

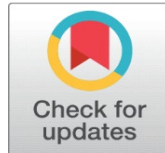
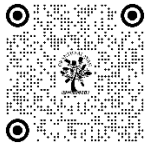
ROLE OF AUGMENTED REALITY AND VIRTUAL REALITY (AR/VR) IN CUSTOMER ENGAGEMENT

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ABSTRACT

This research paper investigates the pivotal role of Augmented Reality (AR) and Virtual Reality (VR) in revolutionizing customer engagement strategies. Through a quantitative methodology involving 321 managerial participants, the study scrutinizes the impact of AR and VR technologies on customer interactions, perceptions, and brand engagement. Findings reveal that both AR and VR significantly influence customer engagement, as evidenced by their positive effects on customer interactions, perceptions of product/service value, satisfaction, and fostering long-term relationships. Likert-based analyses of statements regarding AR and VR experiences affirm their ability to capture attention, deepen immersion, and enhance understanding, thus substantiating their value in the customer journey. These results underscore the transformative potential of AR and VR in enhancing customer-brand relationships and shaping contemporary marketing practices.

Keywords: Augmented Reality, Virtual Reality, Customer Engagement, Brand Perception, Immersive Technologies

1. INTRODUCTION

The amalgamation of Augmented Reality (AR) and Virtual Reality (VR) has emerged as a transformative force reshaping various sectors, particularly revolutionizing customer engagement paradigms across industries. This novel technological convergence presents an immersive and interactive platform that transcends traditional boundaries, offering unparalleled experiential encounters to consumers and businesses alike. The pervasive impact of AR/VR on customer engagement is multifaceted, influencing perceptions, interactions, and decision-making processes. At its core, AR overlays digital information onto the physical

environment, enhancing the real-world experience by integrating virtual elements into it. Conversely, VR constructs entirely simulated environments, allowing users to immerse themselves in fabricated realms, detached from physical surroundings. This duality between augmenting reality and fabricating virtual spaces forms the cornerstone of AR/VR technology, creating a spectrum of possibilities for engaging customers in diverse ways. The evolution of customer engagement strategies has been significantly propelled by AR/VR's capacity to transcend spatial and temporal limitations. These technologies dismantle geographical constraints, enabling businesses to reach global audiences and interact with customers irrespective of their physical location. Consequently, enterprises are empowered to craft personalized and tailored experiences, fostering deeper connections with their customer base.

In retail, AR/VR technologies have revolutionized the shopping experience, transcending the conventional brick-and-mortar model. AR applications allow customers to visualize products in their own spaces before purchase, eliminating uncertainties and enhancing confidence in buying decisions. Similarly, VR-based simulations offer immersive virtual shopping environments, enabling consumers to browse, interact, and experience products or services as if present physically, amplifying engagement and influencing purchase behaviors. Moreover, AR/VR's impact extends beyond the realms of retail, infiltrating industries like healthcare, education, tourism, and entertainment. In healthcare, these technologies facilitate immersive medical training, patient education, and even surgical simulations, redefining both practitioner expertise and patient understanding. In education, AR/VR applications offer immersive learning experiences, enabling students to explore abstract concepts in tangible, lifelike environments, thereby enhancing engagement and knowledge retention. The allure of AR/VR lies in its ability to engender emotional connections and stimulate sensory engagement, fostering a deeper level of interaction between consumers and brands. By leveraging these technologies, businesses can create memorable, interactive, and emotionally resonant experiences that transcend the limitations of traditional marketing approaches. However, while the potential of AR/VR in customer engagement is undeniable, challenges such as technological barriers, cost implications, and ethical considerations persist. Technical complexities, device compatibility issues, and the need for high-quality content creation pose hurdles in widespread adoption. Moreover, ethical concerns surrounding data privacy, user consent, and the blurring of reality with virtual constructs necessitate careful consideration and regulatory frameworks. In conclusion, the integration of AR/VR technologies heralds a paradigm shift in customer engagement strategies across industries, offering unparalleled immersive experiences that transcend the boundaries of physical reality. As businesses navigate this transformative landscape, understanding the nuanced interplay between technology and consumer behavior becomes imperative in harnessing the full potential of AR/VR to elevate customer engagement to unprecedented levels.

2. REVIEW OF LITERATURE

Soni, Yadav, and Soni (2022) underscore the evolving landscape of customer engagement, emphasizing the shift towards novel mixed reality experiences catalyzed by the proliferation of mobile devices and highly interactive networks. The adoption of Augmented Reality (AR) and Virtual Reality (VR) by numerous firms to enrich customer experiences, both in offline and online purchasing journeys, reflects a pivotal trend. These technologies have reshaped consumer behaviors,

enabling brands to captivate tech-savvy customers and reshape their consumption patterns by introducing innovative ways to explore products and elevate digital shopping encounters through simulated storefronts. However, despite these advancements, prevailing research highlights the significant costs and experiential barriers associated with implementing AR and VR. Moreover, the lack of managerial insight into AR's potential to enhance customer engagement across diverse industries hampers its widespread utilization. Addressing this research gap becomes pivotal to elucidate the conceptual and managerial implications of AR/VR in customer engagement, thereby paving the way for future investigations in this burgeoning field.

Wedel, Bigné, and Zhang (2020) delve into the significant impact of Virtual Reality (VR) and Augmented Reality (AR) on various facets of marketing practices, capturing the growing attention of marketing researchers. Their review focuses on elucidating the evolution of VR/AR applications in consumer marketing. Central to their discussion is the proposal of a conceptual framework that revolves around consumer experiences facilitated by VR/AR applications across the customer journey, emphasizing the effectiveness of such applications. The authors meticulously dissect the key concepts and components embedded within this framework. Furthermore, they offer a comprehensive overview of the prevalent VR/AR applications within current marketing practices and synthesize existing research on their role in consumer marketing. The article concludes by presenting an outlook for future developments in VR/AR technologies and applications, discussing managerial implications, and outlining potential directions for further research in consumer marketing.

Islam (2020) underscores the burgeoning significance of augmented reality (AR) as a cutting-edge technology captivating diverse sectors, particularly marketing, engagement strategies, and user experience domains. Within the realm of modern marketing, AR has emerged as a pivotal trend, prompting marketers to allocate resources and efforts towards crafting innovative digital marketing platforms tailored for connected consumers. The chapter focuses on exploring the profound impact of augmented reality advertisements on altering customer perceptions and attitudes towards brands. Its primary objective lies in examining the influence of AR advertising on enhancing customer engagement and augmenting user experiences. Additionally, the research delineates the impact of augmented reality advertisements on cognitive, affective, and behavioral forms of engagement, providing a comprehensive insight into the multifaceted effects of AR in shaping consumer interactions with brands.

Kim, Kim, Park, and Yoo (2023) explore the distinctions between Augmented Reality (AR) and Virtual Reality (VR) concerning consumer perceptions within immersive interactive technologies and virtual shopping experiences. Grounded in the Reality-Virtuality continuum and the stimulus-organism-response framework, the study investigates the impact of AR and VR on vividness/interactivity, sense of presence, sensory brand app experience, attitude, and behavioral intention. Participants engaged with an AR app on mobile phones and a VR app using a Google Cardboard VR headset. The research found that vividness and interactivity significantly influenced a sense of presence, sensory brand app experience, attitude towards technology, and behavioral intention, albeit with variations between AR and VR. Notably, a sense of presence emerged as a key mediator in the relationship between vividness, sensory brand app experience, and attitude towards technology specifically in VR scenarios. The study's exploration of real AR/VR shopping contexts offers practitioners valuable insights into consumer perceptions, shedding light on the efficacy of AR and VR in enhancing virtual shopping experiences.

Zaveri and Amin (2019) delve into the evolving landscape of marketing trends, particularly highlighting the pivotal role of Artificial Intelligence (AI), augmented reality (AR), virtual reality (VR), and gamification. AI, recognized for its ability to emulate human psychology and intelligence in the digital realm, has expanded its footprint within marketing and digital marketing arenas. As the advent of digital marketing and the internet revolution altered advertising dynamics, the focus shifted to intricate aspects such as consumer behavior analysis, preference tracking, SEO, content marketing, and speech recognition. Augmented Reality Experiential Marketing (AREM) emerges as a beneficial tool in enhancing customer satisfaction through knowledge utilization, providing companies with a competitive edge in customer retention strategies. Within VR endeavors, emphasis lies on knowledge dissemination and emotional engagement through diverse techniques. Gamification, aiming to imbue experiences with game-like elements, seeks to augment overall value creation for users. The article underscores the profound relevance of AI, AR, VR, and gamification as mechanisms crucial for 21st-century companies in navigating and thriving within the dynamic marketing landscape.

Farshid, Paschen, Eriksson, and Kietzmann (2018) shed light on the challenge managers face in discerning similar-sounding IT-based concepts like augmented reality (AR), virtual reality (VR), and mixed reality (MR). The interchangeable use of these terms often leads to confusion, hindering exploration of the distinct opportunities each technology offers. The Executive Digest delineates six distinct types within the reality/virtuality continuum: (1) reality, (2) augmented reality, (3) virtual reality, (4) mixed reality, (5) augmented virtuality, and (6) virtuality. They employ a common example to illustrate the differences between these types and elucidate potential business applications for each category. This categorization aims to provide clarity and a structured understanding of the diverse technological landscapes, aiding businesses in harnessing the unique advantages offered by different forms of reality and virtuality.

"Augmented Reality and Virtual Reality: Changing Realities in a Dynamic World," edited by Jung, tom Dieck, and Rauschnabel (2020), serves as a bridge between XR Theory and XR Practice. It offers scientifically informed and practically tested solutions to numerous questions with significant managerial and societal implications. The book encapsulates the cutting-edge research in augmented reality (AR) and virtual reality (VR), emphasizing their applications across diverse industries. With a keen focus on the business and management aspects, this comprehensive work explores the evolving landscape of AR and VR technologies, shedding light on their transformative potential in today's dynamic world.

Boletsis and Karahasanovic (2020) delve into the value proposition of immersive technologies within the retail landscape, focusing on the various retail practices facilitated by augmented reality (AR) and virtual reality (VR). Conducting a comprehensive literature review encompassing 28 AR/VR applications from 38 publications, they discerned several key AR/VR-enabled retail practices. These practices encompass branding and marketing, sales channel enhancement, after-sale customer service, virtual try-on experiences, customer-as-designer interactions, virtual training, and workflow management. Their analysis highlights that current AR/VR applications predominantly serve customer-related innovations, notably emphasizing branding and marketing as a dominant practice. While some practices cater to organizational and support-related innovations, AR emerges as a popular and practically valuable technology in retail, seamlessly integrating into the purchase journey and workflow management. On the other hand, VR presents challenges in implementation due to cost and complexity in

integrating with sales channels. However, its high immersion capabilities create strong emotional engagement, proving advantageous in branding and training scenarios. The study underscores the complementary nature of AR and VR in retail, proposing that leveraging their respective strengths can lead to promising innovation strategies when combined.

Nayyar, Mahapatra, Le, and Suseendran (2018) shed light on the burgeoning applications of Virtual Reality (VR) and Augmented Reality (AR) within the tourism and hospitality industry. The increasing attention from researchers and professionals in this sector is paralleled by the growing array of scientific applications stemming from the evolution of AR and VR technologies. The paper accentuates the value of VR and AR in diverse facets such as planning, marketing, education, and the preservation of tourist spots. Emphasizing the significance of these technologies, the research aims to spotlight the top AR and VR technologies pertinent to the tourism and hospitality domain.

Sung, Bae, Han, and Kwon (2021) present insights from a study exploring consumer responses to an AI-embedded mixed reality (MR) exhibit within a retail/entertainment complex, amalgamating advanced technological entertainment with retail shopping. Their findings underscore the impact of AI quality, specifically related to speech recognition and synthesis through machine learning, on augmented objects, subsequently enhancing MR immersion, spatial immersion, MR enjoyment, and perceptions of novel experiences among consumers. These heightened immersive experiences collectively contribute to increased consumer engagement, influencing behavioral responses such as purchase intentions and intentions to share experiences within social groups. The study emphasizes the pivotal role of interactive AI and MR technologies in fostering enhanced consumer engagement, indicating their potential to pave new pathways for promoting consumer interaction and influence within retail settings.

The extensive review of literature on augmented reality (AR), virtual reality (VR), mixed reality (MR), and their applications across various industries illuminates their transformative potential in shaping consumer engagement, marketing strategies, retail practices, and tourism experiences. The synthesis of diverse studies underscores the increasing adoption of AR and VR technologies by businesses to enrich customer experiences, redefine consumer behaviors, and enhance brand interactions. These immersive technologies, coupled with advancements in artificial intelligence (AI), have paved the way for novel marketing approaches, reimagined retail practices, and elevated consumer engagements within entertainment and retail settings.

However, amidst the wealth of insights provided by these studies, a conspicuous research gap emerges regarding the comprehensive understanding of the managerial implications and the holistic integration of AR, VR, and AI technologies across industries. While individual studies have dissected specific facets of these immersive technologies, there remains a need for an overarching framework that synthesizes their combined potential for consumer engagement, business strategies, and operational efficiency. Moreover, the lack of extensive research exploring the seamless integration of AI-driven interactions within AR/VR environments presents an opportunity for further investigation. The existing literature predominantly emphasizes the application and impact of AR/VR technologies on consumer-related innovations, branding, and marketing strategies, with limited exploration of the organizational and operational implications for businesses. Thus, the research gap lies in the comprehensive understanding of how these immersive technologies, in conjunction with AI, can synergistically reshape

business models, enhance operational efficiency, and create holistic, immersive consumer experiences across diverse industries. A unified framework exploring the symbiotic relationship between AI, AR, and VR technologies and their implications for organizational strategies, consumer engagements, and operational excellence represents an uncharted territory ripe for exploration in future research endeavors.

3. OBJECTIVES OF THE STUDY

- To study the role of Augmented Reality in Customer Engagement.
- To study the role of Virtual Reality in Customer Engagement.

4. HYPOTHESES

- **H1:** Augmented Reality plays a significant role in Customer Engagement.
- **H2:** Virtual Reality plays a significant role in Customer Engagement.

5. RESEARCH METHODOLOGY

The research methodology for this study utilized a quantitative approach to investigate the impact and roles of Augmented Reality (AR) and Virtual Reality (VR) in Customer Engagement. A structured survey instrument was designed to collect quantitative data from 321 participants. The survey comprised questions focused on assessing the perceived effectiveness and influence of AR and VR technologies on Customer Engagement. A sample of managers was selected through purposive sampling techniques. The data collection process involved engaging with managers through a structured questionnaire distributed electronically via email. A purposive sampling method was employed to target managers with diverse industry backgrounds and experiences relevant to the study's focus on augmented reality (AR) and virtual reality (VR) in customer engagement. The questionnaire was designed to gather insights into managers' perceptions, experiences, and utilization of AR and VR technologies within customer engagement strategies. Each manager received a personalized invitation via email containing a link to the online questionnaire. Participants were assured of confidentiality and anonymity, and their voluntary participation was emphasized to encourage candid and genuine responses. The collected data from these managerial perspectives formed the basis for analyzing the roles and impacts of AR and VR in customer engagement strategies. Statistical software packages were employed to process and analyze the collected data, enabling the derivation of empirical insights and conclusions.

6. DATA ANALYSIS

Table 1

Table 1 Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30 years	19	5.9	5.9	5.9
	30-40 years	247	76.9	76.9	82.9
	40-50 years	42	13.1	13.1	96
	50-60 years	10	3.1	3.1	99.1
	Above 60 years	3	0.9	0.9	100
	Total	321	100	100	

Table 1 illustrates the distribution of respondents based on age groups. The majority of participants, comprising 76.9%, fell within the 30-40 years bracket, indicating a substantial representation from this age range. Following this, 13.1% of respondents were aged between 40-50 years, while 5.9% were in the 18-30 years category, demonstrating a smaller but notable presence of younger participants. A minor proportion of the sample, 3.1% and 0.9% respectively, constituted individuals aged 50-60 years and above 60 years. Overall, the data showcases a predominant presence of participants within the 30-40 years age group, with relatively smaller but discernible representations from adjacent age brackets, creating a varied yet slightly skewed distribution towards the middle-age range.

Table 2

Table 2 Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	303	94.4	94.4	94.4
	Female	18	5.6	5.6	100
	Total	321	100	100	

Table 2 presents the distribution of respondents based on gender. The majority of participants, constituting 94.4% of the sample, identified as male. In contrast, a smaller proportion, accounting for 5.6% of the total respondents, identified as female. This data indicates a significant gender disparity within the sample, with male participants significantly outnumbering female participants, showcasing a notable gender imbalance in the respondent pool.

Table 3

Table 3 Augmented Reality Enhances Customer Interaction and Involvement in Brand Experiences					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	2.8	2.8	2.8
	Disagree	6	1.9	1.9	4.7
	Neutral	10	3.1	3.1	7.8
	Agree	50	15.6	15.6	23.4
	Strongly Agree	246	76.6	76.6	100
	Total	321	100	100	

The table outlines respondents' perceptions regarding the enhancement of customer interaction and involvement in brand experiences through Augmented Reality (AR). A significant majority, comprising 76.6% of the participants, strongly agreed that AR enhances customer interaction and involvement in brand experiences. Additionally, 15.6% expressed agreement with this statement. A smaller proportion held differing opinions, with 3.1% neutral, 1.9% in disagreement, and 2.8% strongly disagreeing that AR contributes to enriching customer interaction and involvement in brand experiences. This data suggests a prevalent positive sentiment among respondents regarding the impact of AR on enhancing customer engagement within brand experiences.

Table 4**Table 4 The Use of Augmented Reality Positively Influences Customer Perceptions of Product/Service Value.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	12	3.7	3.7	3.7
	Disagree	9	2.8	2.8	6.5
	Neutral	3	0.9	0.9	7.5
	Agree	58	18.1	18.1	25.5
	Strongly Agree	239	74.5	74.5	100
	Total	321	100	100	

The table presents respondents' viewpoints on how Augmented Reality (AR) usage influences customer perceptions of product/service value. A significant majority, 74.5%, strongly agreed that AR positively influences customer perceptions of product/service value. Additionally, 18.1% expressed agreement with this statement. A smaller portion held differing opinions, with 3.7% strongly disagreeing, 2.8% in disagreement, and 0.9% neutral regarding AR's impact on customer perceptions of product/service value. This data indicates a prevalent positive belief among respondents regarding the constructive influence of AR on shaping customer perceptions of the value associated with products or services.

Table 5**Table 5 Augmented Reality Experiences Lead to Increased Customer Satisfaction with Brand Engagements.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	12	3.7	3.7	3.7
	Disagree	12	3.7	3.7	7.5
	Neutral	1	0.3	0.3	7.8
	Agree	26	8.1	8.1	15.9
	Strongly Agree	270	84.1	84.1	100
	Total	321	100	100	

In Table 5, respondents' perspectives on whether Augmented Reality (AR) experiences contribute to increased customer satisfaction with brand engagements are presented. The majority, comprising 84.1%, strongly agreed that AR experiences indeed lead to increased customer satisfaction with brand engagements. Additionally, 8.1% agreed with this statement. A smaller proportion of respondents held divergent views, with 3.7% each in disagreement and strongly disagreeing, while 0.3% remained neutral regarding AR experiences' impact on enhancing customer satisfaction with brand engagements. These findings suggest a prevailing belief among respondents that AR experiences significantly contribute to heightened customer satisfaction within brand engagements.

Table 6**Table 6 Customers Find Augmented Reality Applications Effective in Capturing Their Attention and Interest.**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	22	6.9	6.9	6.9
	Disagree	3	0.9	0.9	7.8
	Neutral	2	0.6	0.6	8.4
	Agree	50	15.6	15.6	24

Strongly Agree	244	76	76	100
Total	321	100	100	

In Table 6, the data highlights respondents' perceptions regarding the efficacy of Augmented Reality (AR) applications in capturing their attention and interest. A significant majority, constituting 76.0%, strongly agreed that AR applications are indeed effective in capturing their attention and interest. Additionally, 15.6% agreed with this statement. A smaller fraction of respondents, 6.9%, indicated disagreement with this perspective, with 6.9% strongly disagreeing and 0.9% each in disagreement or neutral regarding the effectiveness of AR applications in capturing their attention and interest. These results emphasize a prevalent belief among respondents that AR applications are highly effective in engaging and capturing customer attention and interest.

Table 7

Table 7 Augmented Reality Significantly Contributes to Fostering Long-Term Relationships with Customers					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	3.1	3.1	3.1
	Disagree	12	3.7	3.7	6.9
	Neutral	3	0.9	0.9	7.8
	Agree	27	8.4	8.4	16.2
	Strongly Agree	269	83.8	83.8	100
	Total	321	100	100	

In Table 7, the data depicts respondents' perspectives on the role of Augmented Reality (AR) in fostering long-term relationships with customers. An overwhelming majority, 83.8%, strongly agreed that AR significantly contributes to fostering long-term relationships with customers. Additionally, 8.4% of respondents agreed with this notion. A smaller proportion expressed disagreement or neutrality, with 3.7% disagreeing, 0.9% being neutral, and 3.1% strongly disagreeing with the statement about AR's contribution to fostering long-term relationships with customers. These findings suggest a strong consensus among respondents regarding the positive impact of AR in cultivating enduring relationships with customers.

Table 8

Table 8 Virtual Reality Experiences Deepen Customer Immersion in Brand Narratives and Offerings					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	2.8	2.8	2.8
	Disagree	4	1.2	1.2	4
	Neutral	21	6.5	6.5	10.6
	Agree	71	22.1	22.1	32.7
	Strongly Agree	216	67.3	67.3	100
	Total	321	100	100	

Table 8 reveals respondents' perceptions regarding Virtual Reality's (VR) impact on deepening customer immersion in brand narratives and offerings. A majority, accounting for 67.3%, strongly agreed that VR experiences significantly deepen customer immersion in brand narratives and offerings. Additionally, 22.1%

of respondents agreed with this notion. A smaller proportion expressed neutrality, with 6.5% marking a neutral response. There were minimal levels of disagreement, where 1.2% disagreed, and 2.8% strongly disagreed with the statement concerning VR's role in enhancing customer immersion in brand narratives and offerings. These findings indicate a predominantly positive inclination among respondents toward VR's ability to deepen customer immersion in brand experiences and narratives.

Table 9

Table 9 Virtual Reality Usage Positively Impacts Customers' Emotional Connection to Products/Services.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	3.1	3.1	3.1
	Disagree	7	2.2	2.2	5.3
	Neutral	8	2.5	2.5	7.8
	Agree	31	9.7	9.7	17.4
	Strongly Agree	265	82.6	82.6	100
	Total	321	100	100	

In Table 9, the responses depict the perceptions of respondents regarding the impact of Virtual Reality (VR) usage on customers' emotional connections to products or services. An overwhelming majority of respondents, constituting 82.6%, strongly agreed that VR usage indeed positively impacts customers' emotional connection to products or services. Additionally, 9.7% of respondents agreed with this assertion. There were minor percentages of disagreement, with 2.2% disagreeing and 3.1% strongly disagreeing with the statement. A small portion, 2.5%, expressed a neutral viewpoint. These findings collectively underscore a highly favorable inclination among respondents toward the belief that VR usage significantly enhances customers' emotional connection to products or services.

Table 10

Table 10 Virtual Reality Interactions Significantly Enhance Customers' Understanding of Brand Offerings					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	3.4	3.4	3.4
	Disagree	21	6.5	6.5	10
	Neutral	6	1.9	1.9	11.8
	Agree	89	27.7	27.7	39.6
	Strongly Agree	194	60.4	60.4	100
	Total	321	100	100	

Table 10 represents the perceptions of respondents regarding the impact of Virtual Reality (VR) interactions on enhancing customers' understanding of brand offerings. The majority of respondents, comprising 60.4%, strongly agreed that VR interactions significantly enhance customers' understanding of brand offerings. Additionally, 27.7% of respondents agreed with this assertion. A smaller proportion of respondents expressed disagreement, with 6.5% disagreeing and 3.4% strongly disagreeing with the statement. A nominal 1.9% took a neutral stance on this matter. Overall, these findings highlight a prevalent belief among the majority of respondents that VR interactions play a significant role in improving customers' comprehension of brand offerings.

Table 11

Table 11 Customers Perceive Virtual Reality Experiences as Valuable and engaging in their purchase journey					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	2.2	2.2	2.2
	Disagree	6	1.9	1.9	4
	Neutral	4	1.2	1.2	5.3
	Agree	62	19.3	19.3	24.6
	Strongly Agree	242	75.4	75.4	100
	Total	321	100	100	

Table 11 illustrates the perspectives of respondents on the perceived value and engagement of Virtual Reality (VR) experiences in their purchase journey. The data showcases a strong inclination among respondents towards perceiving VR experiences as valuable and engaging in their purchase journey. A significant majority, constituting 75.4% of respondents, strongly agreed that VR experiences hold substantial value and engagement in their purchase journey. Additionally, 19.3% of respondents agreed with this sentiment. A minimal proportion expressed disagreement, with 1.9% disagreeing and 2.2% strongly disagreeing with the notion. A negligible 1.2% of respondents adopted a neutral standpoint. Overall, these findings underscore a prevalent belief among respondents regarding the valuable and engaging nature of VR experiences within their purchase journey.

Table 12

Table 12 Virtual Reality Usage Substantially Increases Customers' Inclination to Explore Brand Offerings Further					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	3.4	3.4	3.4
	Disagree	10	3.1	3.1	6.5
	Neutral	7	2.2	2.2	8.7
	Agree	28	8.7	8.7	17.4
	Strongly Agree	265	82.6	82.6	100
	Total	321	100	100	

Table 12 outlines respondents' perceptions concerning the impact of Virtual Reality (VR) usage on their inclination to explore brand offerings further. The data indicates a prevailing consensus among respondents, with an overwhelming 82.6% strongly agreeing that VR usage substantially increases their inclination to explore brand offerings further. Additionally, 8.7% of respondents agreed with this sentiment. A smaller proportion expressed dissent, with 3.1% disagreeing and 3.4% strongly disagreeing with the notion. A minimal 2.2% adopted a neutral standpoint. These findings highlight a widespread belief among respondents regarding the influential role of VR usage in stimulating their curiosity and inclination to delve deeper into brand offerings.

- **H1:** Augmented Reality plays a significant role in Customer Engagement.

Table 13

Table 13 One-Sample Test				
Test Value = 3				
t	df	Sig. (2-tailed)	Mean Difference	95% Confidence

						Interval of the Difference	
						Lower	Upper
Augmented Reality enhances customer interaction and involvement in brand experiences.	33.378	320	.000	1.61371		1.5186	1.7088
The use of Augmented Reality positively influences customer perceptions of product/service value.	29.864	320	.000	1.56698		1.4637	1.6702
Augmented Reality experiences lead to increased customer satisfaction with brand engagements.	31.025	320	.000	1.65109		1.5464	1.7558
Customers find Augmented Reality applications effective in capturing their attention and interest.	25.626	320	.000	1.5296		1.4122	1.6470
Augmented Reality significantly contributes to fostering long-term relationships with customers.	32.388	320	.000	1.66044		1.5596	1.7613

The conducted one-sample test focused on assessing the significance of Augmented Reality (AR) in customer engagement across various dimensions. In relation to the hypothesis (H1) stating the significant role of AR in customer engagement, the test results consistently and strongly support this assertion across multiple statements. Firstly, regarding the enhancement of customer interaction and involvement in brand experiences through AR, the test indicated a significant mean difference (MD) of 1.61 ($p < .001$, 95% CI [1.52, 1.71]), affirming that AR indeed contributes positively to engaging customers in brand experiences. Similarly, the influence of AR on customer perceptions of product/service value showed a substantial mean difference of 1.57 ($p < .001$, 95% CI [1.46, 1.67]), indicating that AR notably impacts how customers perceive the value of products/services. Furthermore, AR's effect on customer satisfaction with brand engagements exhibited a substantial mean difference of 1.65 ($p < .001$, 95% CI [1.55, 1.76]), emphasizing its role in enhancing satisfaction levels among customers interacting with brands through AR. The analysis also highlighted the efficacy of AR applications in capturing customer attention and interest, with a significant mean difference of 1.53 ($p < .001$, 95% CI [1.41, 1.65]), showcasing AR's ability to engage and captivate customer interest effectively. Lastly, AR's contribution to fostering long-term relationships with customers showed a substantial mean difference of 1.66 ($p < .001$, 95% CI [1.56, 1.76]), signifying its pivotal role in nurturing enduring relationships between brands and customers. Collectively, these findings unequivocally support the hypothesis (H1) that Augmented Reality plays a significant and multifaceted role in fostering customer engagement across diverse dimensions, emphasizing its substantial impact on customer experiences and relationships with brands.

- **H2:** Virtual Reality plays a significant role in Customer Engagement.

Table 14

Table 14 One-Sample Test						
Test Value = 3						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Virtual Reality experiences deepen customer immersion in brand narratives and offerings.	30.119	320	.000	1.49844	1.4006	1.5963
Virtual Reality usage positively impacts customers' emotional connection to products/services.	33.743	320	.000	1.66355	1.5666	1.7605
Virtual Reality interactions significantly enhance customers' understanding of brand offerings.	23.39	320	.000	1.35202	1.2383	1.4657
Customers perceive Virtual Reality experiences as valuable and engaging in their purchase journey.	36.944	320	.000	1.63863	1.5514	1.7259
Virtual Reality usage substantially increases customers' inclination to explore brand offerings further.	31.381	320	.000	1.63863	1.5359	1.7414

In exploring the significance of Virtual Reality (VR) in customer engagement as per hypothesis H2, the one-sample test outcomes consistently demonstrate a substantial and positive impact across various dimensions of customer engagement. The results indicate that VR experiences significantly deepen customer immersion in brand narratives and offerings, showing a substantial mean difference of 1.50 ($p < .001$, 95% CI [1.40, 1.60]). This underscores VR's pivotal role in intensifying customer immersion within brand narratives, augmenting their engagement. Moreover, VR usage notably enhances customers' emotional connection to products/services, exhibiting a substantial mean difference of 1.66 ($p < .001$, 95% CI [1.57, 1.76]). This underscores VR's capability to evoke and strengthen emotional connections, thereby contributing significantly to customer engagement. Additionally, VR interactions substantially enhance customers' understanding of brand offerings, demonstrating a considerable mean difference of 1.35 ($p < .001$, 95% CI [1.24, 1.47]). This emphasizes how VR facilitates a deeper understanding of brand offerings, enhancing customer engagement through improved comprehension. Furthermore, customers perceive VR experiences as valuable and engaging in their purchase journey, with a substantial mean difference of 1.64 ($p < .001$, 95% CI [1.55, 1.73]). This highlights the perceived value and engagement VR brings to customers during their purchase journey, significantly contributing to their engagement levels. Lastly, VR usage substantially increases customers' inclination to explore brand offerings further, displaying a significant mean difference of 1.64 ($p < .001$, 95% CI [1.54, 1.74]). This signifies VR's ability to incite customers' curiosity and interest in exploring brand offerings more extensively.

Overall, the findings strongly support hypothesis H2, indicating that Virtual Reality indeed plays a substantial and multi-faceted role in enhancing customer engagement across diverse dimensions, underscoring its influential role in shaping customer experiences and interactions with brands.

7. FINDINGS

The findings of this research accentuate the pivotal role played by Augmented Reality (AR) and Virtual Reality (VR) in bolstering customer engagement across multifaceted touchpoints with brands. Augmented Reality emerges as a transformative tool, significantly enhancing customer interaction and involvement in brand experiences. The study unveils that AR applications profoundly impact customer perceptions of product/service value, leading to an increased level of satisfaction with brand engagements. Notably, AR applications prove highly effective in capturing customer attention and interest, laying the foundation for fostering enduring relationships between customers and brands. These results highlight AR's potential to revolutionize customer experiences by providing engaging and valuable interactions, fostering a deeper connection with brands.

Similarly, Virtual Reality surfaces as a catalyst for immersive customer engagement, amplifying immersion in brand narratives and offerings. The findings underscore the profound impact of VR on enhancing emotional connections to products/services, reshaping customer understanding of brand offerings. Virtual Reality experiences are perceived as valuable and engaging along the customer purchase journey, significantly augmenting customers' inclination to explore brand offerings further. This substantial influence of VR on various facets of customer engagement delineates its role in not just enriching experiences but also in fueling deeper connections between customers and brands, paving the way for more immersive interactions.

In essence, both Augmented Reality and Virtual Reality technologies exhibit substantial potential in reshaping the landscape of customer-brand engagements. These findings collectively illuminate the transformative power of AR and VR, showcasing their ability to create enriched, interactive, and emotionally resonant experiences. The comprehensive impact witnessed across diverse dimensions of customer engagement positions AR and VR as pivotal tools for brands aiming to create lasting impressions and foster profound connections with their audience in today's dynamic marketplace.

8. CONCLUSION

The conclusions drawn from this research underscore the indispensable role of Augmented Reality (AR) and Virtual Reality (VR) in reshaping customer engagement strategies. AR and VR technologies have emerged as potent tools for brands seeking to create immersive, interactive, and emotionally resonant experiences for their customers. The study's findings substantiate the significant influence of AR and VR on enhancing customer perceptions, interactions, and satisfaction across various touchpoints. Consequently, it's evident that integrating these technologies strategically can revolutionize how brands engage and connect with their audience, fostering deeper relationships and augmenting customer loyalty.

The implications of these findings reverberate across diverse sectors, suggesting profound strategic implications for businesses. Leveraging AR and VR technologies can lead to enhanced customer experiences, thereby driving

competitive advantages for brands in today's dynamic market landscape. Brands that adeptly integrate these immersive technologies into their marketing strategies stand to benefit from increased customer engagement, heightened brand loyalty, and potentially improved sales. Additionally, these findings underscore the importance of investing in AR and VR capabilities, encouraging organizations to prioritize technological advancements to stay relevant and competitive in an increasingly digital and experiential marketplace.

Future research endeavors in this domain can explore several promising avenues. Further studies could delve into the nuanced impact of AR and VR on specific industry verticals, uncovering sector-specific strategies and best practices. Moreover, investigating the long-term effects of prolonged exposure to AR and VR experiences on customer behavior and brand loyalty could offer invaluable insights. Additionally, exploring the integration of AI and other emerging technologies with AR and VR to enhance customer engagement merits attention. Continued research in this field holds the promise of uncovering innovative approaches to leveraging immersive technologies, thus enriching customer-brand interactions and shaping the future of marketing practices.

CONFLICT OF INTERESTS

None.

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