Influence of Augmented Reality and Virtual Reality in Online Retail and E-commerce

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Abstract*: In this digital age, globalization, easy access to the internet, and rapid development in digital technology made online shopping popular. During the past decade, the usage of online shopping has been enhanced significantly and further promoted by covid-19 pandemic. However, many customers are not satisfied with the products, services, or information they receive in online shopping because online shopping lacks in-store experience. To improve sales, and customer satisfaction, and lessen the number of product returns, E-commerce platforms can make use of augmented and virtual reality (AR/VR) technology to improve the customer's online shopping experience. AR/VR technology can enhance customers' experience by improving how they interact with online retailers. This technology also provides online vendors with a competitive advantage. However, despite these benefits, AR/VR technology is not widely used by online retailers because the adoption of AR/VR technology in India is still in a relatively nascent stage when compared to other developed countries, and the awareness about the usage of AR/VR technology among people. This paper examines how AR/VR technology works and its potential impacts on online retail and e-commerce. This study also attempts to discover online customers' awareness level of AR/VR technology.*

Keywords: Augmented reality, Virtual reality, e-commerce, Online shopping, B2C

I. INTRODUCTION

Today e-commerce has become an integral part of our everyday lives. The main reasons behind the popularity of e-commerce are reduction in cost for retailers, expansion of customer reach, and creation of unique and convenient user experience while shopping. Most of the E-commerce platforms are making use of 2D environment, which makes it easier for retailers to display and categorize their product. But the 2D environment lacks the benefits of traditional commerce, such as the users have limited information about the product. The user may or may not interpret the product correctly and may suffer from ambiguity.

Augmented reality(AR) and Virtual reality (VR) can have a significant impact on online retail. It has the potential to change individuals' purchasing habits, limited number of sellers have incorporated immersive technology components into their e-commerce websites and have developed mobile apps which allow clients to virtually test products such as makeup, sunglasses, jewellery, furniture, clothing, etc. 3D product visualizations through AR and VR can provide a more engaging shopping experience in e-commerce in comparison to the 2D product images used by the majority of retailers.

By virtually "putting the product in the hand of the users" (Haile & Kang, 2020, p. 3) and enable them to observe it as per their requirements to obtain all the necessary data to make an informed purchase decision. E-commerce guarantees more product interaction in addition to more lively and dynamic shopping settings that react to customers' actions. (Hwang &Oh, 2020; Meißner et al., 2020; Paz & Delgado, 2020)

What is e-commerce?

"E-commercerefers to the buying and selling of goods and services conducted electronically over computer networks, primarily the Internet. It encompasses various online transactions, including but not limited to online retailing, electronic payments, digital marketing, and business-to-business exchanges." Smith and Johnson (2023)

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Augmented reality

"Augmented reality (AR) is a technology that superimposes digital information, such as images, videos, or 3D models, onto the real-world environment in real-time, thereby enhancing the user's perception and interaction with the physical world." Azuma, R. T. (1997)

Augmented Reality (AR) technologies are live, direct, or indirect views of a real-world physical environment that have been enhanced by the addition of virtual, computer-generated data.

Virtual reality

"Virtual reality (VR) is a computer-generated simulation of an interactive 3D environment that users can interact with in a seemingly real or physical way using electronic devices, such as headsets, gloves, or controllers." Burdea, G. C., &Coiffet, P. (2003).

"Virtual reality (VR) is a computer-generated simulation of an interactive three-dimensional environment that users can engage with through immersive devices, such as headsets, to experience a sense of presence and interact with virtual objects and surroundings in a seemingly real or physical way." Sherman, W. R., & Craig, A. B. (2002).

Difference between AR and VR Technology

Augmented Reality (AR) and Virtual Reality (VR) are both immersive technologies, but they differ in how they integrate digital content with the real world and the level of immersion they offer.Virtual reality (VR) generates a completely immersive virtual world that either resembles the real world or a completely distinct reality. Through the use of virtual reality (VR) goggles or head-mounted displays (HMDs), users are fully submerged in a computer-generated environment, blocking out the outside world. VR technology creates a sensation of presence and immersion by tracking the movements of the user's head and adjusting the virtual world accordingly. Applications for virtual reality (VR) include teaching and instructional simulations, virtual tours, and immersive gaming.

AR enhances physical reality by merging virtual displays into the real world. Users can simultaneously view and interact with digital and real-world objects.Through augmented reality, consumers may have better, more lifelike experiences in real-life locations. Augmented reality can be used for online shopping using devices like smartphones, tablets, and computers with webcams. Examples of AR applications include mobile games like Pokémon GO, virtual try-ons for retail products, and navigation assistance displaying directions overlaid in the real world.

Problem statement-

While online shopping is popular, the online retail experience has various limitations. For example, customers may receive goods that are different from what they saw online after purchasing the goods. They may also find it difficult to return the goods that they are dissatisfied with. For online retailers, homogeneous competition, where many sellers sell the same product, has always been a major issue.High rates of product returns are causing inefficient, costly issues for e-commerce retailers and the environmental footprint as well.

Research Objectives:

- To determine customers' awareness level about AR/VR in B2C e-commerce retail.
- To study the impact of AR/VR on customer experience in e-commerce retailing.
- To discover the benefits and limitations of AR/VR technology.
- To understand the user's perception ofAR/VR technology usage for online shopping.

II. LITERATURE REVIEW

Paper Title	Authors	Findings
3D AR/VR Environment for E-Commerce	Suvarna Gupta1 , Gayatri Nair 2, Shivansh Agarwal3 , Santosh Bothe4	stage1: Designing and selection of relatable human-computer interaction interfaces. Such models become highly convenient for the user and must be feasible for the retailers at the same time.

		stage2: Designing a fully Immersive 3D Environment using Mixed Reality: This should have easy navigation from one point of the 3D shopping mall to another. Ensuring interactive and clear view of products. stage3: addition of consumer behavior and prediction models. stage4: inclusion of business models to ensure high profitability and a lawful environment.
Consumers' Experience and Satisfaction Using Augmented Reality Apps in E-Shopping: New Empirical Evidence	Mirela-Catrinel Voicu, Nicoleta Sîrghi and Daniela Maria-Magdalena Toth	Customers are more inclined to embrace AR technology and become purchasers when they can find the right products more quickly with the AR app and believe that utilizing them enhances their social image.
Augmented Reality in Real Stores: Empirical Evidence from Consumers' Interaction with AR in a Retail Format	Francesca Bonetti, Eleonora Pantano, Gary Warnaby, Lee Quinn and Patsy Perry.	Consumers experience an enhanced, more immersive, and enjoyable perception of the concept of the 'augmented store', environment as a consequence of the AR experience. They perceive interacting with the augmented store to be "practical," and they usually interact with the immersive store mostly for pleasurable reasons.
Factors Influencing Adoption of Augmented Reality Technology For E-Commerce	Kumar, Karippur Nanda; Chandra, Shalini; Bharati, Supreeth; and Manava, Sushma,	AR adoption by e-commerce firms is influenced by the technology competence of online firms, and the relative advantages the e-commerce industry will gain. Organization:three significant organizational factors are decision makers' knowledge, the financial strength of the firm and the support from the top management. Consumer readyness and competitive pressure.
The Impact of Augmented Reality on E-commerce	Dr Desti Kannaiah, Dr R. Shanthi	Even if AR has an advantageous impact on customers, it might still take some time for it to gain traction in Chennai's marketing environment and achieve financial success. An entrepreneur toeing the idea of using AR, especially for his online business would do well to analyse the costs versus benefits of developing, implementing and delivering AR solutions to his end customers.
Shopping in the digital world: Examining customer engagement through augmented reality mobile applications	Graeme McLean∗, Alan Wilson	Managers should take note of the research's findings, which show how augmented reality might affect consumer satisfaction and brand usage intentions. Managers should be aware that consumers who find augmented reality (AR) technology to be user-friendly, entertaining, and useful have a favorable impact on brand engagement, which in turn affects customer satisfaction and intention to use the brand.

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Implementation of AR in India

Several online retailers in India have been exploring and implementing augmented reality (AR) and virtual reality (VR) technologies to enhance the shopping experience for customers.

1. Flipkart, one of India's largest e-commerce platforms, has been experimenting with AR and VR technologies. They have introduced features such as "Flipkart AR Games" where customers can engage in interactive experiences while shopping for products. Additionally, they have integrated AR features in their furniture shopping section, allowing customers to visualize how furniture would look in their homes before making a purchase.

2. Lenskart: Lenskart, an Indian eyewear retailer, has integrated AR technology into its platform to offer virtual try-on services for eyeglasses and sunglasses. Customers can use their smartphones to see how different frames look on their faces before making a purchase.

3. Myntra: Myntra, a popular Indian e-commerce platform specializing in fashion and lifestyle products, has introduced AR features to enhance the online shopping experience. They have integrated AR technology for virtual try-ons of apparel and footwear, allowing customers to visualize how clothing items would look on them.

4. HomeLane: HomeLane, an Indian home interiors company, utilizes AR technology to help customers visualize furniture and decor items in their homes before making purchasing decisions. Their AR-enabled app allows users to place virtual furniture in real-time within their living spaces to see how it fits and complements their existing decor.

5. Magicbricks: Magicbricks, a leading Indian real estate platform, has incorporated AR technology into its app to provide users with augmented property viewing experiences. Users can use the AR feature to visualize properties listed on the platform in a real-world context, helping them assess factors like size, layout, and compatibility with their preferences.

6. CureFit: a health and fitness startup based in India, has leveraged AR technology to enhance its fitness app experience. They offer interactive workout sessions with AR elements that guide users through exercises and provide real-time feedback on their form and technique.

Advantages:

Online retail shopping became popular due to several benefits over physical in-store shopping experiences which include convenience, a wide range of products, price comparison, reviews of products and services, and ease of returns and exchanges.

- *Convenience and time saving:* the most significant advantage of online retail shopping is the convenience it provides. Customers can browse and purchase products from the comfort of their place, at any time of day or night. There's no need to travel to a physical store or adhere to store timing thereby saving time.

- *Wide range of products:* Online retailers often offer a much wider selection of products compared to physical stores. Customers can easily compare a variety of products from different sellers without having to visit multiple locations.

- *Price Comparison:* During online shopping customers can compare prices across different retailers with just a few clicks. This facility allows customers to crack the best deals and save money.

- *Reviews and Ratings:* Online retailers typically feature customer reviews and ratings for products or services, which can help customers make informed decisions about their purchases. Feedback from other consumers can provide valuable insights into the quality and performance of a product.

- *Ease of Returns and Exchanges:* Most online retailers provide systematic processes for returns and exchanges within a predefined period, making it easy for customers to return or exchange items that don't meet their expectations. Most online retailers provide hassle-free return and exchange policies to enhance customer trust, and customer loyalty, which contribute to overall customer satisfaction.

Disadvantages

While online retail shopping offers numerous benefits, there are also some drawbacks to consider:

- *Shipping Costs:* Many online retailers charge shipping fees, which can increase the overall cost of the purchase. Additionally, expedited shipping options often come with higher fees.
- *Lack of Tangible Experience:* When shopping online, customers cannot physically inspect or try out products before making a purchase. This can lead to dissatisfaction if the product received does not meet their expectations in terms of quality, size, color, or other factors.
- *Security Concerns:* Online shopping requires customers to provide personal and financial information, which can make them vulnerable to data breaches and identity theft if the retailer's website is not secure.
- *Return Hassles:* While returns and exchanges are generally easier with online shopping, the process can still be cumbersome and time-consuming, especially if the retailer has strict return policies or if the item needs to be shipped back.

III. METHODOLOGY

The primary data was collected using questionnaires and interviews. The questionnaire was sent to 112 respondents but received the response from 52 respondents only. In addition to this, face-to-face structured interviews were taken from 36 candidates. Thus, overall primary data is collected from 88 candidates out of which 35 were women and the remaining 53 candidates were male. The data was collected from candidates having age belonging to the range of 18 to 50 years. The secondary data is collected from research papers mentioned in the reference section.

IV. FINDINGS

Below are the questions that were asked in the questionnaire along with responses.

Question	Responses	
	YES	No
Are you aware of Virtual Reality technology in e-commerce?	34	54

Question	Responses	
	YES	No
Are you aware of Augmented Reality technology in e-commerce?	27	61

Question	Responses	
	YES	No
Have you ever used AR/VR technology for online shopping?	12	76

Question	Responses			
	goggle	Watch	Makeup Accessory	apparels
Which product did you recently purchase using AR/VR technology?	3	2	5	2

Question	Responses		
	YES	No	Can't say
Do you think online shopping using AR/VR technology is better than conventional online shopping?	18	8	62

Question	Responses		
	YES	No	Can't say
I found online shopping using AR/VR is more enjoyable.	11	5	72

Question	Responses		
	YES	No	Can't say
Do you think AR/VR technology helps in better decision-making?	22	4	62

Question	Responses		
	YES	No	Can't say
Do you think, use of AR apps helps in a better perception of the product when compared to traditional online shopping?	18	5	65

Question	Responses						
	Makeup Accessories	Jewellery	Apparels	Goggles	Watches	Furniture	Paints
Which product did you recently purchase using AR/VR technology?	22	13	24	9	11	6	3

Question	Responses		
	YES	No	Can't say
I would like to use/continue AR/VR technology for online shopping.	52	3	33

V. LIMITATIONS

The study was conducted on Indian consumers belonging to Nagpur city of Maharashtra state, limiting the generalizability of the results due to cultural differences.

Another limitation of the study is the small sample size, if asimilarstudy were conducted in Metropolitan cities with a larger sample size the result might differ.

The respondents include varying age groups from 18 to 50 years. If similar questions were asked to youth only then results may differ.

VI. CONCLUSION

From the above findings, it is clear that the majority (65%) of the users are unaware of how to make use of AR and VR technology for online shopping. At the current time, most people still prefer to shop in physical stores, either because they are not familiar with AR/VR technology or because of the limited availability of online retailers that provide the option to buy using AR/VR technology. This suggests a need for retailers to gradually introduce this new technology to potential users, educating them and promoting the new tool by providing all relevant information. E-commerce retailers should focus on customer convenience via AR mobile apps and in-store VR setups to enhance the customer experience. AR and VR technologies open up ample opportunities for retailers to connect with customers from their comfort homes. AR/VR technologies enable the user to accomplish offline shopping activities more quickly because they can preview products via virtual tryouts. Thus, AR/VR technology enhances shopping effectiveness and increases offline shopping productivity. This technology will play a vital role in decreasing the number of returns in online shopping. The innovative usage of AR/VR technology will be beneficial for both customers and online retailers. For consumers, it will

reduce perceived crowding, increase satisfaction, and reduce the return rate of products, which will provide a competitive advantage for online retailers.

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