



The current market and its opportunities for a Fractionalized Real Estate Investment start-up

Tom Beyer
152121451

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Abstract

The following research paper “The current market and its opportunities for a fractionalized real estate investment platform” written by Tom Beyer introduces a new concept within the real estate industry. This paper talks about the opportunity of creating a start-up around fractionalized real estate investments. Due to the creation and further development of blockchain technology, it has become possible to revolutionize the real estate industry. Where before an investor would only be constricted to investing in real estate through private investments or REITs, it is now possible to invest in real estate through the blockchain. Research has been done to see if the idea of a fractionalized real estate investment platform is feasible and the market and opportunities have been discussed throughout the paper. A literature review has been conducted to gain more insights and information about the topic, followed by a market analysis which analyses the market size, competitors of the industry and potential customers of the platform. Furthermore, an online survey was performed to gain information and insights of potential customers. The data was then extracted from the online survey and analyzed in a descriptive, quantitative, and qualitative analysis. The research which has been conducted throughout the paper has resulted in an increased knowledge of the market and customer and feasibility of the investment platform. This and several other important findings

throughout the research paper has led to the conclusion that there is an opportunity in this industry to make real estate investment accessible to everyone.

O seguinte documento de investigação "O mercado actual e as suas oportunidades para uma plataforma de investimento imobiliário fraccionado" escrito por Tom Beyer introduz um novo conceito dentro da indústria imobiliária. Este documento fala sobre a oportunidade de criar uma plataforma de investimento imobiliário fracionalizado. Devido à criação e desenvolvimento da tecnologia da cadeia de blocos, tornou-se possível revolucionar a indústria imobiliária. Onde antes um investidor só se limitava a investir em imóveis através de investimentos privados ou REITs, é agora possível investir em imóveis através da cadeia de blocos. Foi feita investigação para ver se a ideia de uma plataforma de investimento imobiliário fracionalizada é viável e o mercado e as oportunidades foram discutidos ao longo do documento. Foi realizada uma análise bibliográfica para obter mais conhecimentos e informações sobre o tema, seguida de uma análise de mercado que analisa a dimensão do mercado, concorrentes da indústria e potenciais clientes da plataforma. Além disso, foi realizada uma sondagem online para obter informações e conhecimentos de potenciais clientes. Os dados foram então extraídos do inquérito online e analisados numa análise descritiva, quantitativa, e qualitativa. A pesquisa que foi conduzida ao longo do documento resultou num maior conhecimento do mercado e do cliente e da viabilidade da plataforma de investimento. Esta e várias outras descobertas importantes ao longo do documento de investigação levaram à conclusão de que existe uma oportunidade nesta indústria para tornar o investimento imobiliário acessível a todos.

Introduction

Blockchain technology is a very discussed topic which could be used throughout different sectors. Today it is still difficult to manage many users at the same time in the blockchain industry. Since the amount of blockchain users has increased so fast in such a short amount of time, the average transaction processing speed also had increased dramatically. The blockchain industry is also unregulated, meaning that the industry is a volatile environment which can easy be manipulated through market manipulation. Because of this unregulated industry there are many scams happening throughout the industry. Users need a secure and regulated environment without having to sacrifice the decentralized aspect of the concept of Blockchain. Blockchain

technology is thereby a quite complex concept to understand and adopt. Before using any kind of its revolutionary features, one needs to read through an enormous amount of information to understand the principles of encryption and distributed ledger. The cost which come with the use of blockchain are currently higher than any financial institution which provides secure payment gateways and other services at affordable prices. Blockchain is usually implemented to eliminate expenses related to intermediaries and third parties. Currently the use of blockchain technology is beneficial but an expensive thing to use which makes it not so easily adopted by governments and private firms (Khan & Hashmani, 2021).

In the United States, real estate takes up two-thirds of the national wealth. Thereby, it also accounts for 25 percent of the gross domestic product (Johnson, et al. 2006). Due to the 2008 financial crisis, the real estate market experienced huge changes. This crisis led to the switch of buying a home to renting a home. The rental market has seen a huge increase of growth since this crisis, and many saw this a big opportunity to make real estate investments. But what one study of A. Pires in 2018 found out is that there are barriers which deters people away from making these types of investments (for residential rental purposes), like: “tenant risk behaviors, location, associated cost (for the owner), tenant characteristics, legal and administrative obstacles, macroeconomic constraints, indecision/gut feel factors (Pires, et al. 2018).

The start-up that will be presented in this thesis will try and solve these and other problems that people are currently experiencing when wanting to invest in real estate. Today a retail investor (non-institutional investor) can invest in real estate in the following ways: private investment in project development or other residential/commercial real estate and investing in REIT (Real Estate Investment Trust/Fund). The first one usually has a required capital of €250,000 (Lerner & Schoar, 2005). There are several types of investment possible like investing in a single apartment, renovating and selling/renting, investing in a project development firm, ... Either way, for all these options one needs a minimum amount of capital which is usually quite high. The second option (REIT) is investing in a real estate investment fund which does all the work for you and chooses in which project they are going to invest in. Some cons of REITs are high debt load, rising interest rates, potentially unsustainable dividends, high real estate prices and non-traded & private REITs (Royal, 2022).

Private REITs usually have an investment minimum of €1,000 – 25,000. These REITs are also often illiquid, this means that it's difficult to access your money after investing it in the fund.

Private REITs are managed by a manager that gets paid to run it. Compensation for them is based on the amount of money that is currently being managed. The manager can therefore commit certain practices which are better for him/her instead of your best interest as an investor (Royal, 2022). Furthermore, there are publicly traded REIT stocks and funds. These ones are publicly traded on the major stock exchanges. The difference between the two is that if you buy an REIT fund you get exposed to the whole public REIT market, this means that you can buy one fund and get a share in 200 different REITs which are traded publicly with different sub-sectors. An REIT stock is just one specific fund (Royal, 2022).

The purpose of this thesis is to research a possible solution(s) to the problem(s) that investors experience when wanting to invest in real estate, it is quite inaccessible on one option and brings along huge fees and low dividend yields on the second option. Currently a project is being executed by me and my co-founder, in which we try to solve this problem. The start-up would be a blockchain based platform which provides a place for real estate investors where they can fractionally invest in real estate projects using NFTs. Real estate project developers would put their project online and start a funding round in which they give out an NFT which is able to sell fractionally until 100% has been sold to different buyers. This will be done with the use of a DAO. “A Dao is an organization represented by rules encoded as a transparent computer program, controlled by the organization members, and not influenced by a central government. As the rules are embedded into the code, no managers are needed, thus removing any bureaucracy or hierarchy hurdles.” (Hackl, 2021). With the use of a DAO (Decentralized autonomous organization) structure, the money would be directly transferred to the project developer without having to experience any fees on the way. Once the project is realized in the future, depending on whether it's a sell or rental project, the money which is generated from the renting or selling will be automatically transferred, with respect of their fractional percentage, into the bank accounts of the investors that bought a fraction of the NFT. On the platform there will be no limitations which investors are currently experiencing in terms of minimum capital required. Due to the lower cost of the entire process of funding through a DAO, the eventual dividend yield would potentially be higher as well. The whole idea of this start-up is about creating accessible real estate investments for everyone. An investor could i.e., easily become a fractional owner of a building with several apartments, which generate rent revenue, and have a fractional revenue of this rent each month. This same principle is applicable to any other real estate project thinkable.

The fractional investments are based on the NFT principle, a Non-Fungible Token. An NFT is a type of token which is unique and cannot be duplicated in any way, this makes it interesting for identifying something in a unique way. A creator of an NFT can prove the legitimate ownership of any kind of digital asset, such as, images, art, videos, tickets, etc. Next to this, every time the NFT gets sold again the creator can earn royalty fees from each secondary sale (Wang, et al. 2021). To fund a real estate project an NFT would be fractionalized before it is sold to the investors of the project. Furthermore, a limited supply of fungible tokens will be issued which represent the ownership of that specific NFT.

Thus, the start-up presented in this thesis is a project is a mobile & web-based platform called “Cardal” where investors can start investing in real estate from as low as one-hundred euros. Investors would sign up and be immediately presented with different real estate projects in their feed. These real estate projects have been put on the platform by real estate project developers who are looking to raise funds for their project through Cardal. The investor decides which project he/she wants to invest in and how much. The platform calculates based on how much the investor has invested in the property, how much of the property the investor will own. This will be done by representing the property through an NFT which is stored on a specific blockchain. The fraction of the NFT owned by the investor will represent the fraction of the physical property that is owned. These “shares” of the NFTs are liquid and can always be sold on our platform or on any secondary market the investor decides to sell it on. Due to the NFT ownership aspect, the investor has voting power when owning the property based on how much he/she fractionally owns. Because of this platform investors which don’t have enough financial resources to fully invest in real estate, are now allowed to do so with the number of financial resources they own. The business model of the platform would be a 1-3% commission fee charged on each transaction made through the platform. Meaning, every time an investor would buy or sell fractionalized NFT shares of a property, the company would charge a 1-3% commission fee based on the amount bought or sold. There would also be a fee for the project real estate developers which want to create a funding pool based on the amount of funding they want to achieve through the platform.

The main research question that arises while researching this topic and problem is if there is a market for fractionalized real estate investing through NFTs. The second research question is if customers are truly interested in fractional real estate investing. When answering this question, I will try to identify the target customers and early adopters. The third and final

research question is if financial limitations are truly the main problem which stops people from investing in real estate. All the research questions will be researched and validated throughout the literature study, defined methodology and data analysis.

Literature Review

REITs

Real estate companies can go public as a real estate operating company (REOC) or as a real estate investment trust (REIT). IPOs are the primary way of raising capital for these kinds of public companies (Ascherl & Schaefer, 2018). Our focus in this part will be the REITs. As of 2020 there are 14 European REIT regimes (“Listed REITs in Europe,” 2020). These are publicly listed companies who own, operate, manage, and develop real estate assets for generating returns from rental income and appreciation of property value. They provide a liquid, transparent way to invest in real estate while the investors funds are managed by professionals. This allows the investor to diversify its investment portfolio while being exposed to real estate returns and cash dividends over the medium to long-term. In Europe these 14 countries that have officially recognized REITs contribute to 78% of the entire listed real estate market in the EU (“Listed REITs in Europe,” 2020). Currently there are 63 companies which have a public REITs with a total value of €312bn, a total market cap of €173bn and a free float of 82.5% (“Listed REITs in Europe,” 2020). It is also important to state that REITs are tax transparent. This means that investors receive income as if they would be directly investing into the real estate market, afterwards a tax is collected by the government when the income is distributed to avoid double taxation. This creates a fair environment for smaller investors which invest into REITs and larger investors that have a substantial larger amount to invest directly into real estate. This been said, due to the fact the liquid public real estate investments, like REITs, are depending on capital flows of the equity markets and may show returns that are characteristically more in line with common stocks than a private real estate investment made outside of the stock market (Yunus, et al. 2012). Based on long term research done by Joseph Pagliari in 2005, it shows that REITs have better returns than private real estate investments over a 21-year period which ended in 2001. REITs averaged 13.5% and private real estate investments averaged 8.4%. By the end of 2020, REITs had a market capitalization of \$1.2 trillion. REITs gives the investor the opportunity to increase portfolio exposure without having

to deal with any kind of acquiring & managing of direct property investments in different markets with political and market structures that are unfamiliar to the investor. These REITs also provide a higher degree of liquidity & transparency while also providing a relatively low transaction cost. The individual shares of these REITs can also be purchased for a lower amount than the shares of a private real estate fund (Arnold, et al. 2021).

Private real estate funds

Private real estate funds are a type of investment vehicle that allows investors to pool their money and invest it in a wide range of real estate assets. Private real estate funds are typically managed by professional fund managers with real estate market expertise who can identify appealing investment opportunities.

Private real estate funds can offer investors attractive returns and diversification benefits (Joseph, 2006). Private real estate funds provide investors with higher returns and lower volatility than public investments (Joseph, 2006). It can also give investors access to a diverse range of real estate assets. According to Geltner et al. (2001), private real estate funds can invest in a wide range of asset classes, such as office buildings, retail properties, industrial properties, and residential properties. According to the authors, private real estate funds provide investors with access to a diverse range of investments that may not be available in public markets.

Finally, private real estate funds can give investors access to one-of-a-kind investment opportunities. Immergluck & Law (2014) discovered that private real estate funds can invest in distressed assets such as foreclosed homes or properties in need of renovation. The authors concluded that it could give investors access to unique investment opportunities that are not available in public markets. Private real estate funds, in general, provide investors with attractive returns, diversification benefits, and access to unique investment opportunities.

The private real estate market has seen a great growth which has helped facilitate domestic investor & growing cross-border investment. There is a different variety of formats in which private real estate funds exist. These funds can diversify market exposure through real estate types and geography. The lifespan of these funds is also another distinguishing feature. There are two different types of lifespans, open-ended or close-ended. Open-ended funds are seen as

long-life/perpetual investment vehicles and can raise capital whenever investor demand allows it. A close-ended fund has a finite life with a fixed maturity date, usually between 7 to 12 years (Farrelly & Stevenson, 2016).

Typically, the minimum amount of capital that is required to invest in private real estate funds is \$250,000 (Bongaerts & Charlier, 2009). Making it inaccessible for investors that do not have enough capital.

There are a couple of benefits of adding real estate in an investment portfolio. There are different studies worldwide which have shown that real estate provides diversification benefits and reduces the overall risk of a multi-asset portfolio (Tomperi, 2010). Real estate is also an inflation hedge while also potentially providing returns which have been reported to outperform bond returns while also being competitive with equity returns (Darst, 2003).

Blockchain technology

Blockchain is the technology behind Bitcoin, currently it is one of the biggest disruptive technologies since the internet (Iansiti & Lakhani, 2017). Creating and elaborating contracts, carrying out payment transactions and maintaining data of specific actions are some of the standard practices of businesses. All these practices are part of the defining structure of our political, economic, and legal systems. Currently all sorts of bureaucracies have been formed around these practices and have not managed to keep up with the economy's digital transformation (Iansiti & Lakhani, 2017). Blockchain provides a solution for this. The principle on which blockchain is based is called an open, distributed, and decentralized ledger which records transactions between parties in a permanent and verified way. The ledger is fully programmed to work autonomously and have no people that can manipulate or control it, thus making it as efficient as possible. *“With blockchain, we can imagine a world in which contracts are embedded in digital code and stored in transparent, shared databases, where they are protected from deletion, tampering, and revision. In this world every agreement, every process, every task, and every payment would have a digital record and signature that could be identified, validated, stored, and shared. Intermediaries like lawyers, brokers, and bankers might no longer be necessary. Individuals, organizations, machines, and algorithms would*

freely trans- act and interact with one another with little friction. This is the immense potential of blockchain.” (Iansiti & Lakhani, 2017).

The blockchain is a distributed ledger which exist in all devices which are connected to the same blockchain network (Di Pierro, 2017). It is protected and organized in a chain of transactions using cryptography. The ideal blockchain is fully decentralized, this means that no authority or group of people validate transactions. The validation of transactions is completely done by the computers which are connected to the network which will accept the transaction or not. Every block on the blockchain is impossible to be deleted, this brings trust & transparency to the technology since it cannot be tampered with. The ideal decentralized blockchains are usually public blockchains (like Bitcoin). These blockchains are public and anyone can connect to it and check information which is included in the blockchain to validate transactions etc. Private blockchains are usually more centralized, being so that a group of people is behind the daily maintenance of the blockchain and has control over the blockchain and the information it possesses (Nofer, et al. 2017).

Blockchain & Real Estate

Blockchain is becoming a very interesting technology in the real estate sector. As stated in previous work of this thesis, investing in REITs and private equity real estate funds provides no true ownership of property to the investors. The investors are only entitled in receiving an increase in value of their investments and occasional dividends. Traditional ways of investing in real estate usually have slow processes and high expenses like management fees, transaction fees, etc.

For REITs the cash flow which will be available to be distributed to shareholders is represented by the following formula: $C_t = Y_t - I_t - G_t$ (C = cash flow available to be distributed, Y = cash flow from properties, I = interest expense, G = corporate overhead expenses). Thus, REITs have a specific amount of expenses which is deducted from the cash flow which is available to be distributed to the shareholders (Capozza & Seguin, 2000). This is a general representation of how expenses impact the eventual cash flows which are distributed to shareholders. Because real estate assets have a certain heterogeneity and immobility, the market for buying real estate

is usually illiquid, localized and highly segmented (Nijland, 2019). There are high transaction costs because of the involvement of a high amount of trusted third parties.

This is where blockchain technology could come into play. Originally, blockchain technology was created to disrupt & bypass the traditional intermediaries in currency issuance (De Filippi, 2018). A lot of institutions realized that this technology would be an opportunity to improve their processes and expenses (Capozza & Seguin, 2000). Thus, the technology would also be an opportunity to improve the process and expenses of real estate investing. Real estate has a lot of inefficiencies and blockchain could bring a solution to improve these different factors. According to Nijland (2019) a survey conducted by Coindesk showed that involved parties mentioned the main benefits of blockchain technology in real estate. Like, reduced operational cost, reduced risk, and shortened settlement times. Real estate also has a high amount of non-transparency in the sector. This is because of the competitive advantage real estate companies achieve by remaining non-transparent. But due to a greater demand for transparency and technological advancements in the real estate sector, there is more and more information related to the property that has become available. The digitized & paper form information which is stored by different real estate firms has resulted in a lack of efficiency and inaccuracy in the buying process of commercial real estate (Nijland, 2019). Because of this lack of efficiency and inaccuracy there is a higher chance of creating fraudulent activities, which usually happens in organizations where there is some kind of unclarity. Nijland (2019) also says that blockchain has the potential to solve these inefficiencies and inaccuracies in the real estate sector. Because of the transparent nature of the blockchain, the real estate sector can adapt this structure to create a more transparent buying process and remove the risk of fraudulent activity while speeding up the process of buying and selling properties at the same time (Nijland, 2019). When buying commercial real estate, there's usually a significant amount of time which is spent on the due diligence related to the financial and legal reviews. This is due to the usage of physical documents for proof of identity. These documents are physically stored in places which have limited flexibility to be personalized to suit various needs. This inefficiency increases administrative tasks and results in loss of information and errors.

The concept of fractionalized real estate using blockchain technology is gaining traction in the real estate industry (Baum, 2021). The benefits of blockchain technology are combined with the traditional real estate market to create a more efficient and secure way to invest in real estate. Blockchain technology is a distributed ledger system that securely and immutably

records and stores data (Di Pierro, 2017). It is used to generate digital assets such as cryptocurrencies, which can then be used to buy real estate. Investors can purchase fractionalized shares of real estate using blockchain technology, allowing them to invest in properties without having to purchase the entire property.

There are several advantages to using blockchain technology in fractionalized real estate. For starters, it enables investors to purchase fractionalized shares of multiple properties to diversify their investments (Austin, 1996). This lowers the risk associated with a single property investment and allows investors to spread their risk across multiple properties. Furthermore, blockchain technology provides a safe and transparent platform for investors to purchase fractionalized real estate shares (Golosova & Romanovs, 2018). This eliminates the need for third-party intermediaries such as brokers or agents, lowering transaction costs and increasing efficiency.

Furthermore, smart contracts between buyers and sellers can be facilitated by blockchain technology (Alharby & Van Moorsel 2017). Smart contracts are digital contracts that are stored on the blockchain and are executed automatically if certain conditions are met. This eliminates the need for manual paperwork and lowers the risk of fraud or misunderstanding between parties.

Finally, blockchain technology has the potential to create tokenized assets, which are digital tokens that represent fractionalized shares of real estate, are created (Gan, et al. 2021). These tokens can be traded on digital exchanges, allowing investors to buy and sell fractionalized real estate shares without going through a traditional broker or agent. This increases market liquidity and makes it easier for investors to buy and sell fractionalized real estate shares.

Fractionalized real estate combined with blockchain technology has the potential to revolutionize the real estate industry (Gan, et al. 2021). Researchers at the University of California, Berkeley discovered that using blockchain technology could cut transaction costs by up to 50% (Kumar, et al. 2020). Furthermore, the study discovered that using blockchain technology could increase market liquidity by 20% (Kumar, et al. 2020).

Overall, the combination of fractionalized real estate and blockchain technology has the potential to transform the traditional real estate market. It can make real estate investing more efficient and secure by eliminating third-party intermediaries and lowering transaction costs

(Kumar, et al. 2020). Furthermore, it can increase market liquidity by allowing investors to buy and sell fractionalized shares of real estate without going through a traditional broker or agent (Alharby & Van Moorsel 2017). As more research is conducted on this topic, it is likely that fractionalized real estate combined with blockchain technology will become increasingly popular in the coming years

Market analysis

Potential customers

We assume that there are two kinds of potential early adopters of Cardal. First, crypto investors that are not able to invest in real estate with cryptocurrencies. Secondly, small to medium sized real estate project developers that wish to raise funds through the use of Cardal. The potential crypto investors that currently have no sophisticated way of investing in real estate are a very important target group. All their investments lie in crypto currencies and other blockchain investments which have high risk and are highly volatile (Baur, et al. 2018). Crypto investors only way of investing in real estate is to change their cryptocurrencies to fiat currencies and invest in private real estate projects, funds or REITs. On Cardal they could directly invest with the cryptocurrencies they hold in their wallets and hedge their risky portfolio through investments in low-risk real estate assets. Having the cryptocurrency investor community on board could significantly boost Cardal's growth and space presence. After we have retained the target early adopters, the focus will broaden to young investors which don't have enough financial resources to invest in real estate. The small to medium sized real estate project developers will be another kind of potential early adopters. Since big funds usually have their own network aligned when raising funds, it is not difficult for them to raise funds for new projects (Bygrave, 1987). Thus, their interest in using Cardal as a funding option might not be interesting for them in the beginning. That's why Cardal would target small to medium sized private real estate funds as early adopters of the platform for their funding process.

Market size

The market size of fractionalized real estate investments is difficult to estimate due to a lack of reliable data. However, it is estimated that the global market for global real estate tokenization is worth around \$3.894 Billion (Global Newswire, 2022). Since the properties will be tokenized, this can be seen as a potential market size. However, this figure is expected to rise significantly over the next few years as more properties will get tokenized and made available for fractional investments on fractionalized real estate platforms. Investors can use these platforms to buy shares in a property, which can then be sold or traded on the platform. Because of its low entry cost and ability to diversify across multiple properties, this type of investment has grown in popularity. The total real estate market size of Portugal, which would be the market in which Cardal will first be launched, is estimated at €24.86 billion in 2022 (GlobalPropertyGuide, 2022). The following property types we're taken into consideration when valuing the market size: Land investment, Residential investment, Commercial investment (Office space, Retail space, Leisure space), and Industrial investment (manufacturing plants, warehouse/distribution, others) (Kanhaiya, 2022).

Competitors

There are several traditional real estate investment trusts (REITs) that offer fractionalized real estate investments in addition to online platforms. These REITs typically invest in a property portfolio and allow investors to buy shares in the trust. This type of investment gives investors access to a larger pool of properties and can be an appealing option for those seeking diversification and higher returns. A number of private equity firms provide fractionalized real estate investments. These companies typically invest in larger properties and allow investors to buy stock in the company. This type of investment may be appealing to those seeking higher returns, but it also carries a higher level of risk due to a lack of liquidity and the possibility of losses if the property does not perform as expected.

The fractionalized real estate sector is a very new industry and there are very few to no companies already established in the world. Currently most of the other companies trying to provide fractionalized real estate investment solutions are start-ups that have not yet been entirely established or are only competing in one specific country. The first type of competitor that will be discussed in this part are the indirect competitors. A company is an indirect competitor when the company satisfies the same need of the customer as you but with a different

kind of product and service (Bergen & Peteraf, 2002). The indirect competitors of Cardal are companies which provide crowdfund investing in real estate. These companies do not use the blockchain to store NFTs but provide a crowdfunding platform where people can fund as much as they like in return for a share of the property. In these cases, the investors do not really own the property but just the shares, they have no voting rights. The main idea is to receive the investment back with extra interest when the entire development project eventually gets sold. The indirect competitors are: Fundrise, RealtyMogul, CrowdEstate, Housers, Republic, BulkEstate, Reinvest24. These are all crowdfunding real estate platforms. The direct competitors are: VAIRT, RealT, BrickX, Algae. VAIRT, RealT and BrickX are all not active in Portugal, where our startup will be founded (Crunchbase, 2022). Algae has recently launched its operations in Portugal, making it our closest competitor (Algae, 2022)

Data Analysis

To start validating all the problems mentioned in the introduction and the first part of the literature study, it is important to find the right method to retrieve all of this data. According to Harrell & Bradley (2009), there are different types of data collection: (1) *Survey*, (2) *Interviews*, (3) *Focus groups*, (4) *Observation*, (5) *(Data) Extraction*, (6) *Secondary data sources*.

Surveys are a set of questions that are fixed and can be answered by paper & pencil, in digital form or by an interviewer with a specific script that is followed. An interview is a one-on-one between the interviewer and the interviewee. *Interviews* are meant to extract information on a very specific set of topics. It can be conducted in person, over the phone or through an online call. The main difference between interviews and surveys are the level of structure that is controlling the interaction. *Focus groups* are discussions which happen in a dynamic group and is used to collect information. *Observation* is a data collection method where the researcher is not participating in the event. This means the researcher is observing the focus group from a third point of view to extract information. This is done because the researcher believes that his/her presence will have a certain influence on the data outcome. *Extraction* is the collection of data which is already available in current documents, records, and other sources. *Secondary data sources* is a method where the researches uses datasets which already exist, like census data. Researchers usually select variables from one or more secondary data sources (Harrell, et al. 2009).

Harrell & Bradley (2009) also suggest that it is important to look at the logistical considerations when choosing a method. These suggestions are the following:

- What will the data collection cost?
- Is there enough time to complete the data collection?
- How many people are needed to accomplish this data collection?
- Are the people and other data accessible?
- Is there already some kind of sampling frame that exists for the chosen population?
- How large do you want the sample to be? How generalizable do you want your results to be?

When one is looking for a complete and detailed response it is usually better to use interviews and focus groups as a method. These two methods are often also the best method to immediately resolve a certain conflict, because the researcher is present and can ask about a conflict and getting more specific information on this. Surveys and interviews are both good methods to measure how strongly someone holds an opinion. Data has a higher chance on being generalizable if the data is well sampled and collected using surveys or a large number of interviews. Focus groups are usually never generalizable, since the outcomes are usually only applicable to the original focus group. When there is a certain time constrain, surveys are not the most appropriate type of method since it takes longer to field correctly.

Online Survey

According to P. Couper's research in (2017) Sampling the general population remains a challenge with web surveys. He then states several methods which can be used for the way that samples can be identified and selected for web surveys like sample matching, respondent-driven sampling, river sampling, survey walls, etc. Today most of the researchers using web surveys use nonprobability samples to conduct online surveys. Nonprobability approaches is often the only affordable option when the researcher wants to conduct a survey on a large-scale. Two common types of nonprobability approaches are opt-in or access panels. The responders are recruited or invited to the web survey through different ways of nonprobability methods. There have been some doubts about these panels in recent years, given the rising concerns of oversaturation and fraudulent or inattentive respondents. Alternatives approaches are the

outcome of these concerns. River sampling is a method which directly intercepts people who are browsing the web and directing them to a survey. Survey walls is a method which gives users access to restricted material if they answer a survey, it is a way of giving compensation for their time and input in the survey. A very widely used method which is going to be explained more throughout is the open-access survey, here an invitation to the survey is posted online on websites, social media, forums, word of mouth, ... Usually this recruitment consists of the researcher's network which, if not very broad, does not support generalization of the data outcome (Couper, 2017). The latter method could be interesting in finding out if something is a problem or not on a specific group of subjects.

Our data in this thesis will be collected using an online survey. There are some questions which are open ended with an area to freely write a text to extract qualitative data, but most will be close ended to extract quantitative data.

To retrieve enough data for the validation of the problem and the answering of the 1st and 2nd research question, I have chosen to use a mix of qualitative and quantitative survey. The survey consists of questions in a specific order which can be found in detail in the appendix.

Throughout the following section the most relevant survey questions and answers to these questions will be individually discussed and explained.

Descriptive analysis

Age (closed question) is amongst the most used demographic questions in surveys throughout the world of research. It is most common that researchers use categories for age, which has been done in this survey. (Hughes, et al. 2016). This question was asked to link in further analysis to the different answers throughout the survey. This demographic question shows us that most of the responders are between 18-29 years old (48%). Followed by 30-39 years old (21.8%) and 40-49 (22%). With the remaining 5% being 50+.

The genders of the respondents were divided but male respondents were a majority throughout the survey. Male respondents represented 61% of the total survey participants and female respondents 39%.

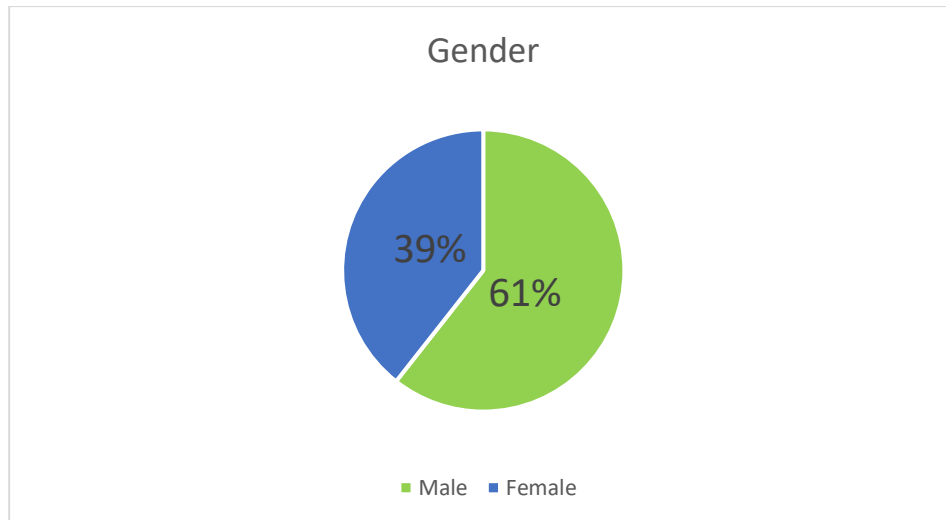


Figure 1: Gender diagram survey (Source: Online survey conducted for this thesis)

The respondents were then asked what type of investments they participate in (open question). The response of the survey shows that 30% invests in stocks, 21% invests in real estate, 21% invests in crypto investments, and 14% invests in mutual funds or ETFs. This qualitative question helps to identify which kind of investor the respondent truly is. This information is important because the results can be linked to age, this could provide us with a view on how age has an impact on the way of investing their money.

What type of investments do you do?

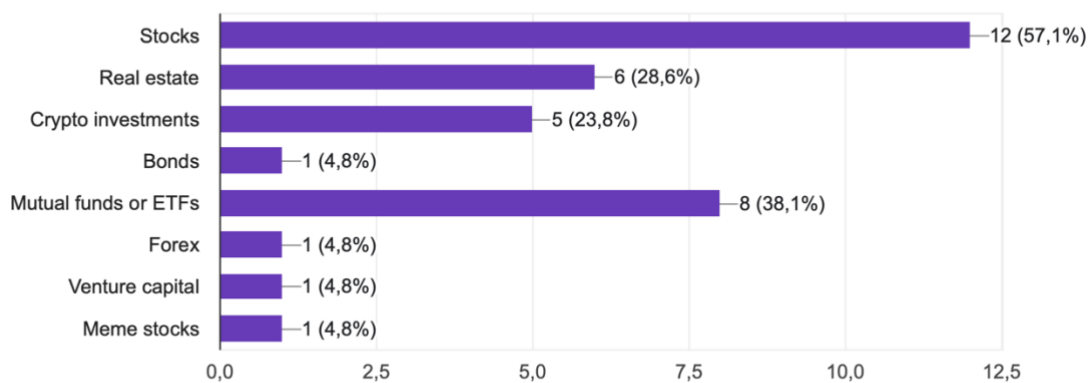


Table 1: Type of investments (Source: Online survey conducted for this thesis)

The risk appetite diagram which was generated by the survey shows us that 47.8% of the respondents are rather risk tolerant. This means that they would allow a certain level of risk in their investment portfolio but that they are not willing to seek the limits of risk. The answers to

this survey question could provide us with more information on how much risk they would allow in their portfolio. These results could be interesting if linked with type of investments and age. We could later identify how risk seeking our target customer or early adopters are, since fractionalized real estate investment involves a relative low amount of risk (Ross & Zisler, 1991).

What is your risk appetite when investing?

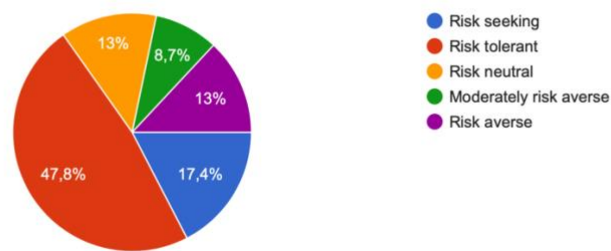


Figure 2: Risk appetite diagram (Source: Online survey conducted for this thesis)

When asked whether their risk appetite has changed due to current market situations, 55,6% of the respondents of the survey implied that there has been no change in risk appetite meaning the answers in this question of the survey were quite equal. Looking at the current volatility of the stock and crypto market, it was important to see if the risk appetite of the respondents changed. If there would have been a major change to a more conservative way of investing, it would have given some indicators that investing fractionalized real estate would become a new option for the respondents that want to change to a more risk-free investment option.

66,7% of our respondents do not invest in real estate. This data shows that there is quite a significant number of investors which do not invest in real estate. After this a follow up question was given which asked the respondents that replied “No” why they did not invest in real estate in their case. 80% of the 67,2% answered that it was because of financial limitations. The respondents don’t have enough financial resources to fully invest in real estate projects. The information retrieved from this question solidifies the claim that financial limitations are the cause of not investing in real estate.

Do you currently invest in real estate?

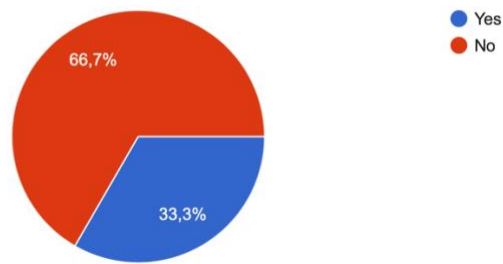


Figure 3: Currently investing in real estate diagram (Source: Online survey conducted for this thesis)

For the people that do invest in real estate, the question was created which asked them in which ways they invest in real estate. 58% invests through private real estate investments, 20% through REITs. The remaining 22% was a mix of tokenized real estate, fintech and mortgage investing. It's important to know in what kind of way the respondents invest in real estate. That information could show us what the preferred way of investing would be if the investor would not experience any kind of financial limitations.

For the respondents that did not invest in real estate it seemed interesting to know which factors are stopping them from investing in real estate. Thus, an open question was created in which we asked which factors stop them from investing in real estate. From the answers it became clear that 80% of the respondents does not invest in real estate due to financial limitations. Another 14% replied that they don't invest in real estate because they have no access to private equity real estate funds because the minimum required capital is too high. Since we can put both percentages in the same category of financial limitations, the results imply that 94% of the respondents who do not invest in real estate do not invest due to the financial limitations they are experiencing to enter the real estate market. This can be assumed, but it is more interesting to keep the two answers separate. This question of the survey truly shows us what stops people from investing in real estate. The answers validate the claim that financial limitations would be the most important barrier which would stop people from investing in real estate. We can conclude that a significant amount of the respondents of the survey experience the same problem.

When asked if they are willing to invest in real estate if they had the possibility to do so, 88% answered yes and 12% answered no. This shows us that there is a significant willingness to

invest in real estate, but many limitations as previously stated. Demographically, the percentage of respondents willing to invest in real estate in the age intervals of 18-29, 30-39, 40-49, 50+ are, respectively: 87%, 94%, 50%, 100%. The results here are quite positive since 88% would be willing to invest if possible.

The respondents were then asked how much they are currently willing to invest in real estate. The results of this question were quite surprising with the 38.9% of the participants responding that they would currently be willing to invest more than €25,000. The initial assumption would have been that most of the respondents would like to invest lower amounts. The results still show that most of the respondents prefer fractionalized real estate investments since the rest of the respondents all answered below €25,000.

How much are you currently willing to invest in Real estate?

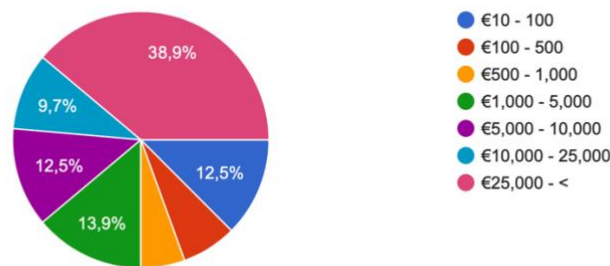


Figure 4: Willingness to pay diagram (Source: Online survey conducted for this thesis)

Furthermore, when asked whether the respondents were familiar with fractional investing, 50% answered yes and 50% answered no. After this question there was a brief explanation about fractional investments. With this information they could answer the following questions. The purpose of this question was to see if fractionalized real estate was an already discussed topic amongst the respondents or not. Since the answers were completely divided, not much could be concluded out of these answers. It does become clear that a significant number of respondents did not know this concept existed. The answers to this question could provide some insights into how early we are in the fractionalized real estate sector. The follow up question formulated as if they would be willing to fractionally invest in real estate. The willingness to invest in real estate was confirmed again by the results of the question. 72% answered yes and 28% answered no. This shows that after explaining what fractional investing the willingness to

invest in real estate dropped but only by 16% due to the fractional aspect. This might be because investors are sceptic of trying a new way to invest in real estate. It could also be because they simply are not interested in owning a fraction of a property and would rather wait until they can own the entirety of the property for them to invest. Demographically, the percentage of respondents willing to invest in fractionalized real estate in the age intervals of 18-29, 30-39, 40-49, 50+ are, respectively: 80%, 67%, 64%, 25%. Compared to the previous question stating if they would be willing to invest in real estate the “traditional” way, the percentages are lower per age interval except for the 40-49 age interval.

With the survey conducted on a sample of 100 respondents, it is safe to say that the second research question can be answered. It is quite clear that there is a significant interest in real estate investing. The biggest problem which stops people from investing in real estate are financial limitations.

Quantitative Analysis

An interesting analysis was to see if the gender of the respondents would have any relation with if they are currently investing in real estate or not. For this analysis a Chi-squared test was done. A Chi-squared test is used to see if there is a relationship between two categorical variables, in this case, gender and currently investing in real estate. When performing a Chi-squared test on these two categorical variables, under a significance level of 5%, the results showed us that there is a relation between gender and if they are currently investing in real estate or not. In other words, if the person is investing in real estate, it is dependent on the gender of the person according to the Chi-squared test performed on these two variables. The value of the relation between gender and currently investing in real estate or not is a positive relationship of 3.992 Pearson Chi-Squared with a significance level of 5%. The test showed us that more male respondents are currently investing in real estate than female respondents, this could be the result of the fact that there we're 20% more male respondents to the survey than women.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.992 ^a	1	.046		
Continuity Correction ^b	3.082	1	.079		
Likelihood Ratio	3.891	1	.049		
Fisher's Exact Test				.055	.041
N of Valid Cases	100				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.88.

b. Computed only for a 2x2 table

Table 2: Pearson Chi-Square test for gender and currently investing in real estate variables (Source: Excel data extracted from online survey)

Another important factor is whether age has a significant relation with investing in real estate. The assumption for this would be that the younger the respondent the less they would be able to invest in real estate. This relationship is again tested through a Chi-Squared test. In this test we could see that a majority of the respondents between 18–29-year-old do not invest in real estate. For the 30-39 range the amounts that do and don't invest in real estate were the same and for the 40-49 age range the Chi-test also showed a majority of non-investors. The Chi-test showed that the relationship between age and investing in real estate is a positive relation with a significance level of 5% and a Pearson Chi-squared value of 10.431. Thus, the assumption of age being a factor when investing in real estate has been accepted. The difference between if the respondents do invest in real estate or not is bigger in the 18-29 age range than for all other age ranges.

Age * CurrentlyInvestinRE Crosstabulation

			CurrentlyInvestinRE		Total
			No	Yes	
Age	18–29	Count	46	10	56
		Expected Count	38.6	17.4	56.0
	30–39	Count	13	13	26
		Expected Count	17.9	8.1	26.0
	40–49	Count	10	8	18
		Expected Count	12.4	5.6	18.0
Total		Count	69	31	100
		Expected Count	69.0	31.0	100.0

Table 3: Crosstabulation age and currently investing in real estate variables (Source: Excel data extracted from online survey)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.431 ^a	2	.005
Likelihood Ratio	10.493	2	.005
N of Valid Cases	100		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.58.

Tabel 4: Pearson Chi-Square test for age and currently investing in real estate variables (Source: Excel data extracted from online survey)

In the following test we will analyze the relationship between the age of the respondents and willingness to invest in real estate. These results are important since they will show which age group is the most interested in real estate investments. The results of the Chi-squared test showed us that there is no association between the age and willingness to invest in real estate. This was concluded after seeing that the likelihood ratio significance value of 0.877 is much higher than the level of significance of 0.05 (after a violated assumption in the Chi-squared test).

Age * WillingToInvestRE Crosstabulation

			WillingToInvestRE		Total
			No	Yes	
Age	18-29	Count	7	49	56
		Expected Count	7.3	48.7	56.0
	30-39	Count	3	23	26
		Expected Count	3.4	22.6	26.0
	40-49	Count	3	15	18
		Expected Count	2.3	15.7	18.0
Total	Count	13	87	100	
	Expected Count	13.0	87.0	100.0	

Table 5: Crosstabulation age and willingness to invest in real estate variables (Source: Excel data extracted from online survey)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.275 ^a	2	.871
Likelihood Ratio	.262	2	.877
N of Valid Cases	100		

a. 2 cells (33.3%) have expected count less than 5.
The minimum expected count is 2.34.

Tabel 6: Pearson Chi-Square test for age and willingness to invest in real estate variables (Source: Excel data extracted from online survey)

In the following test it becomes clear that, as in the previous test, age does not have relationship with willingness to invest in fractionalized real estate. The performed Pearson Chi-squared test showed a result of Pearson Chi-squared of 1.608 at significance level of 5%. But the Asymptotic significance was higher than the significance level at 0.448, meaning the null hypothesis of the two variables being independent of each other is confirmed. This could be seen in between different age ranges. The amount of interested in making fractionalized real estate investments in the age range of 18-29 is significantly higher than the other age groups.

Age * WillingToInvestinFRAC Crosstabulation

			WillingToInvestinFRAC		Total
			No	Yes	
Age	18-29	Count	14	42	56
		Expected Count	16.8	39.2	56.0
	30-39	Count	9	17	26
		Expected Count	7.8	18.2	26.0
	40-49	Count	7	11	18
		Expected Count	5.4	12.6	18.0
Total		Count	30	70	100
		Expected Count	30.0	70.0	100.0

Table 7: Crosstabulation age and willingness to invest in fractional real estate variables (Source: Excel data extracted from online survey)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.608 ^a	2	.448
Likelihood Ratio	1.593	2	.451
N of Valid Cases	100		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.40.

Table 8: Pearson Chi-Square test for age and willingness to invest in fractional real estate variables (Source: Excel data extracted from online survey)

Since we are targeting Cryptocurrency investors as our first stage early adopters, another Pearson Chi-squared test was performed to measure the relationship between the two variables are you a crypto investor and are you willing to invest in fractionalized real estate. A value of 0.231 Pearson Chi-squared at 5% significance level resulted from the test. Again, the results showed an asymptotic significance of higher than 5% p-value. Thus, the null hypothesis of the two variables being independent of each other is confirmed. The test showed that both crypto investors and non-crypto investors have a significant interest in investing in fractionalized real estate. Even though the null hypothesis was confirmed after assuming that these two variables would be dependent on each other, these results solidify the claim that there is a need for crypto investors to invest in real estate and hedge their crypto portfolio. The test resulted in a new claim that it is not depending on whether someone is a crypto investor or to be willing to invest in fractionalized real estate.

CryptoInvestor * WillingToInvestinFRAC Crosstabulation

			WillingToInvestinFRAC		Total
			No	Yes	
CryptoInvestor	No	Count	17	36	53
		Expected Count	15.9	37.1	53.0
	Yes	Count	13	34	47
		Expected Count	14.1	32.9	47.0
Total	Count		30	70	100
	Expected Count		30.0	70.0	100.0

Table 9: Crosstabulation crypto investor and willingness to invest in fractional real estate variables (Source: Excel data extracted from online survey)

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.231 ^a	1	.631		
Continuity Correction ^b	.069	1	.793		
Likelihood Ratio	.232	1	.630		
Fisher's Exact Test				.667	.397
N of Valid Cases	100				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.10.

b. Computed only for a 2x2 table

Table 10: Pearson Chi-Square test for crypto investor and willingness to invest in fractional real estate variables (Source: Excel data extracted from online survey)

In the following Pearson Chi-squared test we look at the relationship between age and the factors which stops people from investing in real estate (Financial limitations & No access to private real estate funds). The results showed that there is no relationship between both variables with a Pearson Chi-squared value of 2.531 at significance level of 5% and a asymptotic significance of 0.282, which is higher than the p-value of 0.05. In all age ranges we see quite even distributed answers between financial limitations and no access to private real estate funds. Because of the even distributed answers a conclusion can be made that financial limitations and no access to private equity funds is a common problem across all age ranges.

Age * FactorsWhichStopFromInvestingRE Crosstabulation

			FactorsWhichStopFromInvestingRE		Total
			Financial limitations	No Access to Private Equity funds	
Age	18-29	Count	27	29	56
		Expected Count	26.9	29.1	56.0
	30-39	Count	15	11	26
		Expected Count	12.5	13.5	26.0
	40-49	Count	6	12	18
		Expected Count	8.6	9.4	18.0
Total		Count	48	52	100
		Expected Count	48.0	52.0	100.0

Table 11: Crosstabulation for age and factors which stop you from investing in real estate variables (Source: Excel data extracted from online survey)

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.531 ^a	2	.282
Likelihood Ratio	2.568	2	.277
N of Valid Cases	100		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.64.

Table 12: Chi-Square test for age and factors which stop you from investing in real estate variables (Source: Excel data extracted from online survey)

The above Pearson Chi-squared tests showed that gender has a relationship with whether the person is currently investing in real estate or not. It showed that the highest percentage of real estate investors were male. Furthermore, the second test resulted in a conclusion that age has a relationship with whether they are investing in real estate or not. The results showed that the younger age range has proportionally less people that invest in real estate than the other older age ranges. The remaining tests that were performed showed no relationship between the variables proposed in the test. These results have given more insight on how these different variables are impacted by each other. This information could be used to find out which group will eventually be an early adopter of the fractionalized real estate investment platform.

Qualitative analysis of open questions in the survey

Below the most important open questions of the survey will be explained and analyzed. When the participants of the survey that invest in real estate were asked why they invest in real estate, the answers were interesting. Most of the answers were usually formulated differently but could be concluded as the same reason. The reason “portfolio diversification and safe asset” took up 70% of the total answers, with the remaining answers being quite diverse and divided. Most of the respondents that invest in real estate do so because of the safe investment that it is. It provides their portfolio with an investment which holds its value particularly well and hedges against several risks of the market.

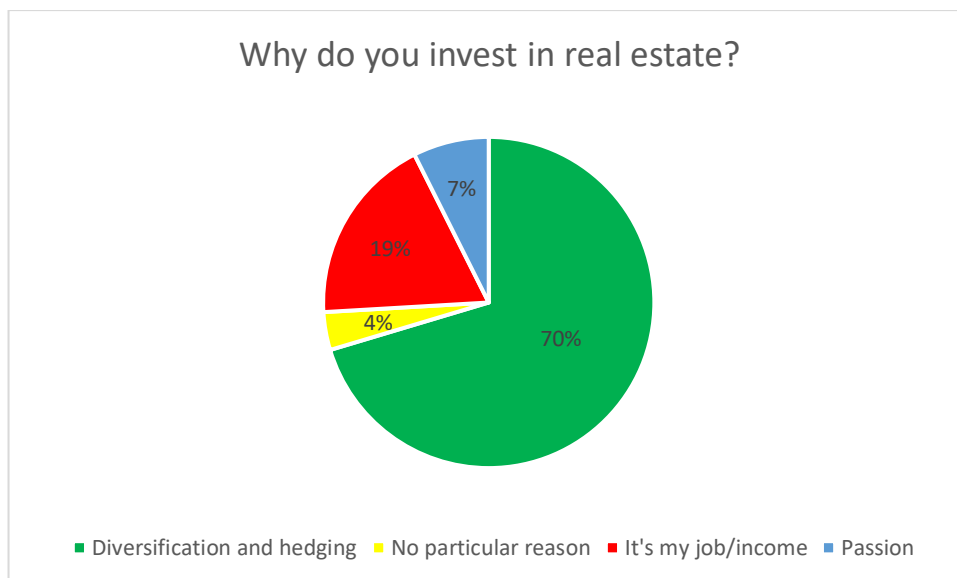


Figure 5: Why do you invest in real estate diagram (Source: Online survey conducted for this thesis)

For the people that do invest in real estate, the question of how they invest in real estate was created. 58% invests through private real estate investments, 20% through REITs. The remaining 22% was a mix of tokenized real estate, fintech and mortgage investing. It's important to know in what kind of way the respondents invest in real estate. That information could show us what the preferred way of investing would be if the investor would not experience any kind of financial limitations.

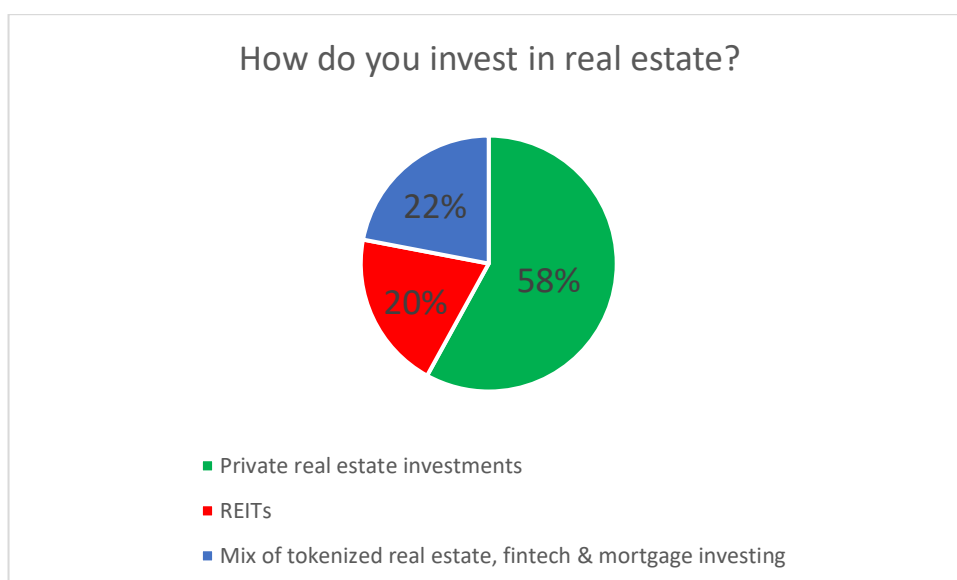


Figure 6: How do you invest in real estate diagram (Source: Online survey conducted for this thesis)

Respondents were then asked what are the current factors which stops them from investing in real estate. The answers resulted into the fact that 80% of the respondents don't invest in real estate due to financial limitations. Another 14% replied that they don't invest in real estate because they have no access to private equity real estate funds because the minimum required capital is too high. Since we can put both percentages in the same category of financial limitations, the results imply that 94% of the respondents who do not invest in real estate do not invest due to the financial limitations they are experiencing to enter the real estate market. This question of the survey shows what truly stops people from investing in real estate. The answers validate the claim that financial limitations would be the most important barrier which would stop people from investing in real estate. We can conclude that a significant amount of the respondents of the survey experience the same problem, this is where an opportunity could line up to solve this problem by providing a way to invest in real estate which is affordable for people that don't have the financial capabilities to do so.

Conclusion

The research conducted throughout the paper has given meaningful insights on different aspects. The research showed how limited people truly are when wanting to invest in real estate. They currently only have three options, investing in private equity funds, REITs or private real estate investments. Throughout the research paper it becomes more obvious that there is room for a new way of investing in real estate, which is powered by blockchain technology. It remains a challenge to connect these two industries which are so different to each other in terms of regulation, but the demand is there. The qualitative analysis showed us that 70% of our survey participants that currently invest do so because of diversification and hedging. Hedging and diversification is an important aspect of investing, and it is something current crypto investors have no easy way to achieve yet. The qualitative analysis also showed 22% of the entire survey respondents to invest in real estate in a different way than REITs or private equity funds, showing us a real trend for alternative ways of real estate investing. The quantitative analysis was enriching, confirming assumptions in some cases, but also showing no relationship between certain variables where previously thought would be a relationship. The research question that arose in our introduction which stated whether customers are truly interested in fractional real estate investing is considered answered. From all the respondents that are willing to invest in real estate but were financially limited 72% answered yes and 28% answered no

when they were asked whether they would invest in real estate fractionally. This shows that the willingness to invest in real estate dropped but only by 16% after explaining what fractional investments are. This shows that there is a significant interest in fractionalized real estate investments and therefor this research question is answered, during this research it became clear that our early adopters would be young investors ranging between the age of 18-29 and crypto investors, which was eventually also backed by the Pearson Chi-Square test which was conducted in the quantitative analysis. The results of the online survey showed that 80% of the respondents don't invest in real estate due to financial limitations. And with 62% of the respondent's willingness to pay being below €25,000 it shows that our research question which assumes that financial limitations are the main problem which stops people from investing in real estate can be confirmed. It must be said that it was the main problem that arose when questioning the participants of the survey, but there were several exceptions as showed in the descriptive analysis and throughout the research paper. Thus, it can be concluded that the main research question which states: "is there a market for fractionalized real estate investing through NFTs?", can be confirmed. There is a market opportunity for fractionalized real estate investments. There was a significant interest across all participants with different background throughout the online survey. It is only yet to be seen if the one and only way would be using blockchain. There are surely other alternatives than using the blockchain to fractionally invest, but with the research conducted and insights gathered it can be said that blockchain has a huge potential to be a cost-effective, fast, and reliable technology to be used when creating a fractionalized real estate investment platform.

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Appendix

Detailed script of online survey

1. How old are you?
2. Gender
3. What type of investments do you do?
4. What is your risk appetite when investing?
5. Has your risk appetite changed due to the current market situation?
6. Do you currently invest in real estate?
7. Why do you invest in real estate?
8. How are you currently investing in real estate?
9. What are the current factors which stop you from investing in real estate?
10. Are you willing to invest in real estate if you had the possibility to do so?
11. How much are you currently willing to invest in real estate?
12. Are you familiar with fractional investing?
13. Are you a crypto investor?
14. Do you think, regarding the current market situation, it is better to fractionally invest in real estate?
15. Are you interested in making fractional investments in real estate?
16. Is it relevant for you to have access to the global market of real estate when investing?