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Title	The Influence of Virtual Events on Metaverse Commercial Real Estate Values: A Review
Type	Article
URL	https://clock.uclan.ac.uk/id/eprint/50826/
DOI	doi:10.47672/ijbs.1799
Date	2024
Citation	Nesaif, Bader Mohammed Rashed Bin (2024) The Influence of Virtual Events on Metaverse Commercial Real Estate Values: A Review. International Journal of Business Strategies, 9 (1). pp. 31-48. ISSN 2519-0857
Creators	Nesaif, Bader Mohammed Rashed Bin

It is advisable to refer to the publisher's version if you intend to cite from the work.
[doi:10.47672/ijbs.1799](https://doi.org/10.47672/ijbs.1799)

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**The Influence of Virtual Events on Metaverse
Commercial Real Estate Values: A Review**

Bader Mohammed Rashed Bin Nesaif



The Influence of Virtual Events on Metaverse Commercial Real Estate Values: A Review



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Article history

Submitted 10.01.2024 Revised Version Received 13.02.2024 Accepted 22.02.2024

Abstract

Purpose: This review paper examines the complex relationship between virtual events and the commercial real estate prices in the dynamic Metaverse, which is a network of interconnected virtual communities enabling real-time interactions. Virtual events have emerged as a prominent element of our digital reality, surpassing geographical limitations and reshaping the understanding of interaction and professional connections. This paper aims to explore the intricate interplay among technology, virtual events, and the commercial real estate ecosystem within the Metaverse.

Materials and Methods: It will analyse several case studies, identify emerging trends, and assess the economic ramifications of these dynamics. This observation highlights the capacity of virtual events to influence the real estate environment of the Metaverse, presenting prospects for developers and investors. However, it also underscores the need for comprehensive regulatory frameworks to guarantee equity and long-term viability.

Findings: The increasing recognition of virtual events by corporations and

organisations has led to a growing need for appropriate virtual venues inside the Metaverse. Consequently, this surge in demand has directly influenced the worth of virtual commercial real estate. The ongoing development of the Metaverse holds the potential to create a forthcoming reality in which the physical and virtual domains coexist and fundamentally transform our methods of engaging with the surrounding environment.

Implications to Theory, Practice and Policy: Utilise digital twin technology for interactive property replicas, enabling potential buyers to explore properties virtually before visiting. Enhance efficiency and transparency in property transactions by exploring blockchain and smart contracts; leverage the metaverse for collaborative design and conduct virtual training for real estate agents to optimize technology utilisation.

Keywords: *Metaverse, Virtual Events, Virtual Commercial Real Estate, Technology, Augmented Reality (AR), Virtual Reality (VR), Economic Implications*

1.0 INTRODUCTION

Metaverse is a network of intertwined virtual communities facilitating real-time user interactions. It enables abrupt and actual communication among users and digital establishments. According to Mystakidis (2022), its production initially facilitated the user's participation capacity across multiple virtual domains. The concept of the Metaverse has gained substantial interest in science fiction and popular Culture and is rapidly proving itself as an analytically detectible phenomenon. The idea of the Metaverse implies the coming together of the physical and virtual domains (Schumacher, 2022). The extensive implementation of Virtual Reality (V.R.) and Augmented Reality (A.R.) technology has aided a very immersive experience that defeats the restraints of traditional methods.

In consequence, the Metaverse beats mere theoretical knowledge and emerges as an obvious domain that is occupied by businesses, individuals, and social groups (Kozinets, 2022). This presence generated the perception of virtual real estate - digital spaces in the Metaverse that are owned, established, and financed, just like tangible properties in the physical world. Virtual events play a considerable role in driving demand for Metaverse commercial space. From trade shows and conferences to product launches and concerts, these events are designed to create engaging and interactive experiences for attendees. The appeal of virtual events lies in their ability to bring together global audiences without the constraints of physical proximity, redefining the concept of networking and engagement (Maddah and Esmaeilzadeh, 2023). As more businesses and organisations realise the potential of virtual events, the demand for suitable virtual venues in the Metaverse will increase, directly impacting the valuation of virtual commercial real estate (Kiong, 2022).

The purpose of this research project is to investigate the complexities of the aforementioned relationship by, among other things, looking at case studies, finding patterns, and assessing the economic repercussions of the situation. Through this analysis, a thorough comprehension of the impact of virtual events on the valuation of commercial real estate in the Metaverse will be established. The purpose of this research is to provide a detailed examination of the intricate interaction that exists in the Metaverse between technology, virtual events, and the ecosystem of commercial real estate. In order to shed light on this interaction, it makes use of academic research, the viewpoints of industry experts, and empirical facts.

Research Aim

This study examines how virtual events affect metaverse commercial real estate valuation. The main goal is to understand the dynamics, variables, and patterns that affect property prices in this new virtual environment. The study aims to offer valuable insights for real estate developers, investors, and policymakers operating within the metaverse ecosystem.

Research Questions

RQ₀₁: What is the extent of the association between virtual events and the commercial real estate sector within the Metaverse?

RQ₀₂: To what extent does the advent of virtual events impact the valuation of commercial real estate?

RQ₀₃: What are the enduring implications of virtual events on the valuation of commercial real estate within the Metaverse?

Research Objectives

- i. To explore the co-relation among virtual events and commercial real estate on Metaverse.
- ii. To assess the influence of virtual events on the value of commercial real estate.
- iii. To determine the effect of virtual events on the value of commercial real estate on Metaverse.

1.0 LITERATURE REVIEW

"Metaverse" refers to a novel virtual realm beyond the physical world. It is a composite word derived from the prefix "meta-" denoting transcendence or going beyond, and the prefix "verse", which is derived from "universe". It signifies the entirety of the globe or cosmos. The term "Metaverse" was initially introduced by American author Neal Stephenson in his 1992 novel *Snow Crash*, which falls under the cyberpunk science fiction genre (Joshua, 2017). Based on this conceptual framework, users can employ digital avatars to effortlessly navigate a three-dimensional environment that faithfully replicates the physical world, enhancing social interactions. Individuals can engage in a virtual environment with three dimensions, designed following the physical realm. The utilisation of avatars in a virtual environment that operates alongside the physical world is accomplished (Alpala et al., 2022).

The concept of the Metaverse was subsequently depicted with greater clarity in science fiction films such as *Ready Player One*, *Lucy*, and *The Matrix* throughout the subsequent three decades (Zhao et al., 2022). The concept of a completely riveting virtual environment where people meet to socialise, play, and work is described in its most fundamental form. It is a replicated digital environment that combines augmented reality (A.R.), virtual reality (V.R.), blockchain, and social media concepts to create spaces for complex user interaction that resemble the real world (Laeq, 2022). Based on immersive engagement, the Metaverse evolves with numerous social connotations (such as fashion, event, gaming, education, and workplace). Even if the Metaverse is not the actual world, services based on immersive, user-interactive narratives can produce a palpable sensation. Metaverse is broken down into its hardware, software, and content from the perspective of each component. (Park and S.M. et al., 2022).

Metaverse has been identified as the next stage of social interaction. It is a constructed universe in which individuals "live" according to the regulations established by the author (Ritterbusch and Teichmann, 2023). Metaverse may be wholly or partly virtual, i.e., like a V.R. system where everything is virtual or an A.R. system where everything is partially virtual (Avila, 2017). Individuals can participate in social interactions by having conversations, playing games, collaborating on projects or learning from their success or errors in the Metaverse (Jovanović & Milosavljević, 2022). Real people or fictional characters may serve as one's partners or companions in the Metaverse (Díaz et al., 2020).

Furthermore, the Metaverse can experience a variety of actions and events, including political events, natural disasters, and economic activity, similar to the real world (Davis et al., 2009). Numerous real-world activities have made their way into the virtual world. Internet conferences, distance education, internet shopping, and other activities such as telecommuting have become commonplace in contemporary society. Like humanity's thirst for stretching the boundaries of the physical world, there is a similar greed for a more advanced virtual world with similar intensity

(Suzuki et al., 2020). Tourism, hospitality, marketing, leisure, education, and citizen-government engagements may be primarily affected if businesses opt for Metaverse concerning their operational capabilities and business model. The constant continuous shift between the virtual and physical worlds, along with the multichannel enhancement of our interaction and experiences, paves the way for an infinite number of future interactions with the Metaverse, many of which may be beyond our current understanding (Dick, 2021). Speaking, reading, hearing, writing, and translation are the five prime elements of contemporary English language education. There is an increased emphasis on interactive communication and real-world situations when it comes to hearing, speaking, and interpreting.

The intense immersion and robust interactivity of the Metaverse are an ideal fit for practical instructional materials. Therefore, speaking, hearing, and interpreting are the domains in which the Metaverse is utilised in advanced English instruction. The results of these three classes of Metaverse are better than those of the conventional classes (Wang, Tang et al., 2023). By letting patients and doctor's talk to each other through avatars in virtual rooms, no matter where they are, the Metaverse may also open up new ways to use telemedicine to treat cancer. Augmented reality and virtual reality technology can give doctors and patients new ways to learn about health and cancer care by using 3D human body pictures (Javaid and Haleem, 2020).

Metaverse can affect not only the entertainment and tourist sectors but also the economy and society, despite difficulties and uncertainties. The future of employment, trade, and social contact may be shaped by the Metaverse's ability to produce new types of value and economic activity (Alam et al., 2022). The Metaverse may cause conventional values and norms to erode and privacy and surveillance issues to surface (Qamar et al., 2023). With well-known platforms like Second Life, VRChat, and Minecraft offering users immersive and engaging virtual worlds for socialising, gaming, and artistic expression, the present use of the Metaverse in entertainment and gaming is already well-established (Ansha, 2023). But the Metaverse's potential uses go well beyond these fields.

3.0 METHODOLOGY

In formulating the methodology for this research, the criteria for source selection were carefully chosen to ensure the integrity and relevance of the information used in this study. The selection criteria are as follows:

Criterion	Inclusion	Exclusion
Year	Research from 2017 onwards	Research Before 2017
Language	Research in English	Other Languages
Research Design	Qualitative Secondary Research	Other than Qualitative Secondary Research
Key terms	“Metaverse,” “Virtual Events,” “Virtual Commercial Real Estate”, “Virtual Real Estate”, “Types of Virtual Events” “Metaverse and Virtual Events”	Other than these words
Publication Type	Peer-Reviewed	Conference Papers, Editorials, Non-peer-reviewed articles

4.0 FINDINGS

Virtual Events

Events have consistently played a significant and central role in our lives, encompassing celebrations, community gatherings, religious observances, and even revolutionary moments (Getz & Page, 2016). Following World War II, the middle-class population expanded due to technological progress, increasing disposable income and available leisure time among the masses. This, in turn, contributed to a global proliferation of various events (Backman, 2018).

Virtual reality includes events that can be experienced by employing unique cameras offering 360-degree views and rotation along with the actual view, much like attending an event in person (Velez et al., 2019). Consuming several video streams helps create a complete 3D virtual portrayal of an event (Xu et al., 2022). Using virtual reality, such environments created are termed 'virtual worlds' (Zainab et al., 2022). Virtual reality is an entity which is expressible in words or through a presentation of images, highly sensible so that one may feel it in his inner side (Strut, 2019). Research studies have a consensus on some aspects, which assists in the differentiation between non-virtual worlds and virtual. Such aspects include persistence, nature, game space, and social nature. Such worlds are distinct from continued game places because they permit an impartial location and social equivalence, and people can create, transmit, and interchange goods, services and ideas here.

A virtual event differs from a web conference as it is not a conventional web conferencing session. Instead, it is an outcome of modern virtual event software tools and platforms that are currently accessible. These tools enable individuals to participate in online events without needing physical presence or in-person gatherings (Cvent, 2020). Such events can be of many types, not limited to but including live stream conferences. There are many advantages associated with virtual events for all the participants involved. The organisers worldwide witnessed an increase in the number of participants (West, 2020). Virtual events have many benefits, including more revenues, less cost and enabling organisers to maintain and trace event attendance. It is also helpful to the commercial brands through their communities' expansion.

Virtual events enable free participation from far-flung areas for interested individuals without being restrained by geographical boundaries (Pearlman & Gates, 2010). This feature offered by virtual events also contributes to reducing travel costs (Cvent, 2020). Virtual events also contribute to eliminating discrimination by maintaining less discrimination. It also offers much comfort. This is because, in such events, participants cannot see each other, and as a result, they cannot create any bias concerning each other in any regard like race, color, ethnicity, etc. (Rheingold, 2008). Without being afraid of contracting a deadly and contagious disease, one may join and participate in an event via virtual events. After the availability of more advanced technologies, going through virtual platforms is more convenient and enjoyable (E.E. News Desk, 2020). According to Evans (2020), virtual events can be categorised as live streaming webcast events, online radio, e-learning events, conferences, webinars, podcasts and virtual and live hybrid events. An event that occurs in a physical space but with live participants online is called a hybrid event (Angage, 2019).

Many events occur every day, which may be more suitable for being conducted virtually if the right strategy and technology are adopted. Many activities and events may be more comfortably conducted virtually, like lectures, informational gatherings and seminars (Evans, 2020). It is pretty simple in certain instances to shift an event onto a virtual world if it involves minimum

participation from the attendees, but in case of events where a large number of participants is involved and which demands input and active conversation among the participants, then the job of conducting virtual events in such becomes highly challenging.

Virtual events have positive and negative features, and the intensity of such characteristics varies with the environment and existing circumstances. Talking about its benefits primarily, it helps reduce travel costs, contributing to carbon emissions. Thus, it saves the climate from the side effects of extensive travelling (Aydogan, 2021). Additionally, virtual events are beneficial in reducing the cost of travel, food or other associated or incidental necessities involved in physical events. Moreover, virtual events can overcome the geographical limitations, event size issues and other physical inabilities of the interested participants by providing a limitless space and domain (Koohang et al., 2023). Many people, without going to a particular venue and restrained by their physical inabilities, can join any event online in the virtual world. However, it has its challenges or problems associated with it, mainly the issue of technology lack or inefficiency. Virtual events require significantly up-to-date technology, which is highly efficient in providing the sought outputs and platform. Still, inexperience or low-grade technology may ruin such a dream (Aloisi and De Stefano, 2022). Additionally, virtual events do not offer the same level of social interaction as physical or face-to-face events (Whillans et al., 2019). In such events, participants cannot feel the same quality of interaction and cannot exchange their experiences similarly.

Virtual events have affected many industries, primarily educational, entertainment and tourism (Donthu and Gustafsson, 2020). After COVID-19, virtual events have gained unbeatable popularity, particularly in these sectors. The impact of virtual events is still far on the rise and will be as the world demands more and more technological reliance. The old and outdated event formats are vanishing, and virtual events are replacing them. The health sector has also been notably impacted by virtual events, especially in cancer awareness, education and treatment in recent days (Ittefaq and Iqbal, 2018). Other more events-centric industries are also shifting towards virtual events for a timely benefit. COVID has triggered and brought undeniable success and fame to virtual events when events had become impossible.

Commercial Real Estate on Metaverse

Technological advancement has affected all industries and has shaped them in its way. Real estate also moves with the waves of technologies and develops in the rays of technology. Until 1990, before an explicit and exhaustive conception of the virtual world, there was no imagination of virtual or commercial real estate. However, technologies have made humans familiar with it in the recent past. At first, this idea seems mythical and imaginary, but it has become a reality with a rising demand. It cannot be touched, i.e., it is not tangible. However, it can be felt through experience or pictures. Virtual real estate exists in a virtual world and is different from intellectual property because it is a property that does exist (Erlank and Standers, 2018). There is an agreed definition of virtual real estate, but for understanding, it is a virtual property that can be bought and sold like the physical world (Geordiac, 2022).

Virtual real estate refers to digital land in the virtual or digital world, more precisely, the Metaverse, a web of online worlds (Dwivedi et al., 2022). In this virtual world, land is equally valuable and exchangeable as in the physical. One can buy, own, sell and exchange such properties for consideration. Metaverse has many platforms, including Decentraland, where investors and purchasers are buying real estate properties; however, as Metaverse is in the developing phase,

most of the land is not sold and is yet to be purchased (Sonnenreich, 2022). Virtual real estate is pieces or segments of land in the virtual world, or more accurately, it is pixels, but it is more than just online images. In such spaces, people can arrange different events, play games, and conduct other social activities virtually. Virtual real estate is expected to grow and develop more after the rise of Metaverse. In 2021, when Facebook changed its name to Meta, an unexpected boom was witnessed in virtual real estate (Kiong, 2022). In 2020, in terms of revenue, the total demand for virtual real estate was 358 million U.S. dollars and is expected to touch 3600 million U.S. dollars by 2025 (Linkedin, 2023).

In a contemporary period characterised by the prevalence of digital encounters and technological advancements, there has been a notable increase in the desire for virtual property. This spike can be attributed to various variables changing how we engage, labour, engage in leisure activities, and even allocate financial resources (UNESCO, 2022). This essay explores the primary variables that contribute to the demand for virtual property ownership, providing insight into the ever-changing nature of this field and its complex ramifications.

The digital economy's rapid growth is generating virtual real estate demand. Online activities, gaming, and virtual experiences are becoming part of modern society, creating a need for flexible digital environments (Petropoulos et al., 2022). Due to the rise of remote work and cooperation, companies seek virtual offices and meeting rooms (Adhlakha, 2023). These venues aim to improve team communication and collaboration across borders.

The gaming and entertainment business drives virtual real estate demand. Virtual environments are being developed for immersive events, interactive experiences, social gatherings that transcend physical reality, and traditional gaming (Dwivedi, 2022). The amalgamation of entertainment and technology has facilitated the emergence of a novel realm of involvement wherein users can establish connections, delve into uncharted territories, and engage in previously inconceivable activities (Koochang et al., 2023). The emergence of non-fungible tokens (NFTs) has brought about a paradigm shift in virtual ownership, hence substantially driving the demand for virtual real estate (Trautman, 2021). Non-fungible tokens (NFTs) facilitate the establishment of digital ownership for distinct assets, such as virtual land and properties. The alteration in ownership dynamics has generated significant interest in acquiring and exchanging virtual properties, converting virtual real estate into a viable avenue for digital investment (Ullah and Sepasgozar, 2020).

The advent of this interconnected digital sphere has captivated the interest of both technology industry leaders and users, heralding a novel era characterised by the emergence of communal virtual environments. The exponential growth in demand for virtual real estate as the foundational element of the Metaverse ecosystem is driven by companies envisioning a future where humans may effortlessly transition between virtual settings (Bojic, 2022). Business enterprises are increasingly leveraging the potential of virtual real estate as a means to enhance their marketing and branding strategies. Using virtual spaces to host events, launch products, and create branded experiences allows companies to leverage the novelty and expansive reach of digital platforms (Rathore, 2018). There are numerous prospects for monetisation within virtual real estate, including virtual commerce, advertising, and sponsored events (Singh and Sisodia, 2023). These avenues contribute significantly to the potential revenue that can be generated. In addition to commercial and branding considerations, the restricted availability of physical space in the physical realm has generated curiosity over the boundless potential for virtual expansion.

The real estate sector is currently experiencing a significant transformation, characterised by the emergence of two separate business paths: commercial virtual real estate and physical commercial real estate. Commercial virtual real estate refers to procuring and overseeing digital properties within virtual environments (Lemley and Volokh, 2017). These assets are commonly utilised for online enterprises, gaming activities, and virtual events. The appeal of this phenomenon is in its ability to provide lowered obstacles to entry, lower operational expenses, and worldwide accessibility. As the popularity of Metaverse concepts increases, virtual real estate presents opportunities for engaging brand experiences and innovative business structures (Barrera and Shah, 2023).

In contrast, commercial real estate refers to tangible properties utilised for various purposes, such as offices, retail spaces, and other similar functions. Despite needing more significant initial financial commitments, this approach offers actual physical representation, direct engagement with customers, and localised promotional prospects. Furthermore, physical real estate exhibits the capacity for value appreciation over an extended period, instilling a perception of enduring existence (Choi, 2023). Both alternatives pose distinct obstacles. The domain of virtual real estate encompasses the challenges posed by digital security, reliance on technology, and the fluctuating nature of the market inside digital platforms. In contrast, tangible real estate is subject to economic swings, necessitates continuous upkeep expenses, and is limited by geographical limits.

Virtual Events and Metaverse Real Estate

Within the dynamic and ever-changing domain of the Metaverse, a noteworthy phenomenon is beginning to surface, which holds the potential to fundamentally transform the virtual real estate sector (Kemec, 2022). The Metaverse is seeing significant growth as a digital domain facilitating social interactions, commerce, and entertainment (Bale et al., 2022). Within this virtual realm, virtual events are emerging as crucial drivers for reshaping the significance and desirability of virtual properties (Zainab, 2022). Virtual events comprise diverse activities, spanning concerts, conferences, exhibitions, and social gatherings. These events can attract substantial audiences, surpassing limitations imposed by geographical distances and time zones (Wu et al., 2022). The ability to draw players worldwide has a ripple effect on the perceived attractiveness and significance of some virtual locales. Similar to how physical venues have been highly regarded for their accessibility and prominence, virtual event spaces are increasingly recognised as valuable assets for their capacity to facilitate captivating and enduring experiences (Wreford et al., 2019).

The implications of these virtual occurrences on Metaverse real estate are complex and varied. To begin with, the triumph of a virtual event has the potential to enhance the reputation of its hosting site, resulting in heightened interest and demand for properties located within the virtual realm. Similar to fashionable districts in tangible urban areas, virtual spaces with a track record of hosting well-attended events may witness increased real estate prices and attractiveness (Tayal, 2022). Furthermore, the increasing prominence of virtual events also catalyses transformative advancements in designing and constructing virtual environments (Maloney, 2020). Currently, developers are allocating resources towards establishing venues capable of hosting events on a big scale (Khan, 2023). These venues are designed to possess the essential infrastructure and interactivity required to facilitate smooth and uninterrupted experiences for participants. The outcome is a synergistic amalgamation of architectural design and technological advancements, wherein virtual properties inside the Metaverse are specifically designed to facilitate immersive engagements and distinctive event encounters (Ahn et al., 2022).

With the ongoing evolution of the Metaverse, virtual events are positioned to emerge as a significant catalyst for the growth and development of its digital real estate sector (Allam et al., 2022). Investors, corporations, and content providers increasingly acknowledge the opportunities presented by utilising these events to augment their brand exposure and interact with a worldwide audience (Yamin, 2017). As a result, there is an anticipated increase in the demand for strategically located virtual properties (Herman et al., 2020), which is projected to have a significant influence on pricing dynamics and market trends (Gordon, 2008).

Virtual events in the Metaverse have benefited virtual real estate. These conferences, concerts, and gatherings have redefined social interaction and increased demand for Metaverse properties. Virtual event spaces have become social hubs for networking and immersive experiences, boosting Metaverse real estate's value. These events allow property owners to rent their virtual spaces for conferences and performances, generating new revenue. Since these events attract visitors, more people and businesses are interested in virtual land ownership for branding, community-building, and creative expression. Virtual events drive demand for Metaverse real estate; innovative properties improve event experiences. The dynamic ecosystem has also spurred innovation in virtual space development, creating more captivating and versatile environments for diverse event needs.

In conclusion, virtual events boost Metaverse real estate by boosting economic growth, inspiring creative property designs, and creating a sense of community in the ever-growing digital world. The relationship between events and real estate will shape virtual experiences as the Metaverse evolves. The blockchain-based virtual world of Decentraland is an example. In Decentraland, people can buy and improve virtual land. Decentraland has successfully hosted conferences, art exhibitions, and music festivals, allowing landowners to lease their properties for such events. For instance, "Parcel X" hosted the virtual Cannes Film Festival, generating revenue for its owner and providing participants with a captivating and immersive experience. This shows how virtual events boost Metaverse real estate demand and owner revenue. Roblox, known for its user-generated content, has seen a rise in branded virtual events. A partnership with Lil Nas X created a unique, interactive concert experience on the platform. This shows how brands can use virtual events to create memorable experiences and build a strong Metaverse presence, driving interest in their properties.

Virtual events have yielded numerous favorable consequences for Metaverse real estate. However, they have also introduced a range of possible adverse outcomes that necessitate careful examination. The exponential growth of virtual events has resulted in a surplus of event venues within the Metaverse, creating a highly competitive market that can potentially diminish the value of properties. Given the surplus of event venues in the market, property owners may encounter difficulties obtaining regular bookings and achieving the anticipated revenue streams. Furthermore, the emphasis on virtual events could potentially result in an excessive number of properties centred on events, thereby diverting attention away from advancing alternative innovative and practical virtual environments. The lack of equilibrium among property types can impede the overall expansion and diversification of the Metaverse real estate market.

Moreover, virtual events can attract substantial audiences; however, they may also exhibit transitory characteristics, whereby properties frequently encounter surges in demand during events but experience periods of inactivity in the interim. The inherent unpredictability of events can lead to instability for property owners who depend solely on income generated from such events.

Moreover, the competition to conceive and construct event-focused establishments may emphasise quantity rather than quality, leading to an abundance of standardised event venues that lack distinctiveness and fail to captivate the interest of discerning individuals. In summary, virtual events have introduced dynamism to the realm of Metaverse real estate; however, it is imperative to approach them with caution due to certain detrimental factors. Ensuring the long-term sustainability and success of Metaverse real estate necessitates carefully managing event spaces and other virtual properties, effectively handling demand fluctuations, and promoting creative, high-quality designs.

Linden Lab developed Sansar, a virtual reality platform with events and social spaces. Due to the quick rise in event-focused properties, some consumers felt oversaturated and lacked variety. This made event space bookings and traffic difficult. This case shows how overstocking event-centric properties can cause severe competition and property value loss. The virtual reality platform known as High Fidelity enables users to generate and oversee events within personalised virtual environments. Although events such as concerts and meetings garnered attention, intermittent periods of inactivity were observed between these events. This situation presented a significant challenge for property owners who depended exclusively on income generated from events, as their properties could potentially remain unoccupied for prolonged durations. This example highlights the importance of developing sustainable income models that consider the unpredictable nature of virtual event attendance.

Factors Influencing Value Changes of Real Estate in Metaverse

A complex interplay of factors determines the value of real estate in the Metaverse. One critical component is location within the virtual landscape, which is analogous to the "location, location, location" mantra of physical real estate. High-trafficked and aesthetically pleasing areas tend to command higher prices and proximity to popular virtual destinations can also be a factor. Infrastructure, which includes the quality of virtual architecture, transportation systems, and amenities, also contributes to a property's desirability and, as a result, its value. Rarity and exclusivity, similar to limited edition assets, can drive up prices in the Metaverse, as can historical significance. In addition, the influence on property values can be attributed to technology advancements, user engagement, and the broader expansion of the Metaverse ecosystem. Social trends and cultural preferences can influence the desire for specific virtual places. A multifaceted interaction of several factors will influence the value proposition of virtual real estate as the Metaverse continues to develop.

Technological breakthroughs significantly influence the value of real estate in the Metaverse. Continuous advancements in technology, software, and communication significantly influence virtual properties' immersive experience and usefulness. Properties with advanced interactive features, authentic simulations, and effortless integration with emerging technology are more inclined to demand elevated prices. For example, virtual real estate that can seamlessly integrate with augmented reality (A.R.), virtual reality (V.R.), and extended reality (X.R.) devices can provide users with enhanced experiences, attracting more demand and thus increasing their value.

Furthermore, the ability of the Metaverse to incorporate emerging technologies like blockchain for secure ownership verification and non-fungible tokens (NFTs) for unique digital assets adds layers of value to virtual properties. The introduction of AI-driven environments that respond intelligently to user interactions and the incorporation of advanced communication tools add to the allure of

specific Metaverse properties. Properties at the forefront of technological innovation will appreciate as users become more tech-savvy and demand more immersive experiences. The interaction between user expectations and technological advancements is critical in determining the attractiveness and value of virtual real estate within the Metaverse in this dynamic landscape.

User engagement and social dynamics are critical forces in the Metaverse that influence the value of virtual real estate. The extent to which users interact with and frequent a particular virtual space influences its value significantly. High foot traffic, active communities, and meaningful social interactions can elevate a virtual location's status and value. Properties facilitating collaborative activities, such as events, exhibitions, or communal gatherings, frequently become interaction hubs and command a higher price.

Social dynamics, such as forming virtual neighbourhoods, economies, and cultures, contribute to a Metaverse property's overall attractiveness. Virtual spaces thrive when they become hubs for social interaction, commerce, and creativity, just as physical neighbourhoods do through a sense of community, shared identity, and cultural significance. Influencers, creators, and thought leaders who establish a presence in specific virtual locales can boost the attractiveness of those spaces.

Furthermore, changes in user preferences, changing social norms, and emerging subcultures can all dynamically impact property values. Properties that align with the prevalent interests of the Metaverse inhabitants or that cater to niche communities frequently experience increased demand and are thus appreciated. The symbiotic relationship between user engagement, social dynamics, and real estate value will undoubtedly remain a key driver in shaping the virtual property landscape as the Metaverse evolves.

Real estate value in the Metaverse is inextricably linked to economic trends and market fluctuations. The Metaverse, like the physical world, experiences supply and demand fluctuations that affect property values. Economic growth in the virtual space can increase demand for virtual real estate as users seek to establish their presence and businesses in thriving digital ecosystems. In contrast, economic downturns or changes in user behaviour can lead to decreased demand and, as a result, decreases in property values.

For instance, changes in the value of virtual currencies can significantly affect the price of real estate in the Metaverse. Users' purchasing power and investment potential are directly impacted by changes in the value of virtual assets as the Metaverse builds its financial institutions and marketplaces. Decentralised financing (DeFi) and blockchain technology are two more innovations that may influence the value of virtual property transactions by adding a higher level of financial understanding. The interdependence of economic trends and market fluctuations with virtual real estate value is a complex dynamic involving micro and macroeconomic factors. As the Metaverse grows and evolves, its economic landscape will be a driving force in shaping the value of virtual properties, necessitating a keen understanding of these trends to navigate the digital real estate market effectively. The connection of macroeconomic and microeconomic factors, as well as market changes, with the value of virtual real estate, is a complicated dynamic. The value of virtual homes will change as the Metaverse expands and changes, and to successfully navigate the digital real estate market, one must be thoroughly aware of these trends.

Virtual Events in Metaverse Implications on Stakeholders

A paradigm shift brought on by the advent of virtual events within the Metaverse has shown the wide-ranging ramifications of this trend for numerous players in the real estate business. As the

Metaverse develops into a multidimensional digital realm where individuals can connect, socialise, and participate in various activities, the idea of virtual real estate is taking centre stage (Buhalis et al., 2023). Developers and investors in real estate are at the forefront of this shift, facing opportunities and obstacles that go against conventional ideas of property ownership and value.

For developers and investors in real estate, the Metaverse offers a fascinating new area for investment and innovation. Virtual land, formerly just an idea, is now a real asset with a market value (Hollensen et al., 2022). The appeal is in the development of virtual event venues that can accommodate meetings, performances, exhibitions, and other events while offering immersive experiences beyond physical location constraints (De et al., 2023). As in the real world, developers can influence the Metaverse's terrain by funding and creating virtual properties (Tunca et al., 2023). This offers a chance to expand revenue streams and diversify portfolios by taking advantage of an expanding market due to a rising consumer desire for distinctive and exciting digital experiences.

Developers must have a big-picture mindset to succeed in this new digital space. To design places that suit the interests of event planners and attendees, they must understand the dynamics of virtual interactions (Dwivedi et al., 2022). Creating seamless, immersive worlds that enthrall and engage individuals will be crucial. Just like in the real world, location matters in the Metaverse. Virtual properties can be strategically positioned in the digital world to maximise their visibility and desirability, which can affect how valuable they are perceived. Collaborations between developers and event planners will be essential to create engaging events that use the Metaverse's special affordances, drive participant engagement, and provide a solid return on investment.

The Metaverse offers a transformative picture for event organisers and businesses to reimagine traditional event experiences. The worldwide ease of access to virtual spaces removes geographical boundaries, allowing access to an enormous and different audience (Singh and Vanka, 2023). Organisers of events can design and organise immersive spaces that attract participants and provide them with different and memorable experiences by teaming up with virtual real estate owners. Metaverse's interactive nature can be utilised by businesses to engage customers in new ways that combine entertainment and commerce (Rathore, 2018). Collaborative product launches, virtual showrooms, and immersive brand simulations are just a few examples of how businesses can use the Metaverse to bond with their customers profoundly.

However, changing to a Metaverse-driven real estate landscape brings critical policy contemplations to the forefront. Rights and ownership of virtual property are still in their infancy, raising concerns about how they should be defined, enforced, and protected (Buhalis et al., 2023). To ensure transparency, security, and the prevention of deceitful practices, supervisory frameworks must be established to govern virtual property transactions. Also, apprehensions about fair access to virtual spaces and potential dominations must be addressed to certify that all participants are on a level playing field. Outstanding the balance between inspiring innovation and protecting consumers' rights will be critical in determining the Metaverse real estate ecosystem's longstanding feasibility.

Lastly, the growth of virtual events inside the Metaverse has instigated a tremolous shift resounding throughout the real estate industry. Creators and investors who venture into the unexplored territory of virtual land can shape the Metaverse and redefine property ownership standards (Bojic, 2022). Businesses and event organisers can benefit from the approval of the

Metaverse aptitude to create immersive and boundary-pushing experiences (Livingstone and Pothong, 2022). However, vigorous regulatory frameworks are essential to ensure a fair and viable Metaverse real estate landscape. As shareholders labour collectively to navigate these unexplored waters, they will have an exceptional opportunity to profile a future in which the physical and virtual realms co-occur, redefining how we intermingle, engage, and experience the world around us.

5.0 CONCLUSION AND RECOMMENDATION

Conclusion

In summary, this research examines the complex correlation between virtual events and commercial real estate in the rapidly expanding Metaverse. The influence of virtual events on the perceived worth and attractiveness of properties inside the digital domain becomes apparent. These various events, which encompass a wide range of activities such as conferences and concerts, surpass the limitations of geographical boundaries and time zones. As a result, they attract audiences from around the world and provide them with engaging and immersive experiences. Virtual events that achieve success have the potential to augment the standing and desirability of properties situated in the hosting location, similar to the way trendy districts in physical cities operate. Developers and investors are provided with prospects to allocate resources and introduce advancements in the realm of virtual real estate, thereby facilitating the emergence of novel sources of income and enhancing the diversity of investment portfolios. Nevertheless, it is essential to exercise prudence in order to effectively navigate the inherent risks of excessive saturation and unpredictability that are intrinsic to this ever-changing environment. The ongoing evolution of the Metaverse brings about a redefinition of criteria pertaining to property ownership, a reshaping of relationships, and the emergence of policy concerns aimed at establishing a virtual real estate ecosystem that is both fair and sustainable. The correlation between virtual events and the valuation of commercial real estate in the Metaverse presents an opportunity for a paradigm shift, wherein the coexistence of physical and virtual domains redefines our modes of engagement with the surrounding environment.

Recommendations

- Implement digital twin technology to create detailed, interactive replicas of properties. This allows potential buyers to virtually navigate and interact with a property before making a physical visit.
- Explore the use of blockchain technology for secure and transparent property transactions. Smart contracts can automate parts of the buying process, making it more efficient.
- Use the metaverse for collaborative design and planning sessions with clients, architects, and interior designers. This can enhance communication and visualization of ideas.
- Provide virtual training sessions for real estate agents on how to use metaverse technologies effectively. This ensures that your team is well-equipped to leverage these tools.

REFERENCES

- Allam, Z., Sharifi, A., Bibri, S.E., Jones, D.S. and Krogstie, J., 2022.
- Avila, S., 2017. Implementing augmented reality in academic libraries. *Public Services Quarterly*, 13(3), pp.190-199.
- Ahn, S.J., Kim, J. and Kim, J., 2022. The bifold triadic relationships framework: A theoretical primer for advertising research in the Metaverse. *Journal of Advertising*, 51(5), pp.592-607.
- Alpala, L.O., Quiroga-Parra, D.J., Torres, J.C. and Peluffo-Ordóñez, D.H., 2022. Smart factory using virtual reality and online multi-user: Towards a metaverse for experimental frameworks. *Applied Sciences*, 12(12), p.6258.
- Aydoğan, D., 2021. Art exhibitions during the pandemic. In *Communication and Technology Congress–CTC* (Vol. 2021, pp. 49-55).
- Aloisi, A. and De Stefano, V., 2022. Your boss is an algorithm: artificial intelligence, platform work and labour. Bloomsbury Publishing.
- Adlakha, P., 2023. Asian Development Bank, ASEAN and Global Value Chain: Locking in Resilience and Sustainability.
- Bale, A.S., Ghorpade, N., Hashim, M.F., Vaishnav, J. and Almaspoor, Z., 2022. A comprehensive study on Metaverse and its impacts on humans. *Advances in Human-Computer Interaction*, 2022.
- Buhalis, D., Leung, D. and Lin, M., 2023. Metaverse as a disruptive technology revolutionising tourism management and marketing. *Tourism Management*, 97, p.104724.
- Backman, K.F., 2018. Event management research: The focus today and in the future. *Tourism management perspectives*, 25, pp.169-171.
- Bojic, L., 2022. Metaverse through the prism of power and addiction: what will happen when the virtual world becomes more attractive than reality?. *European Journal of Futures Research*, 10(1), pp.1-24.
- Barrera, K.G. and Shah, D., 2023. Marketing in the Metaverse: Conceptual understanding, framework, and research agenda. *Journal of Business Research*, 155, p.113420.
- Cvent. (2020). Virtual Events in 2020: The Ultimate Guide. Retrieved August 28, 2020, from Cvent: [https:// www.cvent.com/in/resource/event-cloud/virtual-events-2020-ultimate-guide](https://www.cvent.com/in/resource/event-cloud/virtual-events-2020-ultimate-guide)
- Choi, S.H., 2023. Three Essays in Real Estate Finance and Financial Economics (Doctoral dissertation, Cornell University).
- Díaz, J., Saldaña, C. and Avila, C., 2020. Virtual world as a resource for hybrid education. *International Journal of Emerging Technologies in Learning (iJET)*, 15(15), pp.94-109.
- Davis, A., Murphy, J., Owens, D., Khazanchi, D. and Zigurs, I., 2009. Avatars, people, and virtual worlds: Foundations for research in Metaverses. *Journal of the Association for Information Systems*, 10(2), p.1.

- Dick, E., 2021. Public policy for the Metaverse: Key takeaways from the 2021 AR/VR policy conference. Information Technology and Innovation Foundation.
- De Felice, F., Rehman, M., Petrillo, A. and Baffo, I., 2023. A metaworld: Implications, opportunities and risks of the Metaverse. *IET Collaborative Intelligent Manufacturing*, 5(3), p.e12079.
- Dwivedi, Y.K., Hughes, L., Baabdullah, A.M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M.M., Dennehy, D., Metri, B., Buhalis, D., Cheung, C.M. and Conboy, K., 2022. Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 66, p.102542.
- Donthu, N. and Gustafsson, A., 2020. Effects of COVID-19 on business and research. *Journal of business research*, 117, pp.284-289.
- Evans, C. (2020, March 30). The types of virtual events explained. Retrieved August 30, 2020, from Medium: <https://medium.com/first-event/the-types-of-virtual-events-explained-c15f8d68cd4a>
- Erlank, W. and Stander, A.L., 2018. *Property in virtual worlds and insolvency* (Doctoral dissertation, North-West University (South Africa)).
- Gordon, E., 2008. The geography of virtual worlds: An introduction. *Space and Culture*, 11(3), pp.200-203.
- Getz, D., & Page, S. J. (2016). *Event Studies: Theory, research and policy for planned events* (7th ed.). Routledge.
doi:10.4324/9781315708027
- Hugo Hua 2020. Guide to Virtual Events, pp 3-6
- Herman, A., Coombe, R.J. and Kaye, L., 2020. Your second life?: Goodwill and the performativity of intellectual property in online digital gaming. In *Cultural studies* (pp. 184-210). Taylor & Francis.
- Hollensen, S., Kotler, P. and Opresnik, M.O., 2022. Metaverse—the new marketing universe. *Journal of Business Strategy*, (ahead-of-print).
- Ittefaq, M. and Iqbal, A., 2018. Digitisation of the health sector in Pakistan: challenges and opportunities to online health communication: A case study of MARHAM social and mobile media. *Digital health*, 4, p.2055207618789281.
- Jovanović, A. and Milosavljević, A., 2022. VoRtex Metaverse platform for gamified collaborative learning. *Electronics*, 11(3), p.317.
- Joshua, J. (2017). Information bodies: computational anxiety in Neal Stephenson's snow crash. *Interdiscip. Lit. Stud.* 19, 17–47
- Javaid, M. and Haleem, A., 2020. Virtual reality applications toward medical field. *Clinical Epidemiology and Global Health*, 8(2), pp.600-605
- Kemec, A., 2022. From reality to virtuality: Re-discussing cities with the concept of the Metaverse. *International Journal of Management and Accounting*, 4(1), pp.12-20.

- Khan, M., 2023. Cloud-based Event Management: Organising and Hosting Virtual Events.
- Kozinets, R.V., 2022. Algorithmic branding through platform assemblages: core conceptions and research directions for a new era of marketing and service management. *Journal of Service Management*, 33(3), pp.437-452.
- Kiong, L.V., 2022. *Metaverse Made Easy: A Beginner's Guide to the Metaverse: Everything you need to know about Metaverse, NFT and GameFi*. Liew Voon Kiong.
- Koohang, A., Nord, J.H., Ooi, K.B., Tan, G.W.H., Al-Emran, M., Aw, E.C.X., Baabdullah, A.M., Buhalis, D., Cham, T.H., Dennis, C. and Dutot, V., 2023. Shaping the Metaverse into reality: a holistic multidisciplinary understanding of opportunities, challenges, and avenues for future investigation. *Journal of Computer Information Systems*, 63(3), pp.735-765.
- Laeq, K., 2022. Metaverse: why, how and what. *How and What*.
- Livingstone, S. and Pothon, K., 2021. Playful by Design: Free play in a digital world.
- www.linkedin.com. (n.d.). Metaverse Real Estate Market Size, Share, Trends | Industry Growth and Forecast to 2028. [online] Available at: <https://www.linkedin.com/pulse/metaverse-real-estate-market-size-share-trends-industry-koshti#:~:text=The%20Global%20Demand%20for%20Metaverse> [Accessed 9 Oct. 2023].
- Lemley, M.A. and Volokh, E., 2017. Law, virtual reality, and augmented reality. *U. Pa. L. Rev.*, 166, p.1051.
- Maloney, D., Freeman, G. and Robb, A., 2020, November. A virtual space for all: Exploring children's experience in social virtual reality. In *Proceedings of the Annual Symposium on Computer-Human Interaction in Play* (pp. 472-483).
- Maddah, M. and Esmaeilzadeh, P., 2023. Lying in online social networks: a bug or a feature. *Journal of Information, Communication and Ethics in Society*.
- Mystakidis, S., 2022. Metaverse. *Encyclopedia*, 2(1), pp.486-497.
- Maddah, M. and Esmaeilzadeh, P., 2023. Lying in online social networks: a bug or a feature. *Journal of Information, Communication and Ethics in Society*.
- Neal Stephenson. *Snow crash: A novel*. Spectra, 2003.
- Park, S.M. and Kim, Y.G., 2022. A metaverse: Taxonomy, components, applications, and open chall
- Pearlman, D.M. and Gates, N.A., 2010, November. Hosting business meetings and special events in virtual worlds: a fad or the future?. In *Journal of Convention & Event Tourism* (Vol. 11, No. 4, pp. 247-265). Taylor & Francis Group. enges. *IEEE access*, 10, pp.4209-4251.
- Petropoulos, F., Apiletti, D., Assimakopoulos, V., Babai, M.Z., Barrow, D.K., Taieb, S.B., Bergmeir, C., Bessa, R.J., Bijak, J., Boylan, J.E. and Browell, J., 2022. Forecasting: theory and practice. *International Journal of Forecasting*, 38(3), pp.705-871.
- Ritterbusch, G.D. and Teichmann, M.R., 2023. Defining the Metaverse: A systematic literature review. *IEEE Access*.

- Rheingold, H. (2008). Virtual communities-exchanging ideas through computer bulletin boards. *Journal of Virtual Worlds Research*, 1(1). Advance online publication. doi:10.4101/jvwr.v1i1.293
- Rathore, B., 2018. Metaverse Marketing: Novel Challenges, Opportunities, and Strategic Approaches. *Eduzone: International Peer Reviewed/Refereed Multidisciplinary Journal*, 7(2), pp.72-82.
- Suzuki, S., Kanematsu, H., Barry, D. M., Ogawa, N., Yajima, K., Nakahira, K. T., et al. (2020). Virtual experiments in Metaverse and their applications to collaborative projects: the framework and its significance. *Procedia Comput. Sci.* 176, 2125–2132
- Schumacher, P., 2022. The Metaverse as opportunity for architecture and society: design drivers, core competencies. *Architectural Intelligence*, 1(1), p.11.
- Strutt, D., 2019. The digital image and reality: Affect, metaphysics and post-cinema. *The Digital Image and Reality*, pp.1-256.
- Singh, S. and Vanka, S., 2023. Metaverse and Future of Work: Avenues and Challenges. *IUP Journal of Organizational Behavior*, 22(2).
- Singh, S. and Sisodia, H., 2023. Building Blocks for the Metaverse: Virtual Worlds, Marketplaces, and Tools. In *Concepts, Technologies, Challenges, and the Future of Web 3* (pp. 198-221). IGI Global.
- Tayal, S., Rajagopal, K. and Mahajan, V., 2022, March. Virtual reality based Metaverse of gamification. In *2022 6th International Conference on Computing Methodologies and Communication (ICCMC)* (pp. 1597-1604). IEEE.
- Tunca, S., Sezen, B. and Wilk, V., 2023. An exploratory content and sentiment analysis of the guardian metaverse articles using leximancer and natural language processing. *Journal of Big Data*, 10(1), p.82.
- Trautman, L.J., 2021. Virtual art and non-fungible tokens. *Hofstra L. Rev.*, 50, p.361.
- UNESCO, 2022. Reimagining our futures together: A new social contract for education. U.N.
- Ullah, F. and Sepasgozar, S.M., 2020. Key factors influencing purchase or rent decisions in smart real estate investments: A system dynamics approach using online forum thread data. *Sustainability*, 12(11), p.4382.
- Velev, D., Zlatev, P. V., Steshina, L., & Petukhov, I. (2019). Challenges of using drones and virtual/augmented reality for disaster risk management. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*
- Wang, Q., Tang, L. and Wang, Y., 2023. Potential applications of the Metaverse in higher English education. *Open Journal of Social Sciences*, 11(1), pp.450-459.
- Wu, J., Rajesh, A., Huang, Y.N., Chhugani, K., Acharya, R., Peng, K., Johnson, R.D., Fiscutean, A., Robles-Espinoza, C.D., De La Vega, F.M. and Bao, R., 2022. Virtual meetings promise to eliminate geographical and administrative barriers and increase accessibility, diversity and inclusivity. *Nature Biotechnology*, 40(1), pp.133-137.
- Wreford, O., Williams, N.L. and Ferdinand, N., 2019. Together alone: An exploration of the virtual event experience. *Event Management*, 23(4-5), pp.721-732.

- West, C. (2020). 15 Virtual Event Ideas and Best Practices. Visme. Retrieved September 03, 2020 from <https://visme.co/blog/virtual-event/>
- Whillans, A., Perlow, L. and Turek, A., 2021. Experimenting during the shift to virtual team work: Learnings from how teams adapted their activities during the COVID-19 pandemic. *Information and Organization*, 31(1), p.100343.
- Xu, M., Ng, W.C., Lim, W.Y.B., Kang, J., Xiong, Z., Niyato, D., Yang, Q., Shen, X.S. and Miao, C., 2022. A full dive into realising the edge-enabled Metaverse: Visions, enabling technologies, and challenges. *IEEE Communications Surveys & Tutorials*.
- Yamin, A.B., 2017. Impact of digital marketing as a tool of marketing communication: a behavioral perspective on consumers of Bangladesh. *American Journal of Trade and Policy*, 4(3), pp.117-122.
- Zhao, Y., Jiang, J., Chen, Y., Liu, R., Yang, Y., Xue, X., et al. (2022). Metaverse: perspectives from graphics, interactions and visualisation. *Visual Informat.* 6, 56–67
- Zainab, H.E., Bawany, N.Z., Imran, J. and Rehman, W., 2022. Virtual dimension—a primer to Metaverse. *I.T. Professional*, 24(6), pp.27-33.

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