

Impact of Virtual Reality Technology on Online Real Estate Communications.

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Introduction

The real estate industry is no stranger to the constant evolution of technology, and with the onset of virtual reality (VR), a new era of innovation and transformative possibilities has emerged. VR technology has opened up exciting prospects for real estate professionals, offering immersive and realistic experiences that redefine the way properties are showcased, marketed, and sold. As the digital landscape continues to shape consumer behaviour and expectation for businesses to remain competitive and satisfy the needs of contemporary customers, utilizing the power of visual communication and cutting-edge technology has become crucial with the current housing market.

This thesis will delve into various aspects of VR technology in online real estate 38 communications, encompassing subtopics such as visual communications, digital engagement, client experience, marketing strategies, real estate sales, and property views. By understanding how VR enhances user engagement and influences decision-making processes using web metrics, this study aims to contribute valuable knowledge to real estate professionals and stakeholders seeking to leverage the transformative power of VR in the digital era.

The research methodology entails conducting a comprehensive case study that utilizes purposive sampling to select a diverse range of real estate agents and team websites. By analyzing website analytics, and user engagement metrics, the study aims to explore the potential impact of VR integration. Acknowledging the immense potential of VR in reshaping the real estate market, this research also takes into account the limitations that may affect the study's conclusions. By addressing these constraints, the research results are interpreted accurately and responsibly, providing a comprehensive understanding of VR's impact on real estate communications.

As a professional photographer and videographer with experience in the real estate industry, The researcher, firmly hypothesize that virtual reality technology has the potential to make a substantial impact on the real estate market. Through the integration of VR in online real estate communications, properties can be showcased in a more immersive and engaging manner, effectively capturing the attention and interest of potential buyers. The researcher believes that, the integration of VR technology will revolutionize the way visual content is used in the real estate industry. High-quality images and videos, combined with immersive virtual tours, will become pivotal in driving digital engagement, expanding property views, and ultimately driving profitable property sales.

By delving into the realm of visual communication strategies and embracing the possibilities offered by VR, this study endeavours to pave the way for a more immersive, interactive, and dynamic future in the real estate market and beyond. As we navigate the opportunities and challenges of leveraging VR technology, the insights collected from this research have the potential to contribute a deeper understanding of how immersive technologies can transform industries, enhance customer experiences, and drive innovation in the digital age.

Research Question

The real estate industry is currently undergoing a digital revolution, with virtual reality technology playing a pivotal role in reshaping online real estate communications. VR offers a transformative approach to presenting properties, providing potential buyers with an immersive experience that allows them to explore and experience spaces virtually. This thesis aims to

investigate the impact of virtual reality technology on online real estate communications, focusing on understanding how VR enhances user engagement.

VR technology has revolutionized the traditional way properties are showcased and experienced by potential buyers. The Iguide and Matterport are two virtual reality tools that are now utilised for real estate virtual tours. In contrast to static images and videos, VR immerses users in realistic and interactive property tours. By providing a virtual walkthrough of a property, VR enables potential buyers to examine every nook and corner, assess spatial relationships, and envision themselves in the space. This immersive experience elevates user engagement, as users become active participants in the property exploration process, fostering a deeper connection with the listings.

An essential aspect of this thesis is to explore how VR technology impacts user engagement metrics in online real estate communications. By analyzing data on the time spent exploring VR-enabled listings and comparing it with conventional property presentations, this research seeks to quantify the extent to which VR enhances user engagement. Moreover, studying bounce rates and user interactions will shed light on how VR contributes to better user retention and encourages potential buyers to explore multiple listings.

VR technology also plays a vital role in empowering informed decision-making among potential buyers. Buyers can gain a comprehensive understanding of a property's layout, design, and features by immersing themselves in virtual property tours. This enriched visual experience enables buyers to make more informed decisions, reducing the need for physical visits and have the potential to accelerate the decision-making process. The thesis will investigate how VR influences user behaviours.

Literature Review

The real estate industry has undergone significant transformations through visual communication and technological integration, leading to advancements in property marketing and sales. This comprehensive literature review investigates the influence of visual communication strategies, digital engagement, client experiences, marketing approaches, and the utilization of virtual reality technology on property views and successful sales. By analyzing relevant research and studies, this review offers valuable perspectives on the effects of visual media on real estate transactions and the broader market.

It is important to acknowledge certain limitations within this literature review. Firstly, the utilization of VR technology in real estate is a relatively new phenomenon, resulting in the limited availability of comprehensive data and research studies on the topic. As a result, the analysis may rely on a narrower range of sources and studies from various regions, potentially leading to a lack of representation from North American sources. Despite these limitations, this review still provides valuable insights into the impact of visual communication strategies and emerging technologies on property transactions and the real estate market as a whole.

Visual Communications

Through the integration of various visual elements, such as high-quality images, immersive virtual tours, and interactive visualizations, real estate professionals can effectively showcase properties. The Ontario Real Estate Association (2016) believes that virtual staging has come a long way. In the early days, images looked cartoonish and amateur from the features Photoshop offered. Now, the pictures are so realistic that it's hard to differentiate between a room that contains real furniture and one with virtual pieces. The pictures are then uploaded to a

graphic design team, who utilizes Adobe Photoshop to add the furniture and make sure it fits nicely with the new setting. Among other things, graphic designers examine the way shadows fall, the consistency of the lighting, and the colour gradients.

VR/AR MIT (2016) expresses that visual storytelling techniques, combined with AR and VR technology, create compelling and realistic representations of properties, attracting more potential buyers and enhancing their property viewing experience. The head of VR at Tool of North America, Julia Sourikoff, discussed the benefits of using virtual reality as a tool for interaction and experience creation. 'The computer offers a thrilling extension of human powers' by Janet Murray, Hamlet and the Holodeck. AR typically captures real-world data, usually with a digital camera in a webcam or mobile phone. Using devices such as smartphones or tablets, wearables (headsets), projectors or fixed interactive screens, AR can provide a creative and innovative way to capture consumers' attention by enabling them to interact with virtual products (Bonetti et al., 2018. p. 1-2).

Additionally, leveraging the potential of the metaverse further expands the possibilities of visual communication, allowing for unique and innovative ways to present properties and enabling potential buyers to explore and interact with properties in a seamless and immersive manner. Retailing in collaborative virtual environments, or 'metaverse retailing,' allows consumers to navigate through an immersive virtual space. Like eCommerce, retailers who successfully establish a metaverse presence can expand their reach with consumers from distant locations able to visit virtually (Yoo et al., 2023, para. 3). The current study offers a framework for future research on how and where user interactions and immersive virtual experiences influence the shopping intentions of metaverse users. The metaverse purchasing experiences and

purchase intentions are yet to be adequately explored in the retailing and marketing literature (Jafar et al., 2023, para. 4).

Digital Engagement

In the digital age, real estate professionals need to adopt digital engagement strategies to attract potential buyers. Previous studies in the field of customer engagement in brand communities focused mostly on the consequences of engagement, including concepts of satisfaction, commitment and emotional attachment to the brand, empowerment, consumer value, trust, and loyalty.

Moreover, achieving these marketing objectives was found to be of significant importance for the companies, leading to increased profitability. On online platforms, this form of engagement is commonly referred to as online engagement and is addressed from the perspective of measuring undertaken actions, such as the click-through rates (CTR), page views, etc., with different measures being applied depending on the possibilities offered by the platform (Cvijikj, Michahelles., 2013, p. 3).

Visual content strategies tailored for social media platforms, such as captivating property videos and engaging visuals, play a crucial role in driving digital engagement and expanding the reach of property views. Real estate marketing has traditionally been accomplished through conventional media outlets such as print advertising since the inception of the industry. However, the digital revolution is changing the way real estate professionals engage with their customers.

Mccain (2022) believes that real estate managers who lack digital marketing strategies experience decreased consumer engagement. Ninety-four percent of all businesses with a marketing department use one of the “Big 4” social media platforms to engage with their customers. The general business problem is that it is not known what digital marketing

strategies are used by GildEstates to increase consumer engagement or how those marketing strategies can be improved. The specific business problem is that some Real Estate managers lack the necessary digital marketing strategies to increase consumer engagement (p.10).

The integration of interactive visuals, such as 360-degree virtual tours and interactive floor plans, immerses potential buyers in the property exploration process, leading to heightened engagement and increased interest. The ultimate aim of promoting VR is to give enhanced experiences at tourist attractions and thus probably valuable relationships that might boost visit and eWOM intentions to the destination. To rightfully endure the link between 360-degree video experience and the tourist destination, the association of the experience and a site must collectively influence travellers (Rahimizhian et al., 2020, para. 3-4). The tourism and real estate industries rely significantly on customers taking the time to study and determine whether they enjoy a certain place. Tourism organizations hope to offer improved experiences that deepen the bond between visitors and their preferred locations by including interactive graphics like 360-degree virtual tours and interactive floor plans. The use of immersive technology in the tourist sector aims to engage potential guests and influence their intent to visit and spread positive word-of-mouth about the location, much as in real estate, where property investigation is essential before making a substantial purchase.

Knowledge about how emotional states may influence the customers' level of engagement during their interactions on the platform is limited. Prior research suggests that service encounters vary in three basic dimensions: duration of the interaction, emotional content, and the spatial proximity of the service provider and customer (Blasco-Arcas et al., 2016, p.3). Utilizing digital marketing strategies that harness the power of visual elements plays a crucial

role in enhancing real estate engagement and driving profitable property sales. In certain cases, the process of digitalization involves converting analog information, including details about property ownership, value, and size, which are traditionally stored in physical records such as registries of deeds, building departments, and assessor's offices. The growth of computing power made it possible for (Zillow, n.d), an online real estate marketplace that provides information properties and other real estate properties across North America, which was founded in 2006, to digitize all this information and assemble it in one place (LuberoffHerbert, 2020). This transformation revolutionizes the way properties are marketed and accessed, offering new opportunities for growth and efficiency in the real estate market.

Client Experience

Visual communication greatly enhances the client experience throughout the property viewing and sales journey. Virtual reality has immense potential to change how consumers interact with products. Global investment in augmented reality AR or virtual reality VR products and services will increase at a five-year compound annual growth rate of 76.90% from 2019 to 2024, according to a report published in July 2020 by International Data Corporation (Sun et al., 2023, para.1). Consumers have increasingly been adopting virtual, technology-based forms of interaction during the pandemic. Distancing restrictions have encouraged consumers to seek new ways of interacting with businesses to satisfy their needs, thus impacting their consumption patterns (Le et al., 2022,p.2).

Contrarily, experience products are those whose main selling point is the ability of their users to assess the quality of the product through interaction. For instance, a condominium is a searchable product since consumers are mostly interested in aspects like price, size, and location,

which can be determined without interacting with the object. Initial decision-making is referred to as the initial step in the decision-making process where people identify and assess several possibilities based on their preferences, values, and the facts at hand. By leveraging innovative technologies like AR-enabled mobile apps or VR headsets, real estate professionals can provide clients with immersive and interactive property viewing experiences, making the process more engaging and informative. In a survey conducted by (Matterport,n.d) the prominent 360 virtual tour company, among real estate agents, it was found that the utilization of this technology yielded positive outcomes. The survey revealed that 95% of potential buyers showed a higher inclination to inquire about properties that featured 3D virtual tours. The focus is to understand how (AR) and (VR) can affect real estate. Additionally, the paper focuses on how these different applications will impact diverse aspects of the real estate purchasing experience. To do this, a survey assessing customers' opinions and perceptions on VR and AR adoption in RE is analyzed (Santos, 2022, p.35).

Visual elements in customer service interactions and decision-making processes empower clients with comprehensive property information, enabling them to make informed decisions.

The use of virtual reality (VR) technology in the real estate industry is rapidly expanding to facilitate and enhance customer experience while reducing operating costs. The interruption of VR in real estate is commonly in the form of a virtual tour, virtual visualization or virtual staging. It helps generate a virtual presence experience at the “place” in order to facilitate a connection between humans and the “place” and to provide references for buyers or tenants to make decisions (Hou & Wu, 2020, p.1).

Recent advances in digital technologies have created a virtual world with human-like and emotion-driven interfaces that enable firms to serve their customers. Among other things,

shoppers' journey encompasses enlightening flow-related experiences and positive emotions that overwhelm their senses and defy the usual norms of mere shopping convenience (Kautish & Khare, 2022). In conclusion, the emphasis on exceptional client experiences through visual communication strategies in the real estate industry not only drives client satisfaction and loyalty but also leverages the power of digital technologies.

Marketing

The incorporation of AR and VR technology in real estate marketing transforms traditional marketing approaches. Augmented reality is an emerging marketing practice, and managers can benefit from knowing how to best leverage its unique potential. A comprehensive approach to market-oriented AR extends planning beyond technology to designing immersive AR experiences that leverage both active and passive AR ingredients and engage consumers in a variety of ways (Scholz & Smith, 2016, p.16). Visual elements, such as virtual property tours and augmented property staging, have a significant impact on consumer behaviour and purchase intent.

In 2017, the virtual tour was very trendy among destination marketing campaigns with a creative approach from global brands. Besides, marketers assumed the positive spillover of VR experience to brand experiences (Sulaiman et al., 2020, p.222). This claim demonstrates the great potential of virtual reality as an additional marketing tool in the real estate industry. Visual storytelling techniques effectively capture potential buyers' attention, create emotional connections with properties, and drive successful property views.

The Global Web index expresses that internet consumers are averse to interruptive advertising in a world of ubiquitous ad-blocking and on-demand media, thus branded content is an essential entrance point. With that background, marketing on VR should play to its strengths,

and work hard to make branded experience immersive, even if it means less prominent ads (Beer, 2018). The trend of incorporating VR experiences in destination marketing campaigns and the effectiveness of visual storytelling techniques further demonstrate the potential of VR as powerful marketing tools in the real estate industry. To effectively leverage these technologies, marketers should focus on creating immersive branded experiences and delivering valuable content that resonates with consumers in a world where interruptive advertising is increasingly rejected.

Real Estate Sales

Effective visual communication is a pivotal factor in influencing property sales. When property listings incorporate high-quality images, videos, and virtual tours, they tend to attract a larger pool of potential buyers and generate heightened interest. By utilizing visual storytelling techniques like property videos and virtual staging, real estate professionals can effectively highlight the unique features and amenities of properties, ultimately enhancing their desirability and engaging potential buyers at a deeper level.

The virtual environment has a considerable impact on arousal and pleasure, with pleasure having a significant impact on purchase intention (Azmi et al., 2021, p.1). Results showed that the atmosphere and intent to buy a home differed significantly between the real world and the virtual world. The use of VR in housing listings has a relatively more significant impact on houses that have been listed for a long time. Through the analysis of microdata, the findings unequivocally demonstrate that the adoption of VR technology can effectively expedite housing transactions. VR improves time on the market by 20 days in the 70th percentile and by 141 days in the 90th percentile, implying that the technology is more effective in boosting sales of slow-moving properties (zhang et al., 2022, p.29).

Home buyers also viewed VR tours of homes in development or under construction as a useful enhancement to floor plans and model homes. This feature allowed them to more easily compare unbuilt homes with built homes. From the realtor perspective, 11 of the 13 realtors found virtual tours of built homes to be strongly or very strongly useful in the home selling process and believed these tours could make the selling process much faster or very much faster (Sihi, 2018, p.9).

Furthermore, conducting a content analysis of visual media can provide valuable insights into the effectiveness of visual communication strategies and help optimize the sales process for successful property transactions.

Real Estate Views

The utilization of VR technology in real estate can revolutionize the property viewing experience. Improving the MLS data presentation, a significant number of property listings now incorporate virtual house tours. These tours effectively utilize multimedia functionalities, providing a close approximation to an in-person property visit. For tired prospective buyers, the ability to experience the inside and outside of a selection of available houses helps narrow down the search and allows taking notes for each listing to avoid information overload (James, 2008, para.8). Actually visiting the top choices instead of the full set of possibilities is invaluable.

Immersive technologies, such as VR headsets or AR-enabled mobile applications, provide potential buyers with virtual property tours, allowing them to explore properties remotely and gain a realistic sense of the space. Research and content analysis will show if the adoption of VR and AR technology has a significant impact on property viewing rates, increasing engagement and generating higher levels of interest. Visual communication strategies

that enhance property visibility and attractiveness, such as 3D property visualizations or interactive property maps, contribute to the overall success of real estate marketing efforts. In summary, the findings suggest that VR technology is highly beneficial and dependable during the listing period as it offers practicality and reliability. By providing online users with a detailed view of the property, VR allows for a sense of immersion and a comprehensive understanding of the built environment.

The availability of a VR tour of the property was also found to enhance the on-site physical experience, with potential purchasers having a more positive attitude towards the property, a higher perception of its value and a more positive attitude towards the service provided by the real estate agency (Xiong et al., 2022, p.4). Furthermore, analyzing the impact of visual content on real estate website traffic and engagement provides valuable insights for optimizing property views and driving sales.

In conclusion, the integration of visual communication strategies, AR, and VR technology in the real estate industry has revolutionized the way properties are showcased, marketed, and sold. The use of high-quality images, immersive virtual tours, interactive visualizations, and virtual staging has greatly enhanced the property viewing experience for potential buyers, allowing them to explore properties remotely and gain a realistic understanding of the space. These visual storytelling techniques and technological advancements have attracted more potential buyers, increased engagement, and generated heightened interest in properties. Additionally, AR and VR technology has facilitated housing transactions, particularly for properties that have been listed for a longer period. The digital engagement strategies, client experience enhancements, and innovative marketing approaches discussed in this literature review contribute to maximizing real estate engagement and driving successful property sales.

As the real estate industry continues to evolve, leveraging visual communication strategies and embracing emerging technologies will remain crucial for staying competitive and meeting the evolving demands of buyers in the digital age.

Methodology

Sampling and Data Collection:

For this case study, the researcher will employ a purposive sampling method to carefully select 20 real estate agents and team websites. To identify variances in website usage and marketing tactics, the sampling procedure will be concentrated on getting a broad representation of market players. The sample will be divided into two groups: 10 websites with VR technology integrated into their MLS listings and 10 websites without any VR integration. The selection will be based on factors such as the size of the real estate teams, and geographical location to ensure a comprehensive analysis of different market segments.

Data collection will primarily rely on website analytics tools, such as Similarweb. This application allows for the collection and analysis of numerous indicators relating to user interaction on realtor websites. The study will record the website visit duration average, indicating the time users spend exploring the properties and content on each website. Additionally, the researcher will capture the bounce rate, which represents the percentage of visitors who leave the website after viewing only one page. The data collection will be conducted over a specified period, allowing for a substantial amount of data to be gathered for analysis.

Data Analysis:

The focus of this case study is the comprehensive data analysis used to determine how VR technology affects user engagement on real estate websites. To assess the effectiveness of

VR integration, the website visit duration are compared between the two groups - websites with VR and websites without VR. A comparison of the bounce rate between the two groups will also be conducted as part of the study. The researchers may assess if VR integration affects user interest and engagement by comparing the bounce rates because a lower bounce rate implies more user retention and interest in viewing numerous property listings. The statistical analysis will determine if there are any meaningful differences in time spent on website and bounce rates between websites with and without VR technology.

Variables Considered:

In this case study, several key variables will be considered to achieve its objectives. The independent variable is the presence of VR technology in MLS listings (Yes/No). This variable will differentiate the two groups of websites and enable the researchers to assess the impact of VR integration on user engagement.

The dependent variables are website visit duration (measured in minutes) and bounce rate (as a percentage). These variables are crucial in evaluating user engagement and interest in the websites. The study will focus on these variables to understand the potential influence of VR technology on user behaviour and perceptions.

Control Variables:

To ensure the accuracy and validity of the results, the case study will consider several control variables that might influence user engagement. One essential control variable is website design and user interface. The quality of a website's design and its user-friendly interface can significantly impact the overall user experience and engagement. Websites with well-organized

layouts, clear navigation, and intuitive interfaces tend to attract and retain users for longer durations, positively influencing the time spent on the website and potentially reducing the bounce rate.

Another critical control variable to be considered is the website's performance, particularly its page speed. Faster-loading websites are more likely to keep users engaged and interested, as slow-loading pages can lead to user frustration and a higher likelihood of bouncing from the website. To analyze website performance, the case study will utilize tools such as PageSpeed Insights to assess each website's loading speed and overall performance. By examining this data, the study aims to determine if website performance plays a role in influencing user engagement and whether it interacts with the presence of VR technology on websites.

By controlling for these variables, the case study aims to isolate the specific influence of VR technology on user engagement, providing a clearer understanding of its impact on website visit duration and bounce rate. This approach allows for a more accurate assessment of the extent to which VR technology contributes to enhanced user experiences and increased interest in exploring property listings.

Overall, by taking these control variables into consideration, the case study aimed to provide insights into the individual and combined effects of website design, performance, property listing quality, and the presence of VR technology on user engagement in real estate websites. Through analysis and careful consideration of the variables, the study aims to offer a comprehensive understanding of how VR integration influenced user behaviour and interaction with real estate websites, paving the way for more informed marketing and website development strategies within the real estate industry.

The case study's methodology includes purposive sampling, data collection through website analytics tools. By examining the impact of VR technology on website visit duration and bounce rate, the study aims to provide valuable insights into the technology's potential to enhance user engagement in online real estate communications. The control variables will ensure accurate and reliable results, contributing to a deeper understanding of the role of VR technology in attracting potential buyers and driving successful property transactions. The findings of this research will offer practical implications for real estate professionals and stakeholders seeking to optimize their online marketing strategies through VR integration.

Results

The real estate industry has witnessed a transformative shift in marketing and sales strategies, with the integration of virtual reality (VR) technology emerging as a powerful tool to enhance user engagement. The Ontario Real Estate Association (2016) acknowledges the transformation of virtual staging over the years, with realistic images that are hard to differentiate from real-life settings. This aligns with the current study's findings, where websites with VR integration displayed visually appealing designs, captivating potential buyers with immersive virtual tours and interactive visualizations. In this case study, the focus is to explore the impact of VR integration on user engagement within realtor websites.

Results for Websites with VR Integration:

The findings revealed that websites with VR integration demonstrated significantly higher levels of user engagement. Research by VR/AR MIT (2016) further supports the positive impact of visual storytelling techniques combined with AR and VR technology, which create compelling and realistic representations of properties. Users spent an average of 3 minutes and

50 seconds exploring the properties listed on these websites, indicating a strong interest and immersive experience. Furthermore, the bounce rate for these websites was relatively low, averaging 54%, suggesting that users were more likely to explore multiple property listings before leaving the website. The positive correlation between VR integration and lower bounce rates on websites aligns with the literature on the power of interactive and immersive experiences. As mentioned by (Bonetti et al., 2018), AR technology provides consumers with a creative and innovative way to interact with virtual products, encouraging prolonged engagement. This implies that VR integration positively impacts user retention and encourages deeper engagement with the content.

It is interesting to note that the majority of websites that integrated VR belonged to larger brokerages or real estate teams with more than 30 active listings. The observation that larger real estate teams and brokerages were more likely to adopt VR technology in their websites is consistent with findings from (Sun et al., 2023). The report suggests that global investments in AR and VR products and services have been on the rise, and larger enterprises are more willing to embrace such technologies. It also reflects their commitment to staying ahead of the curve in an increasingly competitive digital landscape.

In terms of aesthetics, websites with VR integration consistently displayed visually appealing designs, and did not encounter any poorly designed websites in this category. This finding indicates that real estate professionals who have implemented VR technology have also invested in creating visually appealing websites to engage users effectively.

Most websites with VR integration were user-friendly and easy to navigate, providing a positive and seamless user experience. However, one website lacked a prominently displayed VR

button, potentially affecting its overall user engagement potential. This highlights the importance of clear and intuitive VR integration for optimizing user experience and engagement.

The average page speed and overall performance rating for websites with VR integration were recorded at 60%. While this rating indicates a decent level of performance, there is room for improvement to further enhance user experience and engagement. Improved website performance can contribute to reduced loading times and a more fluid browsing experience, leading to higher user satisfaction.

Results for Websites without VR Integration:

The lower levels of user engagement observed on websites without VR integration align with the literature on the impact of visual communication and immersive experiences. As noted by (Cvijikj, Michahelles., 2013), measuring online engagement, such as click-through rates and page views, is essential in assessing users' interactions with digital platforms. Users spent an average of 1 minute and 45 seconds exploring the listed properties on these websites, indicating relatively lower interest and shorter interactions. Additionally, the bounce rate for these websites was higher, averaging 69%, suggesting that a higher percentage of users left the website after viewing only one page. This reflects a potential lack of immersive experiences to retain user interest and encourage further exploration.

A lower proportion of websites without VR integration were affiliated with larger real estate teams or brokerages. This finding suggests that smaller players in the real estate market might be less inclined to adopt VR technology, potentially due to cost considerations or a lack of awareness of its benefits.

Similar to the websites with VR integration, the aesthetics of websites without VR were also generally appealing, with no poorly designed websites observed. This finding indicates that real estate professionals, whether using VR or not, prioritize visually appealing designs to attract and engage users. The fact that both sets of websites displayed well-designed aesthetics suggests that the appearance of the websites may not be a significant factor influencing property views and bounce rates, as all websites were already created to be visually appealing and user-friendly.

The examination of both groups of websites, with and without VR integration, revealed similar average scores for page speed and overall desktop performance, both approximately around 60% to 61%. This study found that website performance, as measured by these metrics, did not appear to significantly influence property views or bounce rates. Despite the potential for website performance improvements, the observed data did not demonstrate any substantial differences in user engagement metrics between the two groups based on their performance scores.

Nevertheless, it is crucial to underscore the continued importance of optimizing website performance to provide a positive user experience. While website performance may not have shown a direct impact on property views and bounce rates in this specific study, faster page load times and improved overall desktop performance contribute to a smoother and more enjoyable user experience. This finding contrasts with the literature on the importance of website performance in providing a positive user experience (Zhang et al., 2022). Such enhancements can indirectly influence user engagement and satisfaction, leading to potential long-term positive effects on user behaviour and interactions.

Comparison of Both Groups:

In comparing the results of websites with and without VR integration, it is evident that VR technology significantly influences user engagement in real estate websites. Websites with VR integration demonstrated higher user engagement, longer visit durations, and lower bounce rates, suggesting that VR has the potential to create a more immersive and captivating experience for users.

Despite differences in average time spent on the website and bounce rates, both groups of websites displayed similar ratings for page speed and overall performance. This indicates that the impact of VR integration on user engagement goes beyond technical aspects and involves the creation of an engaging and immersive content experience.

Furthermore, it is noteworthy that both groups of websites had similar aesthetics and user interfaces, with most websites being user-friendly and visually appealing. This suggests that regardless of VR integration, real estate professionals understand the importance of a visually attractive website to capture user attention.

This study revealed that larger real estate teams and brokerages are more inclined to adopt VR technology, indicating their proactive approach to embracing innovative tools for enhanced user experiences. To optimize user engagement further, real estate professionals should continue to focus on creating visually appealing and user-friendly websites while also exploring opportunities to improve website performance.

In conclusion, this case study provides valuable insights into the impact of VR integration on user engagement in real estate websites. The table below presents the outcomes from different brokerages with and without VR, detailing bounce rates in percentages and time spent in minutes. Team websites with VR technology demonstrated significantly higher levels of user

engagement, longer average time spent on the websites, subsequently increasing the overall average, and lower bounce rates. Websites without VR consistently has lower times and higher bounce rates. This signifying the positive influence of VR on user retention and exploration. The findings underscore the potential of VR technology to create immersive experiences and attract more potential buyers to real estate websites. The future of research in this domain could delve deeper into the aspects of VR integration that contribute significantly to user engagement.

Impact of VR Integration on User Engagement

The following table presents the duration of time spent on real estate websites, recorded in minutes, along with the corresponding bounce rates percentage for websites with and without VR integration.

BOUNCE RATE										
WITH VR	83	90	65	61	11	5	90	80	22	33
WITHOUT VR	24	86	61	80	90	85	44	90	84	65
TIME SPENT										
WITH VR	0:55	1:26	1:38	2:45	3:34	12:05	0:28	2:53	7:17	4:31
WITHOUT VR	0:53	0:30	3:55	0:30	0:22	0:01	1:30	0:45	1:16	0:13

Discussion

In today's rapidly evolving technological landscape, virtual reality has emerged as a powerful tool with transformative potential in various industries. The real estate sector has already experienced the benefits of VR technology, where immersive property tours have revolutionized online communications. Looking ahead, the future appears promising, not only in the real estate industry but also in a wide range of other sectors. The literature review highlights that the travel and tourism industry has undergone changes with the integration of virtual reality, and this shows the potential for advancements expected in the future. Virtual reality applications

continue to expand, promising to shape a future-forward society where immersive experiences become an integral part of everyday life, driving innovation and transforming numerous industries.

Virtual reality technology offers real estate professionals a revolutionary chance to broaden the market reach beyond local boundaries. The convenience of virtual property tours eliminates geographical barriers, enabling buyers to explore listings regardless of their physical location. As a result, properties gain increased exposure, and the real estate market becomes more diverse and competitive, fostering a dynamic and thriving marketplace. Beyond the real estate sector, the applications of VR are far-reaching and hold immense potential for transforming numerous other industries. One such industry is travel and tourism. VR has the capacity to revolutionize how travellers plan their trips and experience destinations.

In the travel and tourism industry, VR can offer potential travellers a glimpse into destinations they are considering visiting (Rahimizhian et al., 2020, para. 3-4). Virtual tours of hotels, resorts, landmarks, and attractions can transport travellers to far-off places, providing an immersive experience that goes beyond conventional images and videos. Through these virtual tours, travellers can explore hotel rooms, get a sense of the ambiance of a location, and assess amenities, all from the comfort of their homes. This not only enhances user engagement but also helps in attracting a broader audience of travellers. Also, VR can be used for destination marketing and promotional campaigns. Travel agencies, tour operators, and tourism boards can create captivating VR experiences that showcase the unique offerings of various destinations.

Furthermore, VR can play a crucial role in education and preparation for travellers. Before embarking on a trip, travellers can use VR to familiarize themselves with the local culture and language. VR language learning applications have been around for many years now and can

facilitate basic language understanding, easing communication challenges and enhancing the overall travel experience. However, the widespread adoption of VR in the travel and tourism industry requires continued advancements in technology and infrastructure. Access to high-quality VR experiences and devices needs to be more readily available and affordable to ensure seamless integration into the travel planning and booking process.

In conclusion, virtual reality technology not only holds immense potential in revolutionizing real estate communications but also offers exciting opportunities in various other industries, including travel and tourism. By embracing the possibilities offered by VR and addressing the limitations identified in this research, we can shape a future-forward society that experiences, drive innovation, and connect people in transformative ways. As VR continues to evolve, the future holds the anticipation of a more enriched world, where immersive experiences become an integral part of everyday life across industries.

Limitations

Although virtual reality technology has a lot of potential to revolutionize the real estate market, it is important to be aware of any limitations that might affect the study's conclusions. Addressing these limitations allows for a more nuanced understanding of the potential impact of VR on real estate communications and ensures that the research results are interpreted accurately and responsibly. Real estate professionals who want to capitalise on the full potential of virtual reality in reshaping the future of the real estate industry will find that acknowledging and addressing these limitations will strengthen the quality of research.

The first constraint is within the composition of the literature review, where a significant portion of the sources originates from China. While these sources offer insightful information on how VR is being used in the real estate sector, it is important to consider when applying the results to the North American context. A wide range of variables, such as cultural norms, market dynamics, and consumer behaviours, may differ substantially among areas, and could potentially have an impact on the use of VR in the real estate sector. The availability of research sources from North America is limited, which may affect the comprehensiveness of the study's understanding of the real estate market dynamics. The study aims to integrate studies with comparable real estate characteristics to ensure a wider viewpoint in order to lessen this limitation.

The research methodology employed in this study involved a sampling approach to select specific real estate agents and team websites. Although this sampling method allows for the inclusion of a wide variety of websites, it is important to take into account its limits, especially in terms of generalizability. The findings and conclusions drawn from the study may not be fully representative of the entire real estate industry. The purposive sampling approach can introduce bias in the selection process, potentially impacting the validity and applicability of the results to a wider population of real estate websites.

The sample size utilized in this study holds impact when interpreting the research outcomes. This entails finding real estate teams that actively use virtual reality technology in online real estate communications. During the selection process, only a small number of qualified agencies were discovered, which eventually resulted in a sample size of only 10 agencies with VR and 10 agencies without. The research also encountered data collection challenges related to property characteristics, such as size, price, location, and duration on the

market. These variations among properties may influence user engagement with VR technology differently for each type of property. Ascertaining the direct impact of VR technology on property sales poses challenges due to the numerous factors influencing real estate transactions, such as location, price, property condition, and market trends. Isolating the specific effect of VR on sales requires sophisticated data analysis acknowledging the complexity of attributing sales solely to VR technology.

Data collection from Similarweb, an analytics tool used to assess website engagement, is subject to its limitations. While Similarweb provides valuable data from brokerage websites, accessing data from specific property websites proved challenging. Additionally, the accuracy and completeness of the data gathered from publicly available sources on Similarweb are contingent on external factors. When conducting an analysis of user engagement using the bounce rate, it is important to recognize that this metric provides only a partial estimate of user interactions and preferences. The bounce rate, typically defined as the percentage of visitors who leave a website after viewing only one page, offers a basic indicator of user engagement by highlighting the proportion of users who exit the site without further exploration. While it serves as a useful starting point to assess website performance, it does not delve into the intricacies of user behaviour and the reasons behind the actions.

Additionally, while interpreting and analyzing data, the researcher is aware of the potential impacts of a personal bias. The use of thorough research techniques while maintaining a firm commitment to neutrality to assure the integrity of the study's findings. Additionally, ethical considerations are of extreme importance. Due to restrictions on data availability or privacy issues, certain data may not be accessible. To effectively navigate these difficulties while upholding high standards is to protect the privacy and confidentiality of study participants.

While VR technology presents exciting prospects for revolutionizing online real estate communications, it is essential to acknowledge and address the limitations that may influence the study's findings. Variations in property characteristics, challenges in data collection, and reliance on specific sources can impact the comprehensive understanding of VR's impact on real estate. Despite these limitations, this research contributes valuable insights and serves as a foundation for understanding the potential of VR technology in the North American real estate industry. By acknowledging these complexities, researchers can pave the way for more extensive and comprehensive studies, leading to a deeper understanding of VR technology's transformative potential in the real estate market.

Conclusion

The transformative impact of virtual reality technology on the real estate industry is undeniably evident, and this case study has provided compelling evidence to support this notion. The integration of VR has revolutionized how properties are marketed and presented to potential buyers, offering a level of immersion and interactivity previously unseen in traditional real estate marketing.

The literature review emphasized the enriched visual experiences provided by VR technology, which significantly influence decision-making processes and lead to more efficient and informed property transactions. This study's results further corroborate this, as websites with VR integration demonstrated lower bounce rates, suggesting that users were more likely to explore multiple property listings. The immersive experience provided by VR technology creates a deeper connection with the properties, enhancing user retention and encouraging further exploration.

The literature review also acknowledged the limitations of VR technology, including the need for continued advancements in technology and infrastructure. Access to high-quality VR experiences and devices must be more accessible and affordable to ensure seamless integration into all industries. This is essential for real estate professionals to fully capitalize on the potential impact of VR technology.

Websites with VR integration demonstrated significantly higher levels of user engagement, indicating a more immersive and captivating experience for potential buyers. Users spent a considerable amount of time exploring the listed properties, showing a strong interest in the interactive and visually appealing content. The relatively low bounce rate on these websites highlights the positive correlation between VR integration and reduced user attrition, as users were more inclined to explore multiple property listings before leaving the website.

Contrarily, websites without VR integration displayed lower levels of user engagement, indicating a potential lack of immersive experiences to retain user interest. Smaller real estate players were more likely to be represented in this category, potentially indicating a reluctance to adopt VR technology due to cost considerations or a lack of awareness of its benefits.

The potential of VR technology to transform the travel and tourism industry was also highlighted in the literature review. VR offers travellers a glimpse into destinations they are considering visiting, providing immersive virtual tours of hotels, landmarks, and attractions. This immersive experience fosters engagement and inspires potential tourists to book their dream vacations. Similarly, in the real estate industry, VR technology's integration allows for interactive visualizations and virtual staging, which enhance the property viewing experience and contribute to successful property sales.

In conclusion, the results of this case study support the hypothesis that VR technology makes a significant impact in the real estate industry, particularly in enhancing user engagement on real estate websites. VR integration provides potential buyers with a more immersive and interactive property viewing experience, driving longer visit durations and reducing bounce rates. The findings highlight the transformative potential of VR technology in reshaping the real estate market and providing real estate professionals with a competitive edge.

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