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Effect on consumer behaviour by the use of AR & VR

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Abstract

AR and VR technologies provide immersive experiences that change how consumers interact with products and services. AR enhances reality by overlaying digital content onto the physical world, allowing users to see how products fit into their own environment. This helps in making more informed purchasing decisions, boosting confidence. VR, on the other hand, offers complete virtual environments where users can explore and engage with products in a controlled setting. This deepens their understanding and connection to the brand, leading to increased interest and potential sales. Both technologies personalize the shopping experience, making consumers feel special and valued. This personalization can lead to higher satisfaction, reduced product returns, and greater customer loyalty. AR and VR also gamify the shopping process, making it more interactive and enjoyable. This encourages consumers to explore more products and spend more time with the brand. Unique features like virtual try-ons in fashion or home decor provide a tangible sense of how products will look or feel, reducing hesitation and uncertainty. This paper highlights the transformative potential of AR and VR in the retail landscape, emphasizing their role in shaping the future of consumer interactions and behaviours. By adopting these technologies, businesses can gain a competitive edge, attract and retain customers, and ultimately drive sales in an increasingly digital world.

Key words: Consumer Behaviour, Immersive Experience, Product Interaction, Personalized Shopping, Virtual Try-ons

Introduction

The emergence of augmented reality (AR) and virtual reality (VR) technologies is revolutionizing the way consumers interact with products and services. These technologies offer immersive experiences that transform traditional shopping into engaging and personalized journeys. By overlaying digital information onto the physical world, AR allows consumers to visualize products in their own environments, enhancing decision-making and boosting confidence. This feature is particularly valuable in industries such as fashion and home décor, where visualizing items in context can significantly impact purchase decisions. VR, on the other hand, transports users into entirely virtual environments, providing a controlled space to explore products and services. This creates a deeper level of engagement, as consumers can interact with products in lifelike simulations, gaining a comprehensive understanding before making a purchase. This deeper connection not only influences consumer behaviour but also strengthens brand affinity.

The integration of AR and VR into retail not only enriches the shopping experience but also streamlines operations. These technologies can optimize inventory management, enhance product presentations, and provide detailed analytics on consumer behaviour. By utilizing data generated from AR and VR interactions, businesses can refine their strategies, tailor marketing efforts, and improve product offerings. This data-driven approach enables retailers to respond quickly to consumer trends and preferences, ensuring they remain competitive in a rapidly changing market.

AR and VR are fostering inclusivity in retail by providing solutions that cater to diverse consumer needs. Virtual try-ons and digital showrooms make shopping more accessible for individuals with mobility challenges, while language translation features in AR applications can bridge communication gaps, enhancing the shopping experience for non-native speakers. These inclusive practices not only broaden the customer base but also reflect positively on brand reputation.

Market trends and implications

In retail, AR is revolutionizing the shopping experience with virtual try-ons and interactive product displays, driving higher engagement and reducing return rates by allowing customers to visualize products before purchase. Education is leveraging VR for simulations and virtual classrooms, enhancing learning outcomes through interactive and immersive environments.

These trends underscore a shift towards more personalized and engaging consumer interactions, fuelled by advancements in AR and VR technologies. Businesses that integrate these technologies can expect to enhance customer satisfaction, improve operational efficiencies, and differentiate themselves in competitive markets

The Augmented Reality (AR) and Virtual Reality (VR) markets are experiencing rapid growth, driven by increasing adoption across various sectors. The global AR market, valued at approximately USD 17.67 billion in 2022, is expected to grow at a CAGR of around 39.8% from 2023 to 2030. Similarly, the global VR market, valued at about USD 21.83 billion in 2022, is projected to grow at a CAGR of approximately 15.0% from 2023 to 2030. Combined, the AR and VR markets, valued at USD 28 billion in 2021, are anticipated to grow at a CAGR of 41.5%, reaching an estimated USD 296.9 billion by 2028. These figures underscore the significant expansion and increasing integration of AR and VR technologies in industries such as gaming, healthcare, education, and retail.

Literature Review

Lavoye, V., Mero, J., & Tarkiainen, A. (2021). Consumer Behaviour with Augmented Reality in Retail: A Review and Research Agenda.

This review explores the role of augmented reality (AR) in retail, focusing on its impact on consumer behaviour. AR enhances shopping experiences by offering interactive and immersive elements, which increase consumer engagement and satisfaction. The study also suggests that AR can create both utilitarian and hedonic value, influencing purchasing decisions.

Chen, Y., & Lin, C. A. (2022). Consumer Behaviour in an Augmented Reality Environment: Exploring the Effects of Flow via Augmented Realism and Technology Fluidity.

The study investigates how augmented realism and technology fluidity contribute to consumer experiences in AR environments. It finds that these elements facilitate a flow state, which enhances consumer satisfaction and engagement, leading to positive behavioural outcomes.

Barnes, S. (2017). Understanding Virtual Reality in Marketing: Nature, Implications, and Potential.

This paper examines the use of virtual reality (VR) in marketing and its implications for consumer engagement. VR offers immersive experiences that can significantly influence consumer perceptions and behaviours, making it a powerful tool for enhancing brand engagement and loyalty.

Xi, N., & Hamari, J. (2021). Shopping in Virtual Reality: A Literature Review and Future Agenda.

This literature review addresses the current state and future potential of VR in the shopping experience. The study concludes that VR can provide engaging and satisfying shopping experiences, improve brand perception, and increase consumer loyalty. It highlights the need for further research on consumer behaviour in VR contexts**.**

Alcañiz, M., Bigné, E., & Guixeres, J. (2019). Virtual Reality in Marketing: A Framework, Review, and Research Agenda.

This article presents a framework for understanding VR's role in marketing and reviews existing research in the field. VR can significantly enhance consumer brand experiences and emotional engagement, potentially leading to stronger brand loyalty and increased purchase intentions. The paper suggests a need for more research on the strategic use of VR in marketing.

Kushnarevych, A., & Kollárová, D. (2023). AR and VR as a Shaping Trend in Consumer Behaviour.
This study examines how augmented reality (AR) and virtual reality (VR) are influencing consumer behaviour, highlighting their roles as emerging trends in the digital marketplace.
The research indicates that AR and VR technologies enhance consumer engagement and brand interaction by providing immersive experiences. This leads to increased consumer satisfaction, brand loyalty, and a higher likelihood of purchase.

Pessoa de Amorim, I., Guerreiro, J., Eloy, S., & Loureiro, S. M. C. (2022). How Augmented Reality Media Richness Influences Consumer Behaviour.

This study investigates the impact of media richness in augmented reality (AR) applications on consumer behaviour, focusing on how enhanced interactivity and sensory engagement can alter consumer perceptions and actions. The authors find that higher media richness in AR leads to greater consumer engagement and satisfaction, which positively influences purchase intentions. The study highlights the importance of utilizing AR's capabilities to create rich, immersive experiences to enhance consumer-brand interactions.

Zaveri, B., & Amin, P. (2019). Augmented and Virtual Reality: Future of Marketing Trends.

This paper explores the potential of augmented reality (AR) and virtual reality (VR) in shaping future marketing strategies. It discusses the evolving landscape of consumer interaction with brands through these immersive technologies. The study concludes that AR and VR significantly enhance consumer engagement by providing interactive and immersive experiences. These technologies help in creating memorable brand interactions, leading to increased consumer loyalty and purchase intentions. The authors emphasize the growing importance of AR and VR in modern marketing practices.

Research Gap

Currently, there is a noticeable gap in understanding the comprehensive impact of augmented reality (AR) and virtual reality (VR) technologies on consumer behaviour. While there is growing anecdotal evidence of their influence, systematic empirical research exploring their varied effects across different consumer demographics and product categories remains limited.

Need for Study

This study seeks to fill this gap by rigorously examining how AR and VR technologies influence consumer behaviour. Understanding these effects is crucial for businesses aiming to leverage these technologies effectively in marketing strategies and enhancing consumer engagement.

Objectives-This research aims to achieve the following objectives:

1.Assess the extent to which AR and VR influence consumer purchasing decisions across various product categories.

2.Investigate how AR and VR impact consumer perceptions of product quality, utility, and overall satisfaction.

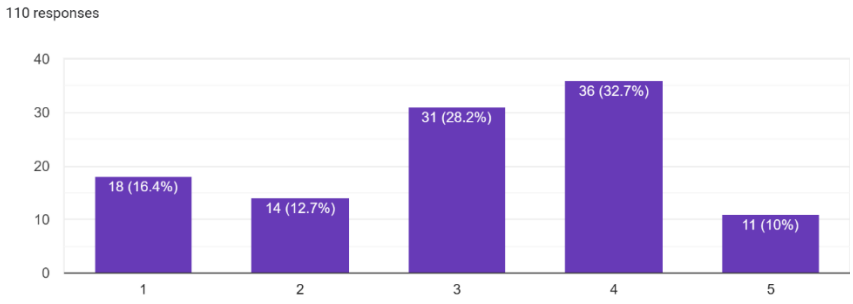
3.Analyse demographic factors that may moderate the effects of AR and VR on consumer behaviour.

4.Provide actionable insights for businesses on optimizing AR and VR experiences to enhance consumer engagement and satisfaction.

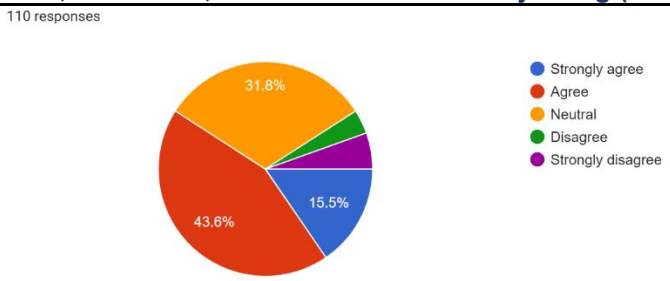
Research methodology

To investigate the consumer behaviour on the use of AR and VR features of a product or service, a quantitative survey-based research methodology is adopted. A Structured questionnaire with close ended questions were developed to gather data. Google forms was chosen as a platform for distributing the questionnaire due to its user-friendly interface and efficient response management. Participants were recruited through social media channels and email lists to ensure a diverse and representative sample. The survey included Likert scale questions to quantify attitudes and behaviours, alongside demographic questions to analyse the influence of age and occupation. Data collection was conducted over a two-week period to maximize response rates. The collected data was then analysed using statistical software to identify patterns, and make meaningful associations from consumer behaviour related to AR and VR usage.

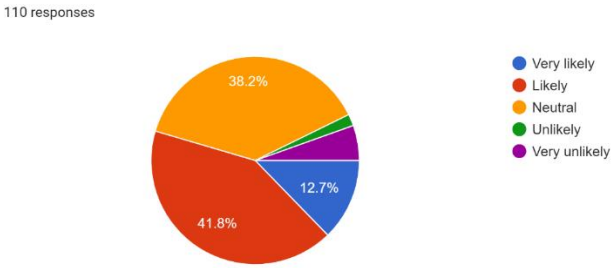
Data Analysis



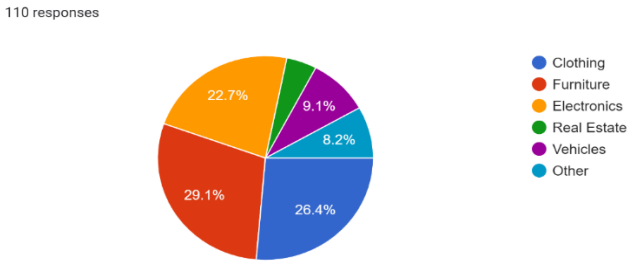
Respondents used a Likert scale from 1 to 5, where 1 represents "highly unlikely" and 5 represents "highly likely." Of those surveyed, 32.2% selected 4, indicating a strong inclination towards agreement. Additionally, 28.2% chose 3, while 16.4% chose 1, indicating a majority leaning towards the belief that AR and VR significantly affect the shopping experience.



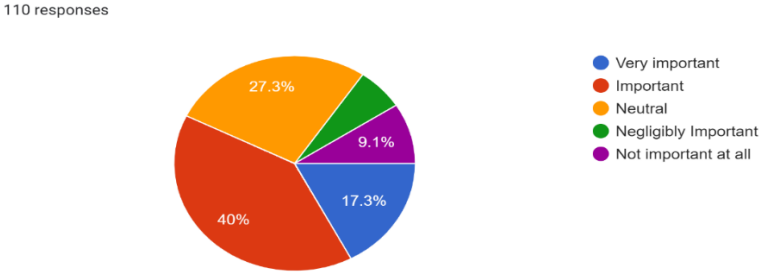
Substantial portion of respondents, around 75.1%, either agree or strongly agree that AR and VR enhance their ability to make well-informed purchase decisions. This indicates a notable endorsement of these technologies' role in improving consumer decision-making processes.



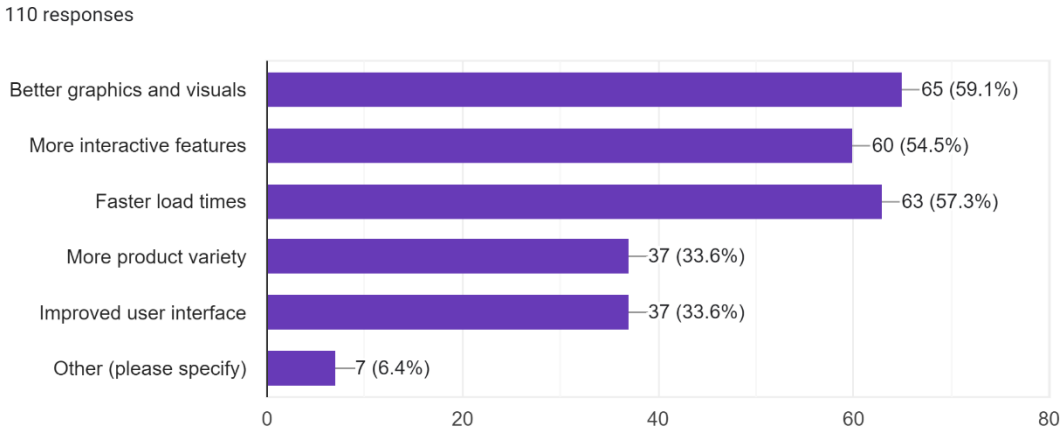
Approximately 54.5% of respondents are either likely or very likely to purchase a product after experiencing it through AR and VR, with an additional 38.2% remaining neutral on the matter. These findings suggest a significant potential for AR and VR to positively influence consumer purchasing decisions.



29.1 % of respondents prefer furniture using AR/VR, 49.1 % percentage prefer clothing and electronics respectively compared to other products and services that signifies the application of AR/VR in various fields.



More than half of the respondents believe that AR/VR availability is an important factor when choosing an online retailer. Whereas very few has an opinion that it is not a important factor.



When we asked respondents about the improvements they wish to see in the AR/VR world, majority of them have voted for a better graphics and visuals, more interactive features and faster load times.

Chi-square tests

Proportions - Are you familiar with AR/VR Technology?

Level	Count	Proportion
Yes	96	0.9231
No	8	0.0769

χ^2 Goodness of Fit

χ^2	df	p
74.5	1	< .001

The output displays proportions related to familiarity with AR/VR Technology. There are two levels: “Yes” (96 respondents) and “No” (8 respondents). Proportions: 0.9231 for “Yes” and 0.0769 for “No.”

Chi-square Goodness of Fit Test:

Chi-square value (χ^2): 74.5

Degrees of freedom (df): 1

p-value: < .001 (highly significant)

The proportions suggest that a significantly larger proportion of respondents are familiar with AR/VR Technology (“Yes”).

Proportions - Have you ever used AR or VR technology?

Level	Count	Proportion
Yes	89	0.856
No	15	0.144

χ^2 Goodness of Fit

χ^2	df	p
52.7	1	< .001

The table presents proportions based on responses to the question "Have you ever used AR or VR technology?" with two levels: 'Yes' and 'No'.

For 'Yes', there are 89 counts, proportion of approximately 0.856.

For 'No', there are 15 counts, proportion of approximately 0.144.

Chi-Square Goodness of Fit Test:

The Chi-Square value (χ^2) is 52.7, with 1 degree of freedom (df), The p-value is less than 0.001.

This test assesses whether the observed distribution of responses fits an expected proportion. The very low p-value suggests a statistically significant difference from the expected proportion. In summary, the data indicates that there is a significant difference in the use of AR or VR technology compared to what was expected.

Proportions - If yes, how frequently do you use AR/VR?

Level	Count	Proportion
Daily	8	0.0769
Weekly	9	0.0865
Monthly	26	0.2500
Rarely	61	0.5865

χ^2 Goodness of Fit

χ^2	df	p
70.7	3	< .001

The table displays the frequency distribution of responses to the question, "How frequently do you use AR/VR?"

The corresponding counts are 8, 9, 26, and 61, respectively. The proportions for each level are as follows:

Daily: 0.0769, Weekly: 0.0865, Monthly: 0.2500, Rarely: 0.5865

Chi-Square (χ^2) Goodness of Fit Test:

The test compares the observed frequency distribution to an expected distribution.

The χ^2 value is 70.7 with 3 degrees of freedom (df). The p-value is less than 0.001, indicating a statistically significant difference in usage frequency. In summary, the data suggests that there are significant differences in AR/VR usage across different frequency levels.

Proportions - What type of products do you prefer to buy using AR/VR?

Level	Count	Proportion
Furniture	31	0.2981
Clothing	27	0.2596
Electronics	25	0.2404
Vehicles	9	0.0865
Real Estate	5	0.0481
Other	7	0.0673

χ^2 Goodness of Fit

χ^2	df	p
38.5	5	< .001

The table lists different product categories and their corresponding counts and proportions.

Here are the details: Furniture: Count 31, Proportion 0.2951, Clothing: Count 27, Proportion 0.2566, Electronics: Count 25, Proportion 0.2404, Real Estate: Count 9, Proportion 0.0857 ,Vehicles: Count 5, Proportion 0.0481, Other: Count 7, Proportion 0.0673

Chi-Square (χ^2) Goodness of Fit Test:

The chi-square test compares the observed frequencies with expected frequencies.

Result: $\chi^2 = 38.5$, Degrees of freedom (df) = 5, p-value < .001. This suggests that there is a statistically significant difference in preferences for buying products using AR/VR across the listed categories.

Contingency Tables

Do you believe AR/VR enhances your ability to make informed purchasing decisions?	Do you find yourself spending more time exploring products when using AR/VR compared to traditional online shopping? 1	2	3	4	5	Total
1	2	0	3	0	0	5
2	1	1	1	1	0	4
3	1	7	15	9	1	33
4	2	12	4	22	6	46
5	0	3	1	5	7	16
Total	6	23	24	37	14	104

χ^2 Tests

	Value	df	p
χ^2	51.3	16	< .001
N	104		

The table displays responses related to the use of augmented reality/virtual reality (AR/VR) technology in comparison with traditional online shopping experiences. The responses are rated on a scale from 1 (strongly disagree) to 5 (strongly agree).

Hypothesis:

Null Hypothesis (H_0): There is no association between the belief that AR/VR enhances purchasing decisions and spending more time exploring products when using AR/VR compared to traditional online shopping.

Alternative Hypothesis (H_1): There is an association between these two variables.

Chi-Square Test Results:

The chi-square test statistic (χ^2) is 51.3 with 16 degrees of freedom (df). The p-value is less than 0.001, indicating statistical significance. Since the p-value is very low, we reject the null hypothesis. There is a significant association between the belief in AR/VR enhancing purchasing decisions and spending more time exploring products using AR/VR compared to traditional online shopping.

In summary, the data suggests that there is indeed a relationship between these two variables. Users who believe AR/VR enhances purchasing decisions tend to spend more time exploring products in AR/VR environments compared to traditional online shopping.

Contingency Tables

How likely are you to purchase a product after experiencing it through AR/VR?	How important do you consider the availability of AR/VR features when choosing an online retailer? 1	2	3	4	5	Total
1	3	1	1	0	1	6
2	0	0	2	0	0	2
3	4	3	19	10	4	40
4	1	2	6	26	9	44
5	0	0	1	6	5	12
Total	8	6	29	42	19	104

χ^2 Tests

	Value	df	p
χ^2	49.0	16	< .001
N	104		

The table explores the relationship between two questions:

“How likely are you to purchase a product after experiencing it through AR/VR?” (rated from 1 to 5, where 1 represents ‘Very unlikely’ and 5 represents ‘Very likely’).

“How important do you consider the availability of AR/VR features when choosing an online retailer?” (also rated from 1 to 5, where 1 represents 'Not important at all' and 5 represents 'Very important').

Chi-Square Test Results:

χ^2 value: 49.0, Degrees of freedom (df): 16, p-value: < .001

The p-value being less than .001 suggests a statistically significant association between how likely someone is to purchase after experiencing AR/VR and how important they consider AR/VR features when choosing an online retailer. This information provides valuable insights into consumer behaviour regarding augmented reality/virtual reality (AR/VR) in online shopping. Businesses can use this data for market research and strategy development.

FINDINGS

- High Familiarity with AR/VR Technology: Over 92% of respondents are familiar with AR/VR, indicating broad awareness but not necessarily frequent use, suggesting potential for growth in adoption.
- Significant Interest in AR/VR for Specific Products: There is considerable interest in AR/VR for certain product categories, especially furniture, highlighting key areas where this technology can enhance the shopping experience.
- Frequency of AR/VR Usage Varied: Most respondents use AR/VR rarely, with significant variation in usage frequency, suggesting that while awareness is high, regular use is still limited.
- AR/VR's Influence on Consumer Behaviour and Preferences: AR/VR features significantly affect consumer engagement and purchase decisions, emphasizing their growing role in enhancing shopping experiences.
- Consumer Value on AR/VR Features in Retail: The likelihood of purchasing after experiencing AR/VR is closely linked to the perceived importance of these features in choosing a retailer, indicating the strategic value of AR/VR for businesses.
- Improvements in AR/VR Technology: Most respondents seek improvements in the working of AR/VR. Constant advancement in operation of the features could invite more consumers under the umbrella of usage.

CONCLUSION

AR/VR technology is widely recognized among consumers, with significant interest in its application for certain products, like furniture. It enhances decision-making by providing immersive product experiences, leading to improved consumer engagement and purchase decisions. Brands using AR/VR are perceived as innovative, attracting tech-savvy customers. As these technologies become more accessible, their use is expected to grow, presenting opportunities for businesses to enhance customer experiences and differentiate themselves in the market. There needs to be staying updated with AR/VR advancements, which is crucial for businesses to maintain a competitive edge.

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