unlike traditional shopping platforms, which cannot provide confirmation of size, fit, or a first-person perspective on quality and tactile sensations, AR allows for these experiences, thereby increasing impulse buying. Features such as interactivity and augmentation enhance the customer experience, resulting in a reduced perception of risk in purchasing decisions (H. Kumar & Srivastava, 2022).

Sustainability

The choice to purchase sustainable products influences sustainable consumption, which is defined as "the use of goods and services that meet essential needs and enhance quality of life, while minimizing the use of natural resources, toxic materials, and waste emissions throughout the product lifecycle, ensuring that future generations' needs are not compromised(Zafar et al., 2021). Virtual reality (VR) technology has gained attention not only for its practical and recreational uses but also for its potential to support eco-friendly initiatives. In some industries, VR has proven valuable in promoting environmental sustainability (Won et al., 2024). AR and VR technology create a multisensory experience that aids in understanding green energy, environmental protection, and sustainable practices. The immersive nature of VR and AR can also enhance environmental awareness by allowing users to interact with virtual ecosystems, making sustainability concepts more tangible and impactful (Negi, 2024).

Conceptual Model



Methodology

The study relies on secondary data. The study used a conceptual research approach to investigate the evolving role of AI-driven Augmented Reality (AR) and Virtual Reality (VR) in e-commerce, specifically in improving consumer engagement, driving impulse purchases, and supporting sustainable purchasing decisions. Using the stimulus-Organism-Response (S-O-R) framework, AI-driven AR/VR serves as a stimulus, impacting consumer engagement and impulse purchasing behaviour through immersive and customised interactions. By synthesising current literature and theories, the study hopes to lay the groundwork for understanding the linkages between these constructs and their implications on customer behaviour in e-commerce situations. Literature reviews serve as the primary foundation for building the conceptual model. Relevant dimensions and correlations were identified by analysing studies on AI in e-commerce, consumer behaviour, impulse buying and sustainable consumption. When selecting the previous study, essential aspects such as AI-driven AR/VR technologies, hedonic value, perceived risk, spontaneous purchase, environmental knowledge, and mobile purchasing attitude were considered. This conceptual approach enables the

study to sketch up a hypothetical model that illustrates the routes and linkages between constructs without relying on empirical evidence

Discussion

The study's findings highlight the enormous potential of AI-driven AR/VR in altering customer behaviour and supporting sustainable e-commerce practices. AI-driven AR/VR boosts hedonic value (Tan et al., 2022) by providing highly personalised and immersive experiences, which helps to engage consumers emotionally and improve their pleasure with the online buying experience(Begum & Harshavardthan, 2024); (Gupta & Bansal, 2022). This increased engagement, in turn, encourages impulsive purchasing behaviours, particularly when perceived risk is reduced via realistic, AI-enabled visualisations (H. Kumar & Srivastava, 2022); (Hollebeek et al., 2024). Consumers can interact with things electronically in ways that are similar to in-store experiences, resulting in rapid, impulse-driven purchasing decisions motivated by sensory satisfaction and urgency (Beck & Crié, 2018); (Joy Onma Enyejo et al., 2024). According to the study, such sensory richness not only increases customer attention but also promotes brand loyalty (Wieland et al., 2024), as people build favourable connections with firms that offer new digital interactions (Bajeja Associate Professor, 2024).

Furthermore, this study adds to the conversation around sustainable e-commerce by arguing that AI-powered AR/VR can aid in eco-conscious purchase decisions (Negi, 2024); (Bernovskis et al., 2024). Accurate product visualisations encourage consumers to make informed purchases that limit the possibility of returns, which aligns with ecologically conscientious principles. The inclusion of environmental awareness as a moderating factor adds an essential dimension to the model (Borre et al., 2024); (Omeish et al., 2024), implying that environmentally conscious customers may be more likely to choose sustainable solutions when AI-powered AR/VR tools enable educated and accurate decision-making. Similarly, mobile shopping attitude promotes impulse purchases in AR/VR settings (Yi et al., 2023);(Blettner, n.d.) as consumers with a positive attitude towards mobile shopping respond positively to AR/VR-enabled impulse triggers. These findings suggest that AI-powered AR/VR in e-commerce can promote a responsible, engaging, and sustainable consumer experience.

This study provides a roadmap for future empirical studies to investigate how AI and immersive technologies in e-commerce affect consumer engagement, impulsive behaviours, and sustainability practices (Chen et al., 2022); (Pedersen & Ritter, 2024). The proposed model in this

study provides a useful framework for analysing the function of developing technologies in transforming digital consumer behaviour.

Conclusion

This study sheds light on the transformative role of AI-driven AR and VR technologies in shaping consumer engagement, driving impulse purchases, and fostering sustainable practices within e-commerce environments. By conceptualising these technologies as stimuli within the S-O-R framework, the study highlights how personalised and immersive digital interactions can enhance hedonic value, reduce perceived risk, and catalyse impulse buying behaviours. Moreover, the incorporation of sustainable purchasing dimensions reveals AI-powered AR/VR's potential to support environmentally conscious decisions, thus aligning consumer behaviour with ecological goals. The findings underscore that AI-driven AR/VR not only bolsters consumer satisfaction and brand loyalty but also offers a pathway towards a more responsible and engaging e-commerce experience. Future research is encouraged to empirically validate this conceptual model, further exploring how emerging technologies in e-commerce can drive sustainable, engaging, and impulse-friendly consumer behaviours.

Author Contributions

Thafseela Thasni U: Primary literature review, identified key concepts and writing

Shibla Nargees K : Theoretical framework and conceptual model

Dr. Saleena T.A : Review & Editing. All authors have read and agreed to the manuscript.

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Conflict Of Interest

The authors declare no conflict of interest

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