PROPERTY OF THE FUTURE

A RESEARCH INTO FACTORS INFLUENCING THE VALUE OF VIRTUAL LAND

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Colophon

Title:	Property of the future
Subtitle:	A research into factors influencing the value of virtual land.
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Date:	1 July 2022
Version:	Final

“The metaverse: where the real and virtual world merge”

- Van Hooijdonk, 2021 -

Abstract

The metaverse is a virtual world where people live, work, shop, and interact with others - all from the comfort of their couch in the physical world. The metaverse is seen as an evolution of the Internet. Although the metaverse may sound futuristic, it has similarities to the real world. The metaverse is a place where one can own property, work, socialise, or travel around (Winters, 2021). This study addresses one of the visible trends in the metaverse, which is the purchase of digital land (DiLella & Day, 2022). As in the real world, land is a popular commodity in the metaverse. Yet, information is limited in academic research. The purpose of this study is to examine the factors that influence the price of virtual land and whether they are consistent with or different from those considered important in existing theories of land prices. To answer this question, the following primary research question was posed. "Which factors influence the value of digital land in the metaverse?" The purpose of this study is to investigate what factors may influence the desirability, and therefore the price, of land in the metaverse. Little research has been done on this new type of land, so the sources used for this study will mainly come from the media. Qualitative research was chosen as the approach for this study because it is best suited to provide new descriptive insights into the nature, meaning, and structure of media coverage (Patton, 2002). In the metaverse, location is important. Just as with real estate in the real world, according to Kiguel, the metaverse is about three things: location, location, location (DiLella & Day, 2022). The location of the property is critical to its value. Similar to the real world, land use plays an important role in determining the value of land in the metaverse. As in the real world, the price of land depends on the area in which it is located. Just as you pay much more for a house in Amsterdam, you pay more for your property in Decentraland if it is located in a favourable area. In general, it can be said that many factors that affect the value of physical land are the same as the value factors for digital land. Still, it must remember that this is an emerging market where much is still based on speculation and suspicion.

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1. Introduction

Imagine a virtual world where people live, work, shop, and interact with others - all from the comfort of their couch in the physical world. Such virtual worlds are referred to as the metaverse. The metaverse is seen as an evolution within the Internet. It can take many forms, including games, online communities, and business meetings where people collaborate via a digital facsimile or avatar of themselves (Needle, 2021).

The metaverse, which exists in parallel with reality and in some cases overlaps the physical world, allows people to work, open businesses, socialize, communicate, and interact with each other in a fully immersive system, with new goals (van Hooijdonk, 2021). Some commentators even compare the metaverse to the Internet, which you can no longer just view from a phone or computer screen, but which you can enter (Yousefpour et al., 2019). Of course, many people have doubts about the metaverse, and it is easy to understand why. Living in a virtual world is a mix of science fiction and emerging technology, and it challenges basic notions of what it means to be human. The promise of a metaverse also raises ethical concerns and endless questions (Winters, 2021). Is the metaverse real? What problems might arise from its existence? And who will benefit from it?

Although the metaverse may sound futuristic, it does have similarities to the physical world. The metaverse is a place where one can own property, work, socialize, or travel around (Winters, 2021). While this emerging trend is visible, little is known about the economy in the metaverse. Recently, concerts have been organised, Domino's Pizza has opened a stand and the Australian Open took place live both in the real world and in the metaverse. More details about these events will be in Chapter 2. However, as more activity takes place in the metaverse, it seems that knowledge and information is missing (Bray, 2022). For example, where the events take place and how the location is chosen in the metaverse. Yet, this information is limited offered in scientific research. Therefore, this study addresses one of the visible trends in the metaverse, namely the purchase of digital land (DiLella & Day, 2022). As in the real world, land is a popular asset in the metaverse. The following questions are relevant for land as well. What do people actually buy? And what factors determine that someone is willing to pay a certain amount of money for a piece of digital land?

Since there are comparisons between the physical world and the metaverse in terms of land and its location, such as ownership and development opportunities, this study examines whether existing land pricing theories from the physical world can be applied to digital land. But first, let us explore what exactly the metaverse is.

1.1 Background

The term ‘metaverse’ was first used in the 1992 science fiction novel *Snowcrash* by Neal Stephenson. It was coined as the successor to the Internet and represents his vision of how a digital world might soon emerge. The metaverse, in this novel, is the digital realm where anything we may imagine can exist. Eventually, we will be constantly connected to the metaverse so that we can expand our senses of sight, hearing and touch, blend digital objects with the real world and immerse ourselves in fully immersive 3D environments at any time (Stephenson, 1992). Even though Stephenson wrote his book 30 years ago, it is still relevant today, perhaps even more so now than in 1992, because it laid the foundation for what the metaverse should look like (Huddleston, 2021).

To properly understand the concept of the metaverse, we must first briefly discuss the history of the Internet. Web 1.0 was described by the ‘inventor’ of the Internet, Tim Berners-Lee, as the ‘read-only’ Web, used mainly on a desktop computer (Berners-Lee et al., 1992). This was followed by Web 2.0, which is all about social interaction, primarily via mobile devices. We are now standing on the eve of Web 3.0 (Candid, 2022). This natural evolution of the Internet is based on decentralization and peer-to-peer networks connected via the blockchain, rather than the centralized, managed, and regulated web applications we know and use today. The emphasis on decentralization in Web 3 is based on the idea that "the users are the platform" and the platform is collectively maintained by those who participate in it. As co-owners of the platform, users therefore have the right to enjoy sovereignty over their virtual assets, data, and digital wealth. This shift in infrastructure and the pursuit of user-centricity is already leading to entirely new applications such as decentralized finance (DIFI). The goal of DIFI is to provide a financial system that allows customers to transfer value without a trusted intermediary or central authority (Zetzsche et al., 2020).

The grand vision of the metaverse is to create a digital universe connected to our physical world through multiple digital technologies. These parallel virtual environments and the convergence of the online and offline worlds will allow us to experience and communicate in the digital world thorough avatars. Still, the metaverse features many elements from physical reality, including buildings, work and leisure locations, and other landscapes and locations (Winters, 2021).

Although the implementation and creation of the metaverse is still in full development, it is possible to speak to some extent of a link between the physical and digital worlds (Shawon, 2022). This by approaching the digital world from the physical world and looking at the interaction between companies and events in the physical and digital worlds. Currently, the broadest form of the term metaverse is being discussed and explained as a virtual world where people can interact with each other online. It is a network of virtual 3D spaces where users can perform all sorts of activities through an avatar, a digital doppelganger (Winters, 2021). But just as people in the 1980s could not imagine what the internet would look like in 2022, it is not so easy to describe the metaverse. Nevertheless, a number of core properties of the metaverse can be mentioned (Shawon, 2022). First, the metaverse is 'continuous' and 'persistent'; it has no pause and no end. It cannot be reset and continues indefinitely. Second, a metaverse runs synchronously and is 'alive'. There are pre-planned and independent events. Just like in real life. It is for everyone and in real time. The third core feature is that there is no limit to the number of simultaneous users. Fourth, it is a fully functioning economy. It is possible to participate both as an individual or as a company. It is possible to invest, buy and sell. The last key feature is interoperability, which means that any data, digital goods or content can be used throughout the metaverse.

However, the concept of metaverse is not as new as it may seem. Since 2003, people have been gathering in the online environment of Second Life to engage in working, socializing, and travelling. Second Life reached its peak in the late 2000s (Wetering, 2019). It uses keyboard-and-mouse control, and the blocky graphics are far from the sophisticated vision of the current immersive environments transmitted via virtual reality headsets and produced by companies like Meta and Microsoft. Second Life, on the other hand, still has a loyal following and is perhaps the longest-running experiment with the potential of a metaverse-like world (Wetering, 2019).

There have been two recent events that are not directly related to the technological growth of the metaverse, but have contributed to its popularity. One is COVID, which has led to a need to move certain social and recreational activities to the Internet (Simon, 2020). Many large companies are trying to figure out how to profit from this. The other is the fact that Meta (the owner of Facebook) has

argued that the metaverse is a big deal and is trying to align with it with its new brand identity (Heath, 2021).

Although we are still far from the reality of creating a real metaverse, there are more and more initiatives moving in that direction. Tech giants such as Facebook, Apple, Samsung, Google and Microsoft are investing aggressively in the metaverse, but there is no guarantee yet that their efforts will be successful. And not just the big tech giants that are investing in the metaverse: 70 fashion brands, including big names like Estée Lauder, Tommy Hilfiger, Dolce & Gabanna and Forever 21, have joined a virtual fashion week on a metaverse platform – there are several platforms such as the Sandbox, Decentraland and Cryptovoxels, - Another example is HSBC Bank, which previously closed 69 physical locations while purchasing virtual properties on a metaverse platform. The metaverse is big business, and venture capital investors are looking for deals in this space (Palmer, 2022).

With the rise of the blockchain, cryptocurrencies and NFTs in recent years, a new technological infrastructure has emerged that has given entrepreneurs and crypto enthusiasts the tools to build a new kind of economy – decentralized, without trusted third parties – for the digital world (Iansiti & Lakhani, 2017). Chapter 2, paragraph 2.1, discusses the meaning of the preceding terms in detail. Many investors are buying digital land, and it is this aspect of the metaverse that this study will explore.

1.2 Research problem

It is no secret that the real estate market is booming, and this is true for physical land as well as property in the metaverse. Prices for land in the metaverse have increased by up to 500 percent in recent months, after Meta announced it would focus entirely on VR and even changed its company name from Facebook to Meta (DiLella & Day, 2022). But what determines the price of an individual parcel of virtual land? This study will focus on what factors determine the value of digital land in the metaverse. Currently, it is unclear what mechanisms are behind the development of land prices in the metaverse.

Current scholarship offers various theories on how land prices are determined in the real world. Standard economic theory states that agricultural land prices are determined by income value, i.e. the present value of all future net returns to land (Boere, 2015). In addition, local market conditions affect land prices. Proximity to a city also affects the price of land: the closer to the city, the higher the land price, as proposed in the 19th century by Johann von Thünen. Speculation about the expansion of cities also affects land prices. In fact, many other factors impact the price of a specific plot of land in the physical world. We do not know yet whether land values are determined in the virtual world in a different, or perhaps similar way. After all, distance as we know it no longer exists, nor are there specific foods grown on specific types of land, brought to specific markets. This may suggest that traditional theories regarding land prices do not (fully) apply to the price of virtual land.

The aim of this study is to examine the factors that affect the land price of virtual land, and whether they are consistent with or different from the factors that are deemed important in existing theories of land prices. To answer this question, the following primary research question established.

"Which factors influence the value of digital land in the metaverse?"

To answer this main question, four secondary research questions are set:

1. *"How can virtual land be purchased in the metaverse?"*

2. *"What factors influence land prices for tangible land?"*
3. *"What factors influence land prices for virtual land?"*
4. *"What are the main differences between the factors?"*

1.3 Societal and academic relevance

In terms of academic relevance, this study builds on the existing literature on land economics and land price theories, which examines the factors that influence the price of a plot. However, existing literature relates to physical, tangible land, as we have known it to date. The growing use of virtual land has as yet been little researched. This study will therefore offer a new and exciting view of current developments in the virtual economy.

In terms of social relevance and impact, this study will provide a broader perspective on emerging developments within the metaverse. Virtual land is very risky; therefore, users should only invest money they are willing to lose, similar to investments in other high-risk assets such as cryptocurrencies. However, this speculative investment can be extremely lucrative. Now that even companies like PWC, the second-largest financial service network in the world with knowledge about investment and real estate, invest in the metaverse, it is interesting to gain some idea of the factors that influence the price of land (Birch, 2022). While this does not ensure that investments will be profitable, it does help investors in making thoughtful decisions. Therefore, the study will identify more clearly what the move towards virtual worlds means and what determines the price of an essential asset in a digital world. It will also shed light on why certain plots are more financially and/or commercially attractive than others.

1.4 Structure of the thesis

Chapter 2 discusses existing land price theories for tangible land in more detail. In addition, this chapter details the various worlds in the metaverse on which this study focuses. Next, Chapter 3 discusses the qualitative research method used for this study. Chapter 4 presents the data collected. Finally, in Chapter 5, a comparison will be made between the data collected about digital land and the theory previously discussed regarding physical land, in order to identify the most important differences and similarities between the two types of land. This chapter will also provide space for discussion and conclusions. Finally, considerations and recommendations for future research will be made.

2. Theoretical Framework

2.1 Technical workings of the metaverse

To dive further into the world of metaverse, it is important to acquire some basic knowledge about the technical background of metaverse and the following concepts: Blockchain, NFT, Ethereum, DAO and trusted third parties.

Blockchain technology is the foundation of the metaverse (Modderman, 2021). This technology, a new way of registering transactions, was first used with the introduction of Bitcoin in 2009. This was a remarkably new technology: not only did Bitcoin not have a central database, but the entire system was peer-to-peer and extensively equipped with cryptographic solutions for recording transactions. The technology behind Bitcoin that makes this possible, the blockchain, ensures that the essential functions of the "trusted third party" are fully automated over the Internet. This made them as accessible, programmable, and freely available as the Internet itself (DNB, 2020). A trusted third party is an entity that holds things like source code, data certificates, and keys for third parties, for example a bank.

A blockchain is a transaction chain of data exchanged between a network of individual independent parties. In our everyday life, we constantly deal with registers, ledgers and important data. In the past, this information was written down in books, but today digital databases are preferred for storing information (Nakamoto, 2008). Since it is not desirable for everyone to be able to view and change all the information, these databases are usually managed by a single party. It is essential that this party is trusted by everyone, i.e. a trusted third party. The owner of the database has absolute power and therefore the ability to change or delete all information without anyone else knowing. A blockchain is different from this traditional digital database. Transactions are stored in blockchains without being deleted or modified. In principle, a blockchain is decentralized, meaning that each party connected to the blockchain network has a complete copy of the ledger. A blockchain is jointly managed by many people:; each party in the network is not connected to one database, but to everyone else in the network. This is called peer-to-peer (Figure 1). Thus, the information in a blockchain is not in the hands of a single party, but in the hands of a large number of different parties connected to the blockchain network (Noort, 2015). Each participant in the network owns the entire ledger, but at the same time, no one owns it.

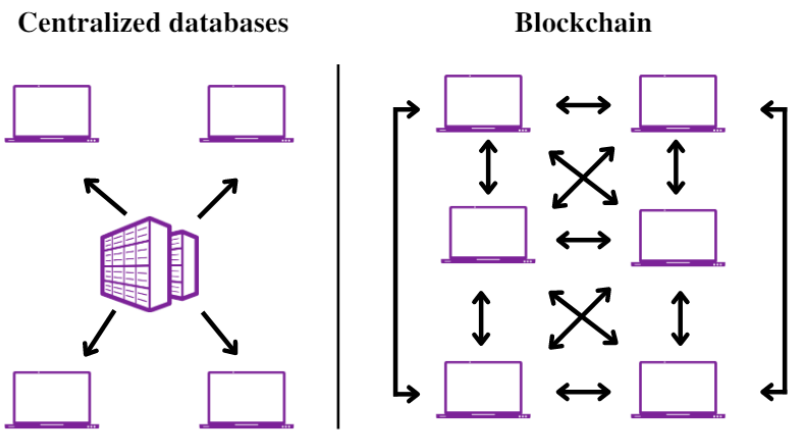

Figure 1: Centralized databases vs. blockchain (drawing by author)

Because the metaverse uses the blockchain, it does not belong to anyone, but is created collectively by the users. There is no regulator, no control, and no government regulations. It is a Decentralized Autonomous Organization (DAO) and therefore a platform that operates independently, without staff. The entire operation is written in programming code, and with the help of smart contracts, the company knows exactly what to do. The metaverse thus may be compared to a computer program that gives a computer its work instructions. These are organizations without a central authority, that are transparent and where everyone is equal because management is based on smart contracts. There must be accountability to the users of the platform. Section 2.2 further discusses Decentraland, the first decentralized world, that functions entirely as a DAO.

Another concept that is important to the metaverse and is based on the blockchain are NFTs. The term NFT stands for Non-Fungible Token. Something fungible means that it can easily be replaced by another identical thing. A €10 bill can easily be replaced by another €10 bill. They are two different bills, but they have the same value when used to buy something. Non-fungible is the opposite: it is a unique specimen that cannot be replaced by another. If we apply the above to the physical world, image that you have a proof of ownership that is in a glass safe to which only you have the key. Since you have the key, it is clear that you are the owner. Since the safe is made of glass, everyone can see what is inside and everyone knows you are the owner (Duursma, 2021).

In contrast, an NFT is a certificate that contains a unique ID, a link to a digital object, and a signature from the maker (Ham, 2022). An NFT is not a picture, MP3 or video, but a file that can be found somewhere on the Internet. In other words, an NFT is a reference to an external file (Duursma, 2021). The NFT is your own unique proof of authenticity and provenance: you know with certainty that you own the NFT and not someone else. The certificate contains this reference, including the reference to the owner. NFTs are immutable, cannot be edited, and are stored in the blockchain (Sarandos & Akkineni, 2022). NFTs can be created from any digital file, such as a recording of songs, photos, videos, Twitter messages, articles, TikTok videos, computer game purchases, professional videos and soundtracks, but also digital land or buildings. In many ways, the value of NFT is comparable to that of traditional art and auction trading (Heurman, 2021). Just as in the art world one buys or sells a piece of art history or aesthetic beauty in the form of an object, the same is now happening on the Internet. The value of an object is rarely determined by the object itself. Its value is what people ascribe to it, and rises when people consider it valuable and are willing to pay for it. People who share a common cultural belief that something has value. After all, even a painting by Picasso is practically worthless if all you consider is the wood, paint and canvas. On the other hand, the price the object receives because of a shared cultural belief is extremely high (Duursma, 2021).

What makes an NFT so important when considering its impact on the digital land is that the existence of NFTs allows users to prove ownership of their virtual lands and spaces in the metaverse (Mileva, 2022). The underlying blockchain technology makes it possible to prove ownership of these digital assets. NFTs can be used in the metaverse to sell or rent digital land, set up online stores or organise social events, among other things.

Furthermore, cryptocurrencies play an important role in the metaverse. These are a type of digital currency that is often used as an alternative monetary system to regular currencies (Wolfgang et al., 2020). The most famous cryptocurrency is Bitcoin, but each metaverse world has its own cryptocurrency. Just like in real life, metaverses are a place where commercial exchanges take place. These transactions, such as the purchase of NFTs, are conducted in cryptocurrencies. In a metaverse it is possible to buy and sell land, buildings or clothes for an avatar. These virtual products take the form of money that can be used to buy or sell goods. These virtual products have the form of NFTs (Tran, 2021).

Blockchain and NFT technologies have enabled the development of interoperability between different metaverse worlds. Because NFTs are property titles registered on the blockchain, ownership of a digital asset is not limited to the confines of a particular platform or game. From a technical perspective, this is only possible with open and decentralized metaverses based on the same blockchain (Tran, 2021a). Cryptocurrencies such as Bitcoin, Litecoin, and Ether, the Ethereum blockchain's currencies, are built on blockchains (Cuofano, 2021). Such interoperability is not yet possible on most existing metaverses, but is becoming increasingly important.

2.2 Definition of the metaverse

The metaverse is a broad term. The metaverse is the entire network of interconnected 3D virtual spaces in which users can interactively look around and interact, often with the help of avatars.

These 3D spaces consist of different "worlds" (Winters, 2021). In the gaming world, metaverse-like virtual environments already exist, such as Fortnite, Roblox, Minecraft, Decentraland, Cryptovoxels, Axie infinity, NVIDIA Omniverse, Sandbox, OpenSea, and Facebook Horizon (Liszio & Masuch, 2016). However, it is possible to develop new "worlds", so that there will most likely be new worlds yet to come. In the gaming world, these virtual worlds already play a major role. The actual completion of the metaverse, however, could take another ten years. But the technical and cultural foundations are now in place.

There are many differences between these metaverse worlds. For example, some are fictional and other are exact digital copies of reality (Figure 2).

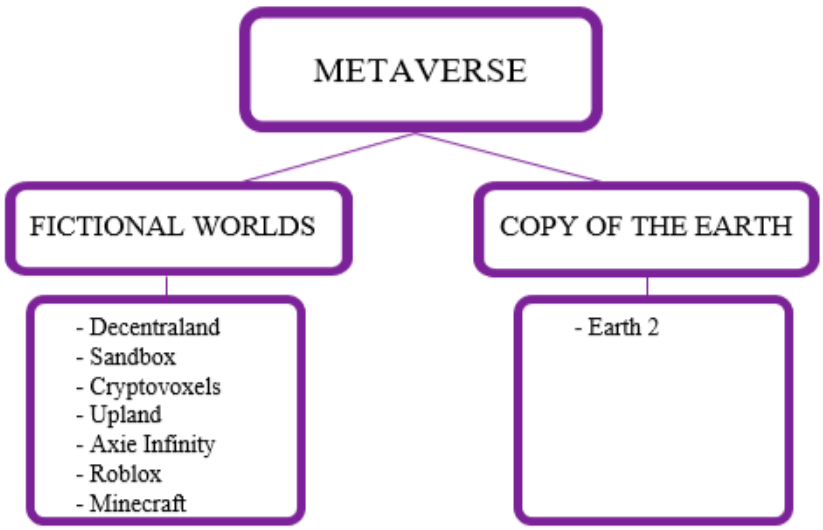

Figure 2: Overview of the metaverse and various most common worlds (drawing by author)

The fictional worlds are virtual animations. These worlds have their own street map, locations and addresses. In these worlds it is possible to travel independently and participate in events. In them, users can build, develop and organize activities. As for the development of the metaverse, Sandbox and Decentraland take the approach of creating a virtual world, with avatars moving. Axie Infinity, on

the other hand, is more of a game focused on collecting items to breed and maintain creatures in the game (similar to Pokemon Go). It is likely that many other approaches are yet to come (CFTE, 2022).

Earth 2, on the other hand, is a futuristic concept for a second Earth, a metaverse between virtual and physical reality where real places on an articulated map correspond with user-created digital virtual environments. Here, virtual land can be owned, bought and sold. People are using real money to buy digital assets and real estate in this futuristic virtual metaverse of Earth. One major difference between Earth 2 and the fictional world platforms is that Earth 2 is currently a 3D variant. It is expected that in the future there will be a game variant associated with it. For now, however, it is not possible to walk around with an avatar or participate in events.

For this study, it was decided to examine the fictional virtual worlds in more detail. The reason for this is that these worlds are where most of the development is currently taking place, and they are the most advanced in terms of creating virtual environments. To get an idea of what a digital world looks like, one of the largest metaverse worlds, Decentraland, will be explained in more detail. The decision to elaborate on Decentraland was made not only because it gives a better picture of what a digital world looks like, but also because it is one of the most well-known worlds. Decentraland is the most established and well-known of the decentralized virtual land projects (Winters, 2021). The description of Decentraland serves primarily as additional information for the reader to learn more about how fictional metaverse worlds work. The study as a whole will be broader and focus on several fictional worlds.

2.2 Decentraland

Decentraland is exactly what you would expect if you read the name correctly: it is a decentralized virtual reality world powered by the Ethereum blockchain. In early 2015, the founders created a proof-of-concept for recording ownership of virtual real estate on a 2D grid of pixels using blockchain technology (Winters, 2021). Now, Decentraland has developed into an interactive 3D world that can be accessed with a virtual reality headset or simply through a web browser. Decentraland is an open-source interactive virtual reality platform that allows users to buy, use and build things on a virtual property. The system guarantees its users full ownership rights and permanent registration of property on the Ethereum blockchain. Thus, everything they create is their own property and not the property of the game developers (Tran, 2021). As in other metaverse environments such as Minecraft or Second Life, there is no real destination in Decentraland. Instead, users go through a virtual world and purchase virtual land, which is called LAND. Here they can create content and applications, but also experiment with structures. The following images are illustrative to get an idea of activities in the Decentraland.

Figure 3: Match at Australian open (Ausopen, 2022)

Figure 4: Australian open (Ausopen, 2022)

Figure 3 and 4 show how visitors could attend the Australian Open in Decentraland during the Covid pandemic. In addition to the matches, virtual viewers saw exclusive content, including behind-the-scenes videos from more than 300 cameras in and around the park, as well as the players' entrance areas and training village. Fans were able to walk through the city to get to the Beach House and Grand Slam Oval, where live and historic games were shown on screens. Hosting the event in Decentraland matched the aim to become the "most accessible and inclusive sports and entertainment event in the world."

Figure 5: Concert in Decentraland (Hakki, 2021)

Figure 6: Socializing in Decentraland (Hakki, 2021)

It is also possible to attend concerts in Decentraland, as shown in Figure 5 and 6. As in the physical world, it is also possible to get in touch with others and hold conversations in this world.

The fact that major brands are also interested in the metaverse can be seen in Figures 7 and 8. In Decentraland, real fashion shows are organized, for example, by Tommy Hilfiger. At these shows, a combination of "real" clothes and clothes in the form of NFTs are shown. Users can buy these clothes for their avatars in the metaverse world.

Figure 7: Fashion show TH (Terra, 2022)

Figure 8: NFT clothing TH (Terra, 2022)

Figure 9: Ordering a pizza at Domino's (Ivelina, 2021)

Figure 10: Waiting in line for Domino's (Ivelina, 2021)

That the connection between the physical world and the metaverse is increasingly sought after is shown by the company Domino's pizza. As a pilot project, they have opened a pizza stand in Decentraland (Figure 9 and 10). At this stand you can order a pizza, which is then delivered to your home in the physical world, but currently only in certain areas in the USA.

Figure 11: Company in Decentraland (CoinYuppie, 2021)

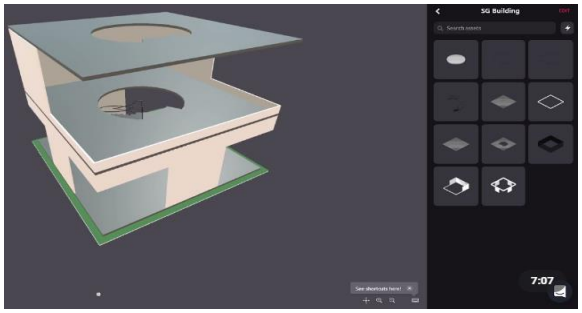

Figure 12: Designing in Decentraland (Swissverse,2021)

Users can also develop their own digital property. Figure 11 shows a commercial building on site in Decentraland. This building can be used to organize events and create a place where people can meet. Figure 12 shows, how the design of a digital building works in practice. Of course, not everyone is equally creative. For this reason, it is also possible to access the services of architects in Decentraland.

2.2.1 Land

Decentraland has two tokens: a Non-Fungible Token, called LAND, and a "normal" token, called MANA, which is used as the cryptocurrency in the game. The world of Decentraland is divided into 90,601 parts of LAND called parcels. Each LAND parcel measures 16 meters by 16 meters in size and is represented by an NFT (non-fungible token). A non-fungible token is a unit of data on the blockchain that represents a unique digital item, in this case virtual real estate (Republic, 2022).

Parcels of land are traded at market value via the blockchain, allowing users to buy or sell land to other users both through the decentralized marketplace on Decentralands website and through the secondary market OpenSea. OpenSea is the largest marketplace for non-fungible tokens or NFTs in the world.

The land in Decentraland can be purchased with the currencies Ether or MANA, the home currency of Decentraland. Cryptocurrencies such as Ether and MANA can be purchased on exchange platforms such as Coinbase and Binance. On these platforms, users can exchange national currencies for cryptocurrencies (Jakes, 2022).

LAND can be purchased by players using MANA. This can be bought on the crypto exchange. The Ethereum blockchain keeps track of who owns which piece of LAND. It should be pointed out that the world of Decentraland cannot get bigger or smaller; there will always be 90,601 parcels. This makes land in this world scarce and thus valuable. As demand for a specific parcel increases, its value also increases. The owner can sell it or rent the space on their land to brands that want to advertise or host events, while the owner gets a portion of the revenue. The owner can also open a shop on their land and sell digital items to users (Ravenscraft, 2021).

As mentioned above, Decentraland is a DAO. As a result, MANA token holders are also entitled to vote on critical land use changes such as building height restrictions and content filtering (Hoogendoorn, 2020). Users receive one vote for each unit of measurement they own at the Ethereum address they use to vote, as do private landowners, who receive 2000 votes per parcel they own, and property owners, who receive 2000 votes per parcel in Decentraland. This allows landowners with a larger financial portfolio to have a significant stake in the future direction and day-to-day operations of Decentraland, consistent with the concept of a decentralized world (Jakes, 2022).

2.2.2 Use and benefits of land

Owners of LAND own a virtual piece of land in the form of an NFT. On this piece of land within the virtual world of Decentraland, the owners can do whatever they want: the piece of land belongs to them. LAND owners can therefore build on their own piece of the virtual world. The Decentraland map consists of privately owned land and public land that cannot be bought or sold, such as roads and plazas owned and controlled by the platform. Roads are marked in grey on the Decentraland game map, and private land is marked in blue. If the land is for sale, it is shown in light blue on the map. Other large plots of land have been reserved for places owned by the Decentraland community and are marked in green on the map. Each square has its own theme. The most central square on the map is the Genesis Block Plaza, which serves as the starting point for all avatars entering Decentraland.

As an owner of private land parcel, you have complete control over its design and appearance, with no interference from Decentraland's development team. Parcel owners can create content on their land using the Decentraland Builder or software developer kits. Using this, owners can easily build things like static 3D scenes, interactive applications, and games. Digital art in the form of an NFT is also often placed on a piece of LAND. Players can then purchase this digital art via MANA (Vreeswijk, 2021). Land can be traded at market value on the blockchain, allowing people to buy or sell land to other users on both the Decentraland Marketplace and OpenSea's secondary market.

In the marketplace users can view the individual parcels for sale or the entire map of Decentraland (Figure 13 and 14). If the user moves their mouse over the parcels, they can check their details. If the user clicks on the parcel, they will see the price and details about the location. Here they can also bid on or buy the land. Once they select the land wanted, they can make an offer or buy the land at the price it is currently listed at.

Figure 13: Buying land on Decentraland Marketplace (Solberg, 2021)

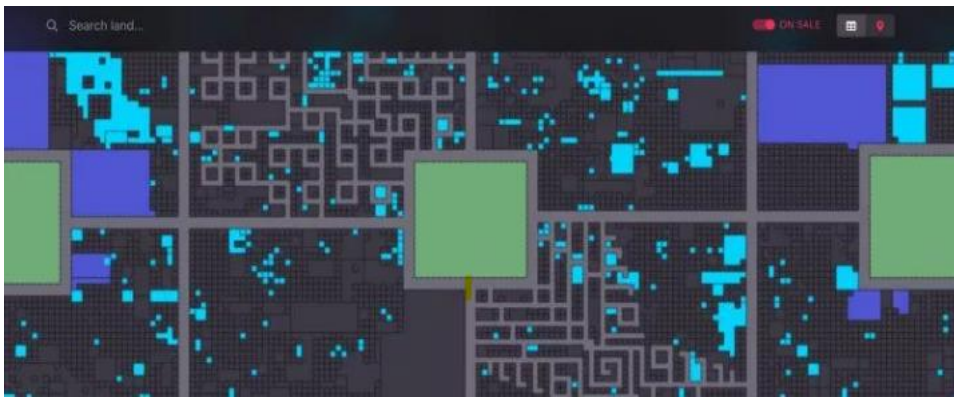

Figure 14: Choose your land on the Decentraland map (Sahid, 2022)

2.2.3 The virtual economy

Decentraland has a virtual economy where users can engage in a variety of economic transactions. They can earn money with the applications they create themselves (Duursma, 2021). Examples of economic activities in Decentraland are a casino; the auction house Sotheby's also has a digital branch there. The American company Boson has purchased $700,000 worth of land in Decentraland to build a shopping center (Thompson, 2021).

Having property in the virtual world provides several opportunities to create a consistent source of income. First of all, property plays an important role in the virtual world, as they allow owners to host live experiences such as games, art museums, stores, landscapes, interactive education, etc. These experiences can be planned and created using unique development tools. Players may have to pay an entry fee in cryptocurrency to access the experiences offered on the land. Users can also lease out the parcels they own to developers to construct buildings, arcades, concert halls, offices and other venues. This is ideal for those who want a steady stream of income. However, it is important to keep in mind that land in demand in prime metaverse locations is expensive. Another alternative is to buy a plot and develop it yourself with VR design and development skills. Unlike games, designing properties and buildings requires more work and can be expensive depending on the resources used. Different metaverse platforms also have their own limitations, but the return on investment is the same (Nickerson, 2022).

Finally, selling land within the platform is another way to make money. As pointed out before, the number of LAND parcels in Decentraland is limited to 90,601. This total of land of 90,601 exists out of 43689 private land parcels, 33886 district LAND, 9438 roads and 3588 plazas (Winters, 2021). Private parcels can be bought and sold, and are all the standard size: 16m x 16m, or 52ft x 52ft. Height is restricted by certain limitations. Two or more parcels can be combined into an estate, which greatly expands the possibilities for content creation. Roads are an example of public parcels. Plazas, like roads, are not for sale and represent public areas meant to engage and educate users. There are nine plazas, each owned by the Decentraland Foundation and are built to serve as welcoming introductory spaces for newcomers as well as respawn zones (Winters, 2021). Once all the land will have been sold, the number of available rentals will skyrocket, as more people become aware of this virtual world. Demand will be especially high in high-traffic and highly desirable areas of the virtual world. This study aims to investigate the factors that determine which areas are the most desirable.

2.2.4 Economic structure

The economy of the metaverse will probably be similar in important parts to the current (online) economic system. They produce, exchange, use currency, invest, collect the profit (or loss) from it. They produce goods, offer things on marketplaces, advertise, hire people. They watch ads to get products for free or sometimes have to perform an action (fill out data, level up in a game, earn certain tokens) before they get access to certain products, services, or worlds. The same will be true for the metaverse (TNL, 2022).

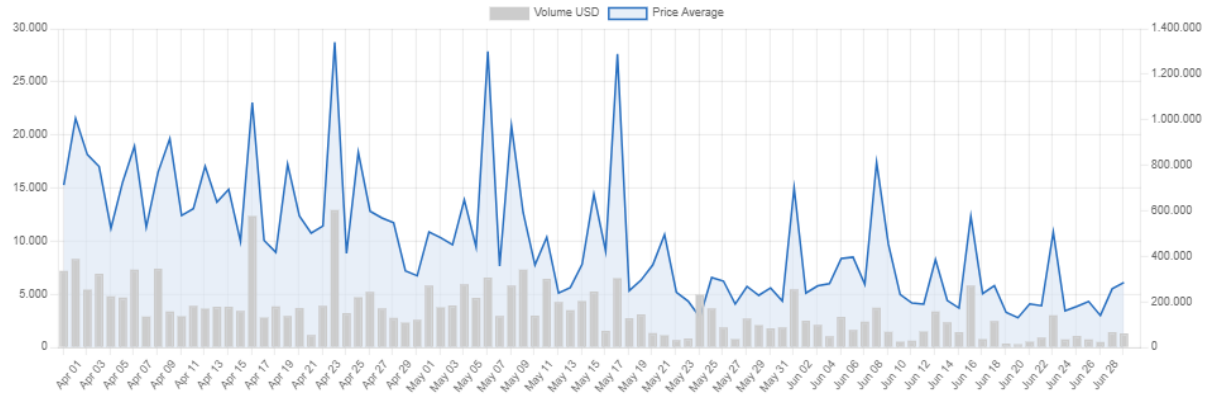

Figure 15: Decentraland Price Chart (NFT Stats, 2022)

Looking at Decentraland's statistics, for June 2022, shows that Decentraland's total sales volume is $454.32k. The average price of a Decentraland NFT was $5.3k. There are 7,395 Decentraland owners with a total supply of 97,609 tokens (NFT Stats, 2022). Figure 15 shows the prices and volume for the months from April to June 2022. The left Y-axis shows the volume in dollars, and the right Y-axis shows the average price in dollars. The X-axis shows the months. Figure 16 shows the top 5 sales of Decentraland in the last 30 days. The image shows the name of the plot, how many days before June 29 2022, it was sold, and the sales price in dollars.

	NFT	Date	Price
1	Bet	21 days ago	$79.2k
2	888	28 days ago	$55.2k
3	888	28 days ago	$53.3k
4	赌	26 days ago	$25.6k
5	Aoyama Real Estate	30 days ago	$22k

Figure 16: Top 5 selling Decentraland parcels of the last 30 days -29/6/2022- (NFT Stats, 2022)

The value of 1 MANA against the dollar changes over time. Since land is purchased in decentralised land with MANA, the value of MANA against the dollar affects the value of land.

Judging by the technical analysis, the historic journey of prices in Decentraland is similar to that of other digital assets, and this could be the main reason for its popularity (Cox, 2022). According to the

positive MANA forecast and future market capitalization, the road is full of blossoms provided that investor confidence continues to boom, which will lead to a big push for Decentraland price and make it cross all barriers above $4.8 in the cryptocurrency market according to an unbiased crypto forecast for 2022 Decentraland MANA price prediction (TNL, 2022). According to the MANA price forecast, the crypto price will reach $5.1 by 2022. These same predictions expect MANA to be $97 by 2030. Although this is based on predictions, it does not promise certainty. Importantly, if the value of MANA changes over the years, this will also affect the value of land in Decentraland. If MANA increases or decreases by x percentage over the years, the same change in value will be reflected in the value of the land. However, other factors affecting land values will continue to play a role (Cox, 2022).

2.3 Land value theory

According to Wolcott (1987) the value of land is reflected by the flow of profit from the land. This profit can be related to the environmental factors of the land, which are divided into two factors: human factors and non-human factors. The human factor means that increasing the value of land can be done by building something on the land, such as buildings, housing or irrigation systems. The non-human factor are external factors that impact the value of the land. They can be subdivided into economic, social, government and physical factors.

Economic factors

The economic factors are related to the relationship between supply and demand which determines the flow of purchases. The demand variables include the number of people in the labour force, salary levels, income levels and purchasing flow, leisure costs and transaction costs. Supply variables are the availability of land, the price of permits, taxes, and other overhead costs.

Social factors

The social factor refers to the characteristics of the people in the area where the land is located. These characteristics that can affect the price of land are: the total population, the diversity of the population within the residence, and the level of education.

Government factors

Governments and their agencies decide and implement laws and this may affect land use. The government can determine the pattern of land use, settlement and economic centres and infrastructure in the region. In addition, the government sets the amount of tax on products.

Physical factors

The physical nature of the land can be measured by looking at the externalities of the soil. Land externalities are divided into beneficial and detrimental externalities. Beneficial externalities of land exist when the land has a strategic location. Infrastructure is another beneficial externality; it may prevent damage to the land by disasters like floods, but also offers transportation options such as roads and railways. Beneficial externalities increase the price of land compared to land without beneficial externalities, even if the land has the same size and soil type. Negative externalities are elements that affect the price of land negatively. These include long distances to markets, the risk of natural disasters in the area, and proximity to dangerous structures such as waste disposal plants. The price of land decreases due to these factors (Pearce & Turner, 1990).

2.3.1 Existing theories about land price

Over the years, many theories about land prices have been developed. The most relevant are discussed in this section. These existing theories have been applied only on the basis of real, physical land. The question, therefore, is to what extent these theories are also relevant for online land. Theories and models indicate that land prices and land use are closely related (Koomen, 2002).

In this section we discuss factors that affect the value of physical land. Buitelaar and Witte (2011) have studied the characteristics of land parcels that can potentially be used for development and the factors that influence the value of this land. They have identified the following factors as influencing land price: Residual Value, Location, Land Characteristics, Land Use, Density, Size of Land, and Landowner. Therefore, this section will discuss each of these factors in detail. These factors will then be used in the content analysis to see whether these same factors also apply to digital land.

Residual value

Since the early 1990s, the value of land has increasingly been calculated on a residual value basis. The residual value of land is determined by the difference between the expected cost and final costs of realization. This factor can be traced back to David Ricardo's land rent theory, one of the first classical building land theories (Buitelaar et al. 2008). Ricardo's theory, dating to 1817, is based on the fact that the fertility of the site or soil has a great influence on rent. On the most fertile soil, therefore, different crops were grown than on more barren soil. Ricardo thus pointed to a principle that is still central to land valuation today. He mentioned that corn is not high because rent is paid, but rent is paid because corn is high. This assumption still forms the basis for determining residual value today. Land value is thus a derivative of the income that can be earned from it. Pricing therefore also takes place on the futures market: when there is a shortage in the housing market, land with the function of housing is worth more. Herein lies the essential contribution of Ricardo.

If it is assumed that a plot of land will be developed, the development is always based on the characteristics of the plot and takes into account what can be built on the land. The land revenue minus the land cost results in the balance of the land utilization. This balance represents the maximum amount that can be spent on land that is ready for construction and is therefore equal to the value of the land. The above reasoning is based on perfect information rationality, which leads to the value of land being equal to its actual price (Ricardo, 1821). This, is typical of neoclassical economic theories. In practice, however, rationality and information appear to be limited, and other motives and mutual motivations are important. As a result, the price and value of the land are rarely the same.

In calculating the residual value, not only is the value of the future use important, but the value of the current use, the use value, also plays a major role (Schutte et al. 2002). The value in use is determined by deducting the expected future income from continuing the current use by future expenses, calculated back to the present. When the zoning plan of a piece of land changes, this can also affect the value of the land (Van Buuren et al., 2006). For example, the new allowed functions may be more profitable than the current ones or vice versa. For example, in many cases agricultural land is worth less than land to which a residential designation is assigned.

Location

Ricardo's land rent theory refers mainly to the agricultural land market. A fundamental limitation of this theory is that it focuses only on the fertility of the land and not on its location, especially in relation to the market for the goods produced. Von Thünen (1826) pointed out the importance of

distance and location of land. He assumed that, given the cost of transportation, farmers tried to locate themselves as close to the market as possible (Schneider, 1934). Assuming that the soil is equally fertile everywhere and that every farmer makes the same profit, it can be said that the rent of the land decreases as transport costs increase. Von Thünen theory's focuses on the value of land, based on the cost of transportation to market. He explains rental value and land rent as a function of yield per unit area, production cost per unit commodity, market price per unit commodity, and distance to market (Rodrigue, 2013). In other words, Von Thünen's theory estimates economic rent value based on spatial variation, or the location of resources in the economy. The premise of Von Thünen's model is that transportation costs depend on the distance to market and the different product types. His so-called 'isolated state model' consists of four rings with different specifications and functions, giving the best use of land in each area, given the transportation options. Von Thünen observes the effects of these two variables on profit maximalisation, keeping other factors the same. When examining the difference between total income and total costs, the farmer can decide to either farm all the land, choose one specific product, or not farm all the land (Gaspar, 2020).

Von Thünen's ideas about the agricultural land market are fairly easy to translate into an urban context. To this must be added the insight of Ricardo that soil of the same quality is not available without limit (McDonald & McMillen, 2007). Land is a scarce commodity and has a value because it has specific characteristics and is only available to a limited extent. These considerations are taken into account in Alonso's (1964) theory of land rents. He developed a theory in which the price of land that people are willing and able to pay, given a particular utility, is made dependent on the distance of a piece of land from the economic centre of a city. While Von Thünen limited himself to the agricultural sector, Alonso adapted the model to make it applicable to multiple sectors. In Von Thünen's model, it was assumed that costs, unlike rent, are a fixed amount per hectare. Thus, rent and other inputs were fixed in relation to each other. Alonso abandoned this assumption and introduced substitution into the model. This means that land inputs can be substituted for the other inputs. As in the Von Thünen model, the 'highest' curve at this point can also yield the greatest profit. The result is the bid-rent curve; a curve, often L-shaped, in which the interest rate that firms or households are willing to pay decreases with increasing distance from the centre.

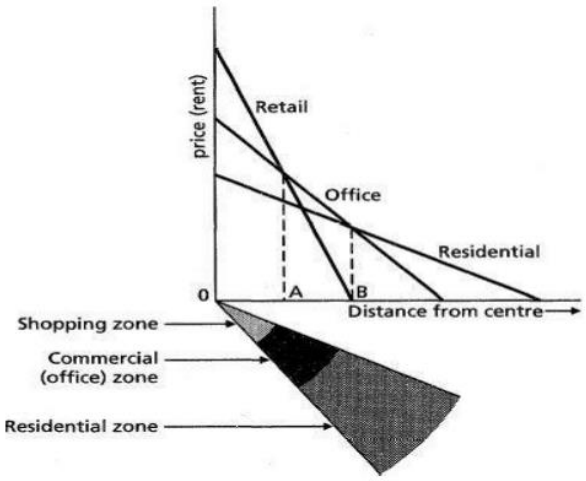

Figure 17: Bid rent curve (Alonso, 1964)

Alonso based his theories mainly on monocentric cities. In practice, however, this was not always the case, because cities also have to deal with so-called subcentres (Garreau, 1991).

Land characteristics

Another factor that plays an important role in the value of land is the condition of the soil. Soil condition is important in making decisions about building (Wigmans, 2002). If the soil condition is poor, for example due to physical properties, but also due to pollution, the land price may decrease. This is mainly because additional costs are incurred before the land can be used.

Land use

Besides the fact that the location of the land in relation to the centre is important, the zoning plan of the land also plays an important role in determining its value (Leve & Kramer, 2020). The zoning plan determines whether residential development is allowed or whether the land is only suitable for agricultural use. Governments involved in zoning plans know what impact their plans will have on the value of the land. They are implicitly aware of the bid-rent curve, so the likelihood that the urban centre will be used for agricultural purposes is low.

According to neoclassical theories, in situations without constraints, equilibrium should occur between the various land prices. In practice, however, things are different. The rights and opportunities from the land use plan largely determine the land use and thus the value of the land.

Density

Building density varies within the city and between building areas. Density can also be viewed as a result of the supply-rent curve and state regulations. The standard bid-rent curve has a high slope near the city centre as land and capital partially substitute for each other (McDonald & McMillen 2007). As a result, households and businesses that own land in central locations must settle for less land and use it more intensively.

Size of Land

The size of locations can have an effect on the cost, because economies of scale can be achieved. In other words: the value per square meter decreases as the number of square meters increases. In contrast, for small plots the risk of holding a plot will increase as the size of plots becomes smaller, due to the increase in the number of owners who might be involved in future development (Buitelaar & Witte, 2011). This often manifests itself in smaller lots, taller buildings, and less undeveloped land, i.e., densification (Groot et al, 2010). However, the state can also encourage or sometimes even mandate higher densities. However, if this happens too much against the rationality of the supply-rent curve, problems with selling the land can occur, with negative consequences for land development.

To make projects viable in certain areas, density is often shifted within a project. For example, a decision may be made to build more in a particular area to cover costs.

Landowners

Following Alonso's (1964) reasoning, the closer the location is to the economic centre, the more fragmented land ownership is. Due to the high land values and the possibility to 'go up' – and to substitute land for capital – landowners in inner-city areas can usually manage with less land, which should be expressed in more landowners per hectare. Nevertheless, things sometimes happen on the land market, and certainly the agricultural land market, that cannot be explained by the neoclassical approach. Emotions, family ties, land consolidation and other formal and informal institutions partly determine the way in which land ownership and land transactions are established (Needham et al. 2011). Fragmentation of land ownership can hinder location and area development and can lead to increased costs (Adams et al. 2002; Louw & Wigmans 2004).

2.4 Conceptual model

Based on the literature, the profit to be gained from land can be related to the environmental factors of the land, which are divided into two factors: human factors and non-human factors. The human factor means that increasing the value of land can be done by building something on the land, such as buildings, housing or irrigation systems. The non-human factor are external factors that impact the value of the land. They can be subdivided into economic, social, government and physical factors. Based on literature, the most important, factors that determine prices are residual value, location, land characteristics, land use, density, size of the land and land owner.

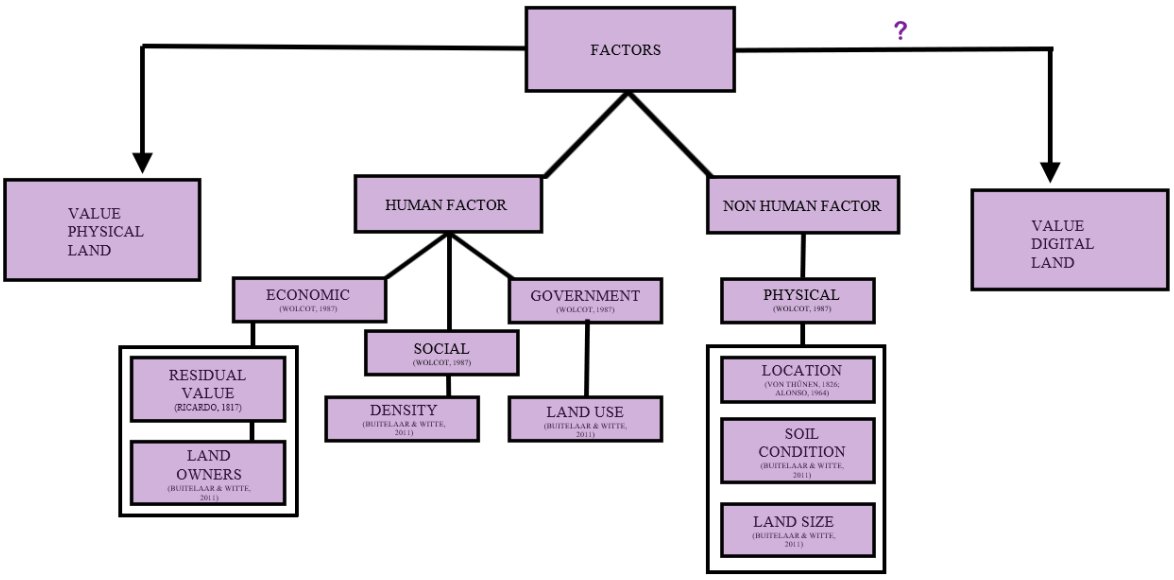

Figure 18: Conceptual Framework (drawing by author)

2.5 Hypothesis

After a careful review of the literature and the creation of a conceptual model, the hypotheses can be formulated. The hypothesises that the locational factors affecting virtual land prices are, on the whole, no different from those affecting tangible land. Although certain factors such as transportation and distance are relatively different from the physical world, the similarities are greater. Finally, the researcher assumes that traditional theories also say something about the nature of the metaverse that meets certain criteria, e.g., that limited/non-expandable land is a copy of the real earth or the like.

3. Methodology

The purpose of this study is to investigate what factors can influence the attractiveness and therefore the price of a plot of land in the metaverse. Little research has as yet been carried out about this new type of land; therefore, the sources used for this study will mainly consist of media sources. Qualitative research was chosen as the approach for this study, because it is best suited to provide new descriptive insights into the nature, meaning, and structure of media coverage (Patton, 2002).

In the following sections, the content analysis method will first be explained in detail to clarify the difference between the use of quantitative and qualitative research. Next, this chapter will discuss data collection, data selection and finally data analysis.

3.1 Content analysis

The research method chosen is qualitative content analysis. Content analysis is a research method that has been used for a long time. Still, there is a great deal of disagreement in the literature about the definition of content analysis. One of the founders, Berelson, gave the following definition: "Content analysis is a research method for arriving at objective, systematic and quantitative descriptions of the manifest content of communication" (Berelson, 1971). This definition is used as a starting point when talking about content analysis (Hay, 2000). With this definition, it is immediately clear that content analysis is mainly used for quantitative research. However, content analysis is also frequently used in qualitative research. A definition by Mayring (2000) is a good example: "Content analysis is a set of systematic, structured techniques that can be used to analyse the information content of texts" (Mayring, 2000).

Ultimately, Miles and Huberman (1994) formulate the most appropriate definition for this study. According to them, there are different forms of content analysis, qualitative and quantitative, but they all have something in common. They are all concerned with "systematically categorizing texts in order to better understand them" (Miles & Huberman, 1994). The main difference between the two forms lies in the way they generate categories and apply them to the data, as well as in the way they analyse the data (Morgan, 1993).

In quantitative content analysis, data are usually categorized using predefined categories that do not come from the data under study and are then analysed in an algorithmic and purely quantitative manner (Morgan, 1993). In this way, the categorized data are largely decontextualized (Jacoby & Siminoff, 2008). In other words, quantitative content analysis makes it possible to reduce a large amount of textual data to numbers and frequencies suitable for statistical analysis (Shelley & Krippendorff, 1984).

In contrast to quantitative content analysis, qualitative content analysis categorizes the data according to categories that are at least partially inductive (i.e., created from the data themselves). The data are also analysed in a more qualitative way, for example, using close reading (Morgan, 1993). Qualitative content analysis is the most appropriate research method for our study, because it consists of exploring the underlying themes in the data studied (Bryman, 2012). According to Kaefer et al. (2015), qualitative content analysis does not only examine the manifest (literal) content of the data. They argue that the themes and ideas of the text are the main content and that the contextual information surrounding the text is the latent content (Mayring, 2000).

Qualitative research is the most appropriate method for this particular study. The goal of qualitative research is to understand a phenomenon rather than to develop generalizations based on sampling or statistical analysis (Polit & Beck, 2010). Examples include describing and/or summarizing in detail the views, motivations, and experiences of study participants and explaining the meaning they attach to those experiences. In this way, this study seeks to examine what media sources say about land and its value in the metaverse.

Conducting qualitative research can be likened to a learning process in which the researcher increasingly matches his or her preliminary ideas to the research field by trying out observational procedures and adapting questions. Phases of observation and analysis thus alternate; they are guided by continuous reflection on the results (Elo et al., 2014). The quality of using qualitative research depends on the particular openness of the researcher to respond flexibly to what happens in observation situations and to adapt the conceptual framework accordingly (Hak, 2004). The interactive aspect comes to the fore when search options and sources are adapted during the research.

Qualitative data are represented by words, pictures, or icons that are analysed through a thematic explanation (Wong, 2008). Data representativeness, which is the most important requirement for quantitative data, is important for qualitative data. While quantitative data is about quantity (number of sources), qualitative research is mostly concerned with the criteria that the source of the data must meet. In this way, new topics can be discovered and explored, and complex issues can be better understood (Hennink et al., 2011).

The internet is the main source of qualitative data for this research. The internet was used to gather information about how locations are described in the metaverse and what factors determine the value of a location. Despite frequent criticism that content analysis is too subjective or that the implementation of the method is influenced by the researcher's research question, it is one of the most commonly used methods for studying online content (Kim & Kuljis, 2014). However, it is debatable whether this method also applicable for information published by different types of media outlets. Nevertheless, this method was chosen as the most suitable for this study. The topic is very new and not much studied, so that, many different sources are needed for the analysis. Using qualitative content analysis, this study examines media sources that explore location in the metaverse.

3.2 Data collection

This study attempts to formulate an answer to the question "What factors affect the value of digital properties in the metaverse?" Since the metaverse is a digital environment, it also seems most logical to search for the data online. As described in section 2.2, the metaverse consists of different worlds. It is to be expected that many media write about the metaverse in general and do not mention a specific platform. In order to first gather as much relevant information as possible about location in the metaverse, it was decided to collect data based on virtual worlds and the metaverse in general, not on a specific world. Initially, it seemed most relevant to seek information on the ten most popular tech media websites, based on Google search terms and views. This means that these are the most searched technical websites on Google in 2019. These were the following websites:

1. TechCrunch.com
2. Gizmodo.com
3. TheVerge.com
4. Venturebeat.com

5. Wired.com
6. Digitaltrends.com
7. Mashable.com
8. TheNextWeb.com
9. BusinessInsider.com
10. Engadget.com

In addition, a specific top 7 of websites related to Metaverse news was created (Winters, 2021):

1. Medium.com
2. Ryanschultz.com
3. Nftplazas.com
4. Nwn.blogs.com
5. Nftnewstoday.com
6. Cnbc.com/techdrivers
7. Metaverse.banklesshq.com

In total, 71 articles were deemed relevant. In order to determine a cut-off point, no more articles were added after June 1, 2022. Table 1, shows an overview of the dataset. Of the 71 collected articles, 50 briefly addressed one or more factors that determine the value of land in the metaverse. The remaining 21 articles discussed these factors in detail.

Website	**Author**	**Year**	**Extensive or Short**	**Codes**
TechCrunch.com	Ramaswamy, A.	2022	Short	Uncertainty
TechCrunch.com	Shu, C.	2022	Short	Government, Land Use
TechCrunch.com	Lomas, N.	2022	Short	Government, Land Use
TechCrunch.com	Hatmaker, T.	2021	Short	Government, Land Use
TechCrunch.com	Wilhelm, A.	2022	Short	Government, Land Use
TechCrunch.com	Wilhelm, A.	2022	Short	Government, Land Use
TechCrunch.com	Ramaswamy, A.	2022	Short	Government, Land Use
TechCrunch.com	Butcher, M.	2022	Short	Government, Land Use
Gizmodo.com	Wodinsky, S.	2021	Extensive	Physical, Location
Theverge.com	Robertson, A. & Peters, J.	2021	Short	Government, Land Use
Venturebeat.com	Takahashi, D.	2022	Short	Government, Land Use
Venturebeat.com	Takahashi, D.	2022	Short	Government, Land Use
Venturebeat.com	Ferber, W.	2022	Extensive	Physical, Location
Venturebeat.com	Adebayo, K.S.	2022	Short	Government, Land Use
Venturebeat.com	Takahashi, D.	2022	Short	Government, Land Use
Venturebeat.com	Grinfeder, S.	2022	Short	Government, Land Use
Venturebeat.com	Keida, R.	2022	Short	Government, Land Use – Physical, Location
Venturebeat.com	Staff, V.B.	2022	Short	Physical, Location
Wired.com	Ravenscraft, E.	2022	Short	Scarcity
Wired.com	Unknown	2022	Short	Government, Land Use
Wired.com	Unknown	2022	Short	Government, Land Use
Wired.com	Ravenscraft, E.	2022	Short	Government, Land Use –

				Physical, Location
Digitaltrends.com	McMichael, C.	2022	Short	Government, Land Use – Physical, Location
Digitaltrends.com	White, M.J.	2021	Short	Physical, Location
Digitaltrends.com	Zucosky, A.	2021	Short	Government, Land Use
Mashable.com	Unknown	2022	Short	Government, Land Use
Mahsable.com	Unknown	2022	Short	Physical, Location
TheNextWeb.com	Young, M.	2022	Extensive	Physical, Location – Government, Land Use
TheNextWeb.com	Beedham, M.	2019	Extensive	Government, Land Use
TheNextWeb.com	Marinotti, J.	2022	Extensive	Economic, Land Owners
TheNextWeb.com	Macaulay, T.	2022	Extensive	Physical, Location – Government, Land Use
BusinessInsider.com	Mozée, C.	2021	Extensive	Physical, Location – Government, Land Use
BusinessInsider.com	McCarthy, A.M.	2022	Extensive	Physical, Land Size
BusinessInsider.com	Canales, K.	2022	Extensive	Uncertainty – Physical, Location - Scarcity
BusinessInsider.com	Dailey, N.	2022	Extensive	Physical, Location - Uncertainty
BusinessInsider.com	Mozée, C.	2022	Short	Physical, Location – Government, Land Use – Uncertainty
BusinessInsider.com	Dailey, N.	2022	Short	Physical, Land Size
BusinessInsider.com	Shumba, C.	2021	Short	Government, Land Use
BusinessInsider.com	Mozée, C.	2021	Extensive	Uncertainty – Physical, Location
Engadget.com	Nino, T.	2020	Short	Government, Land Use
Medium.com	Adegoriolu, D.	2022	Extensive	Physical, Location
Medium.com	HODL_GAP	2021	Extensive	Physical, Location – Government, Land Use
Medium.com	Zatara	2022	Extensive	Physical, Location
Medium.com	Bixin	2022	Extensive	Scarcity
Medium.com	Holland, T.	2022	Extensive	Physical, Location - Uncertainty
Medium.com	Perera, A.	2022	Short	Government, Land Use – Physical, Land Size
Medium.com	Perera, A.	2022	Short	Social, Density – Government, Land Use
Medium.com	EasyFi Network	2022	Extensive	Physical, Location
Medium.com	UE SAI	2022	Short	Physical, Location – Government, Land Use
Medium.com	Bentley, A.	2021	Short	Physical, Location
Medium.com	Galli, A.	2021	Short	Government, Land Use
Medium.com	Huynh, J.	2022	Short	Physical, Location – Financing
Medium.com	Nft Studio	2022	Short	Financing

Medium.com	Landindex	2022	Extensive	Physical, Location – Financing
Medium.com	Zwerner, B.	2022	Short	Scarcity
Medium.com	Infinity Skies	2022	Short	Physical, Location – Government, Land Use
Nftplazas.com	Russel	2022	Short	Coordinates – Physical, Location.
Nftplazas.com	Paul, J.	2022	Short	Government, Land Use
Nwn.blogs.com	Wagner, J.	2022	Extensive	Physical, Location
Nwn.blogs.com	Thomas, L.	2022	Short	Physical, Location
Nftnewstoday.com	Musa	2022	Short	Physical, Location – Government, Land Use
Nftnewstoday.com	Romina	2022	Short	Physical, Location – Government, Land Use – Financing
Metaverse.banklesshq.com	Peaster, W.M.	2022	Short	Scarcity
Cnbc.com/techdrivers	DiLella, C. & Day, A.	2022	Extensive	Physical, Location – Government, Land Use
Cnbc.com/techdrivers	Frank, R.	2022	Short	Physical, Location
Cnbc.com/techdrivers	DiLella, C. & Day, A.	2022	Extensive	Physical, Location
Cnbc.com/techdrivers	Bursztynsky, J.	2022	Short	Physical, Location – Government, Land Use
Cnbc.com/techdrivers	Frank, R.	2022	Short	Physical, Location – Government, Land Use
Cnbc.com/techdrivers	Gewirtz, J.	2022	Short	Government, Land Use
Cnbc.com/techdrivers	Unknown	2021	Short	Uncertainty, Financing
Cnbc.com/techdrivers	Unknown	2022	Short	Uncertainty, Financing

Table 1: Dataset online articles location in the metaverse

3.3 Data analysis

All relevant articles found were collected in a Word document, including a summary of the content, author, date and title of the article. A prerequisite for qualitative research is that the researcher becomes familiar with the data being studied (Braun & Clarke, 2019). This familiarization with the data should occur prior to coding (Braun & Clarke, 2019). This will help the researcher better understand not only the news items themselves, but also their context (Hennink et al., 2011). After an initial analysis, each item was divided into 'location extensive' and 'location short'. ‘Location extensive’ refers to an article in which location in the metaverse is the main topic, while articles marked as 'location short' only briefly mention location in the metaverse. This was done to assign an initial structure to the data file before the coding process began.

After a thorough examination of all the data and the division between 'location extensive' and 'location short', the coding was conducted. As with many qualitative content analyses, this study opted for a

deductive and inductive approach, which is particularly noticeable in the coding process. The deductive code tree was created based on the conceptual framework. The colour assigned to each factor is reflected in the analysed dataset existing out of the 85 articles. The inductive code tree was created based on the content analysis. After analysing the content analysis, the following concepts were created. The corresponding sentences are also marked in the respective colour in the transcripts. The first step in the coding process is to assign predetermined codes. The codes deduced on the basis of the theoretical framework. There was also room for inductive codes; these were assigned to pieces of text in which new concepts were recognized after thorough reading of the relevant sources (Mason, 2002).

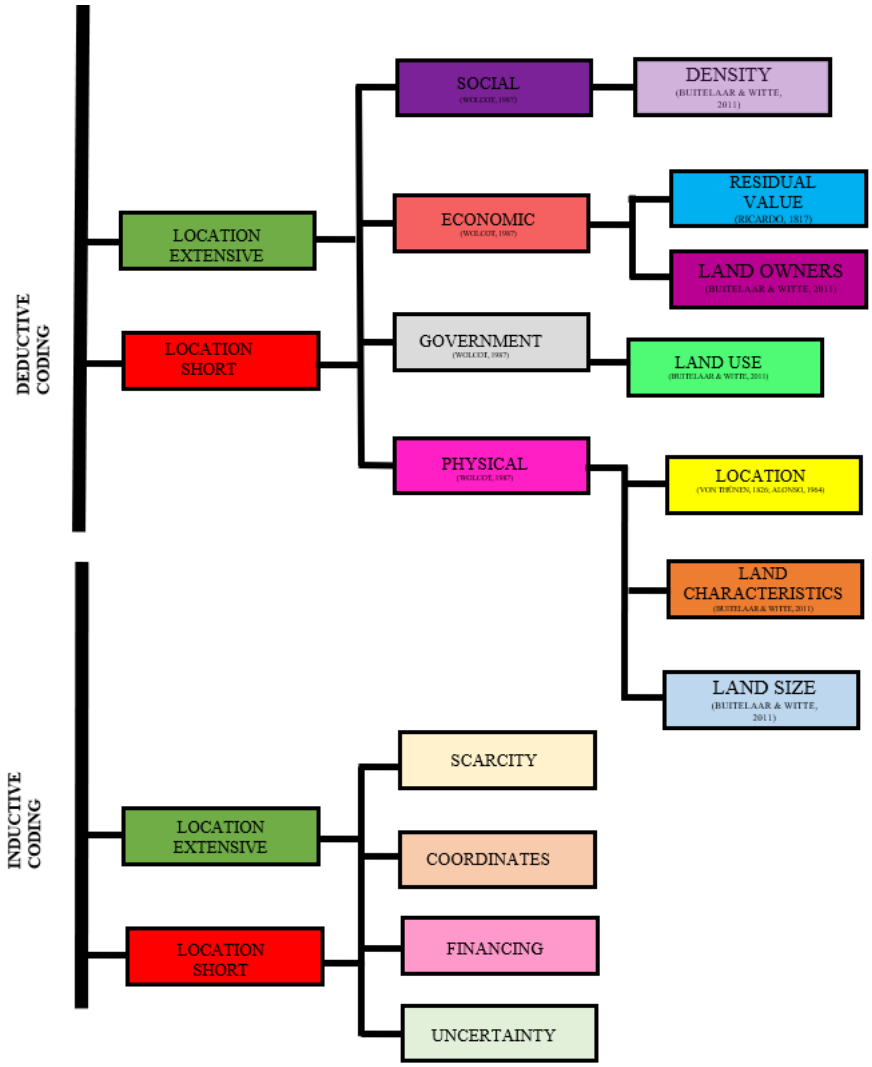

Figure 19: Code tree (drawing by author)

4. Results

The goal of this chapter is to gain an in-depth knowledge of what factors influence the value of digital land by analysing data from the content of tech media websites. The conceptual framework presented in Chapter 2 was used as a guide for possible factors that influence the value of digital land. In addition, the concepts that emerged through inductive coding are highlighted.

The deductive codes were created in advance based on the conceptual framework. When analysing the data, it appears that the most frequently mentioned factors related to the value of digital land are the physical factor of location and the governmental factor of land use.

First the physical factor, location. In the metaverse, location is important. Just like real estate in the real world, Kiguel says the metaverse is about three things: location, location, location (DiLella & Day, 2022). The location of the property is critical to its value. If the surrounding neighbourhood is attractive for application. If a property is located near another valuable property, its value will increase. If the adjacent properties are already crowded, this makes it easier to attract people to your property. This depends on the concentration of footsteps/eyeballs in the metaverse.

When you first enter the metaverse, there are areas where people congregate; those areas are certainly much more valuable than the areas where there are no events (DiLella & Day, 2022). For example, Snoop Dogg is building a virtual mansion on a property in Sandbox, and someone recently paid $450,000 to become his neighbour. However, these high-traffic areas also attract the big spenders. Take the board game Monopoly as an example: areas where people congregate are much more valuable to advertisers and retailers if they can find ways to reach that audience there. Furthermore, it is like being in a club: people want to join others who have similar interests.

"We look at location. We look at what we think foot traffic can be, and what we think we can get as yield." - (Putzier, 2021).

"We choose key strategic locations" - (Mozée, 2022).

The geographic context shows the proximity of properties in the metaverse to commercial facilities. Indeed, more money circulates where businesses are located, and proximity therefore increases the possibility of pulling value from land. This is similar to traditional real estate, where many brands seek to cluster together to concentrate customers. Thus, in the future, the metaverse could also lead to groups banding together to buy large properties.

"Location is really huge. The same with real estate in real life, it's all about where you are." - (Putzier, 2021).

Buying virtual land is easy, either directly through the platform or through a developer.

“What makes real-estate so expensive. Just like the real world there are a plethora of features that drive up the value of a place. In the metaverse, the number of visitors as well as the location.” – (EasyFi, 2022)

A notable factor that has been mentioned and that is not reflected in the predefined codes is the influence of the coordinates on the value of the land. Not only is the location of the virtual land important, but if the site has favourable coordinates, the value increases. This is because it is believed that coordinates could be the new addresses. Coordinates that are easy to remember would therefore be of additional value for shopping centres or other facilities, for example (EasyFi, 2022). People buying

nice coordinates, like 50 50. Because they are wondering how an address in the metaverse will look like. And expect it is easy to transport to.

The second most frequently mentioned factor is the governmental factor, land use. The articles often point out that the value of the land is influenced by what is possible and allowed on the land. For example, if the land has a retail function, the value of the land increases. Both businesses and investors expect to make money on that land through operations and marketing. The value of surrounding land in the area also increases due to the increase in 'traffic flow'.

Just like in the real world, the price of land depends on the neighborhood. Just as you pay much more for a house in Amsterdam, you pay more for your property in Decentraland if it is in a convenient area. If your virtual property is closer to a shopping mall or casino, you will naturally pay much more for a piece of land. It should be noted that these plots of land often have a specific purpose as well. For example, everyone wants to have a plot of land in a busy area to build a casino or a shopping mall. The owner of that property may then, for example, open an art gallery near the shopping center in the hope that more people will visit the gallery, so that more art will be sold in the form of NFTs.

"We think the Fashion District purchase is like buying on Fifth Avenue back in the 1800s … or the creation of Rodeo Drive," he said, referring to the high-end shopping areas in Manhattan and Beverly Hills" - (Kiguel, 2021).

"Proximity to important things of consequence, to events and entertainment venues, also drives value in the metaverse." - (Canales, 2022).

Again, geospatial context shows the proximity of land in the metaverse to commercial establishments. In fact, more money circulates where a business is located, so proximity increases the likelihood of receiving a benefit from one's land. This is also similar to what happens in traditional real estate, where brands often seek to establish themselves in the same location in order to centralize their customers. In the future, for example, the metaverse could also lead to groups joining together to coordinate the purchase of large tracts of land.

According to the articles, factors such as land size and density, determined in advance based on the literature, also affect the value of digital land. For example, the value of more densely populated land is often higher than that of less populated parcels. In addition, the size of the land affects the value. When several parcels of land are purchased next to each other, it is referred to as a settlement; when one area is larger, the development opportunities on that land are also greater. For this reason, the land is also worth more.

Factors that were not established in advance based on the literature, but which appeared several times as factors influencing the price of land, were the factors 'uncertainty', 'scarcity' and 'financing'. For this reason, these factors were added based on inductive coding.

First, the "uncertainty" factor mentioned earlier. The main finding of the media analysis is that an important factor affecting the value of digital land is uncertainty and speculation. The metaverse is seen as an emerging market with growth potential, making individuals and companies eager to participate. But the 'how' is often still uncertain. For this reason, there is a lot of investment in metaverse worlds. Above all, the fear of missing out plays an important role.

"We paid so much for it because we want to do something big, something very immersive." - (Putzier, 2021).

There is also the uncertainty of which metaverse worlds will ultimately prevail. Investors are not only investing heavily in existing worlds, but also want to share in the possibilities of developing new worlds. For this reason, investors are investing in different worlds, in the hope of eventually owning

land in the world that will turn out to be the most relevant. Land in Axie Infinity, Decentraland, and The Sandbox are particularly popular.

"Although important questions remain about which platforms and use cases will win the day in the metaverse craze, one thing is clear, capital is flowing fast in the metaverse." - (Ramaswamy, 2022).

Yorio (2021) warns, however, that investing in digital real estate is a risky business. "It is very, very risky. You should only invest capital that you are willing to lose," Yorio told CNBC. "It's highly speculative. Also, it is based on the blockchain. And as we all know, cryptocurrencies are very volatile. But it can also be very rewarding."

Second, the factor scarcity. Similar to the physical world, supply and demand play an important role in determining the value of land in the metaverse. The availability of comparable land will significantly affect supply. There are two things in particular that give real estate in the metaverse its value: scarcity and location, two fundamentals of physical real estate. According to experts, however, these do not apply to the metaverse, because scarcity cannot be artificially induced.

"Appreciate because it is limited" - (Mozée, 2021).

Therefore, these experts say that future investors should be aware that their virtual land may not increase in value as much as they expect. In some worlds, it is already the case that land remains scarce. For example, in Decentraland there are only 90,601 LAND parcels. However, the question naturally arises to what extent this will remain the case in the metaverse, or whether there will be the possibility of creating additional land in the future.

And finally, the third factor financing. Each metaverse has its own token that can be used to purchase land directly on the platform. In Decentralized, this token is MANA. The value of this token is an important factor in pricing primary sales. When buying on the secondary market, the minimum price for land, i.e. the absolute lowest price at which one can enter the project at a given point in time, determines how much buyers are willing to spend in total. The value of a token thus affects the value of the land. The stability of a token also plays a role. For example, if the value of this coin increases, the value of the land automatically increases. However, it is important to note that other factors also have an impact. A price increase or decrease on MANA alone does not automatically mean the same percentage price decrease or increase for the land.

"Each Metaverse has its unique token that will be used to acquire land. The value of this token is important." - (Mozée, 2021).

5. Conclusion and discussion

In general, it can be said that many factors that influence the value of physical land correspond to the value factors for digital land. Nevertheless, it is important to remember that this is an emerging market where much is still based on speculation and suspicion.

The research was divided into several research questions. The first was to answer several sub-questions. The first question is, "How can virtual land be purchased in the metaverse?" Based on this research, it can be said that it is possible to purchase virtual land through various platforms. These can be proprietary marketplaces of the metaverses themselves, such as Decentraland. Or via a marketplace of an intermediary like OpenSea. It should be noted that virtual land is purchased with cryptocurrencies. Various metaverse platforms also have their own currencies. Next, there is looked at the existing literature based on physical land valuation. Classic land pricing theories were examined and a conceptual framework was established that includes the following factors that influence the value of physical land: Residual Value, Location, Land Characteristics, Land Use, Density, Land Size, and Landowner. Based on a qualitative content analysis, it was examined whether these factors also apply to the valuation of digital land. The location and land use factors showed the greatest similarity. The analysis also showed that the factors of financing, scarcity, and uncertainty also influence the valuation of digital land. These factors had not previously been included in the conceptual framework. Looking at the main differences between these factors, findings show that physical and digital land differ mainly in the area of physical land characteristics, for example the fertility of the soil. Although this may play a role in the metaverse in the future. After answering the above sub-questions, it is also possible to answer the research question "Which factors influence the value of digital land in the metaverse?" Namely, location, location, and the commercial potential of a piece of land.

5.1 Discussion

Theoretical discussion

The theories that were the most relevant to this study were Alonso, Von Thünen and Ricardo. These theories were based primarily on urban land value theories. These theories proved to still be relevant to the metaverse. Since the metaverse is still in its infancy, one of the difficulties was that there is still little literature on the metaverse itself, especially scientific literature. Most sources are articles about the metaverse in forums and blogs. This presented an additional challenge in finding relevant literature. This made it even more important to thoroughly search for background information about the authors. For further research, there can be made a broader conceptual framework based on classical and neo-classical theories land value theories. Even though these have partly been addressed in the study.

Methodological considerations

For this study, a selection of tech media platforms was made in order to provide a clear delineation for data collection. It is true that many new websites have been created specifically for this topic. Among them are "newspapers" that deal specifically with the metaverse. It is true that these media that focus specifically on the metaverse are very biased. On these platforms, mainly positive aspects are described. For this reason, it was decided to focus on the tech media platforms that have been around for a long time. Nevertheless, the author's opinion was sometimes clearly visible in various "official"

tech media, so their reliability can be questioned in some cases. This study is based on qualitative data collected through content analysis. For further research, it would be interesting to complement the methodology by verifying these results through expert interviews or a case study. In the case of a case study, for example, Decentraland's sales data could be used to verify whether the location factors mentioned in this study actually appear to play a role in Decentraland's transaction history.

The content analysis was conducted very carefully. Each step in the selection of items was carefully considered. In addition, each article was thoroughly reviewed and coded. Both deductive and inductive coding were explored. The use of inductive coding was a conscious decision to be open to new location factors that might impact digital land, but not existing land. It is important to note that manual summarization in qualitative research always leaves room for personal interpretation. The fact that new understanding occurs with each new article also plays a role. To get a more objective review, it is suggested to re-code all articles or have another person code the articles as well and discuss the results mutually (Verweij & Trell, 2019).

Contribution to planning theory

Although the metaverse may still sound very unreal, expectations are high. Even in this emerging world, planners can be of great importance. They should think not only in terms of developing digital environments, but also in terms of shaping policy in these worlds. Ultimately, policy will play a big role here as well. Moreover, it would be a great opportunity for planners to find a good balance between physical and digital worlds. This is also where a big challenge lies. How can we see the metaverse as a complement to our existing world? What could be the benefits? Cities are the main places where today's humans settle. For this reason, the changes that affect the urban landscape can impact the lives of most people. As a new medium, the metaverse can allow people to be present in the 3D virtual world through media. Because this technology offers unprecedented communicative conveniences that were previously unavailable to people, it is expected to pave the way for dramatic changes in all interpersonal relationships (Winters, 2021). As the metaverse aims to reconstruct the world, the urban landscape, which is a product of perceptual interactions between people and the city, seems to be influenced by its emergence. The metaverse can also play a role in the field of sustainability. The simplest ecological benefit of the metaverse is that it creates physical events, constructions, activities, and products into virtual forms. Whether in the physical world or the digital world, there is a role for planners in both worlds. Special attention can be paid to connecting the two worlds, to enjoy the best of both.

Suggestions for further research

Precisely because the metaverse is still so young, there is much room for further research. As mentioned earlier, there are opportunities to further test the results of this study through expert interviews or a case study. In addition, there are many opportunities to further explore the role of planners in the metaverse. Particular attention can be paid to policymaking, about which very little is currently known. It is interesting to look at the global context of the metaverse and see what is appropriate policymaking. It could be explored whether existing policies are applicable in a digital world. In addition, the connective role of the planner can be further explored: what opportunities exist in the area of interaction between the physical and digital worlds?

The metaverse also offers many research opportunities in other areas such as education, finance, and marketing. For example, there are unlimited possibilities for education in the metaverse. From attending a lecture at your local university and a lecture at Harvard fifteen minutes later. The finance sector could look at the liquidity and value of the underlying NFTs used in metaverse platforms.

Finally, there are the many retail, e-commerce, and marketing opportunities within the metaverse. Again, it can be examined why, for example, a company like Mc Donalds has already acquired many rights within the metaverse and is even looking to open online counters. In the long term, the profitability of retail in the metaverse should be a subject of study. In short, the metaverse offers a new world full of new research opportunities

“Today, I think we LOOK AT the internet, but I think in the future you’re going to BE IN the experiences”

- Zuckerberg, 2021 -

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