Cherniatina Mariia

Blockchain Investments and Mining Opportunities for Real Estate Businesses.

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Abstract

Author: Cherniatina Mariia

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Keywords: blockchain investments, mining, real estate company, graphs and charts, information gathering, Bitcoin, Etherium, technical analysis, cryptocurrency.

Nowadays small or medium-sized enterprises (SMEs) in the field of real estate in Russia are facing many challenges due to exposed sanctions, political and economic decrease. This country was chosen particularly due to its unstable financial markets during crisis making the research problem more attractive for the analysis. The research problem was the drop of price of both Bitcoin and Etherium in contrast with the significant price rise in 2021.

This thesis aimed to discover whether blockchain investments and bitcoin mining opportunities are profitable in the field of real estate businesses, especially those located in Russia. Another goal was to share possible investment opportunities for real estate businesses and discuss the ways in which SMEs can use them in the future. The thesis supposes that the reader already has an insight of blockchain technology and does not explain the beginning of this industry, but rather focuses on the abilities to use it in the real world. Ultimately, the outcome of the thesis is the list of potential investments and bitcoin mining opportunities for further practical implementation in the commissioning party.

The study employed both qualitative and quantitative methods. The qualitative data was processed with a classification method, while the quantitative data was analysed with SPSS as well as technical analysis instruments. All the data was supported not only by the choice of literature, but also by in-depth analysis, interview and a survey. The thesis closely reviewed the graphs and evaluated the potential profitability levels.

The findings of the study confirmed the profitability of short-term blockchain investments. Therefore, recommendations for potential investments and blockchain integration for the commissioning party were provided in the end of the paper considering all the opportunities and drawbacks of a blockchain for the real estate sector. The advantages included increased efficiency, faster transactions, and cost savings. The thesis can be utilised by companies to review blockchain opportunities and integrate them into their business operations.

List of Figures

List of tables

Table of Contents

List of Symbols

BaaS – Blockchain-as-a-Service

CBR – Central Bank of the Russian Federation

DLT – Distributed Ledger Technology

GDP – Gross Domestic Product

EMA – Exponential Moving Average

EU – European Union

HS – Head & Shoulders Pattern

ICOs – Initial Coin Offers

PESTEL – Political, Economic, Sociological, Technological, Legal and Environmental factors

PoS – Proof of Stake

PoW – Proof of Work

ROI – Return on Investment

SHA-256 – Secure Hash Algorithm with a 256-bit Long Output

SPSS – Statistical Package for the Social Sciences

SME – Small or Medium-sized Enterprise

SWIFT – Society for Worldwide Interbank Financial Telecommunication

USA – United States of America

1 Introduction

The main subject area of the thesis is cryptocurrency investments. The thesis supposes that the reader already has an insight of blockchain technology and does not explain the beginning of this industry, but rather focuses on the abilities to use it in the real world. The author is about to discover whether blockchain can be used further in real life businesses, such as real estate industry indeed. The focus is directed at studying bitcoin mining opportunities as a potential investment for real estate companies due to difficult economic situation in Russia, where the commissioning party is located. It makes this topic more engaging for the author due to the fact that the research on blockchain will be done for unstable Russian markets because of sanctions, exposed on the country by United States of America (USA) and the countries of European Union (EU). Therefore, in current circumstances this topic is particularly relevant. Moreover, the author of the thesis is a solo trader; therefore, there is a personal interest in expanding existing knowledge in the field of cryptocurrency.

It is also beneficial for the commissioning party. Due to difficult economic situation in the country many Russian companies are trying to find additional side-hustles which can be profitable for businesses and the thesis will analyse the idea of blockchain investments for real estate industry and evaluate whether this kind of investment is profitable or not (Isidore, 2022).

1.1 Introduction to the commissioning party

The commissioning party is a real estate company "Fifth element", a company located in Karelia, Segezha, which is engaged in the lease and management of own commercial real estate. It was established in 2014. Officially the gross profit at the end of 2022 was RUB 2 109 000 ₽ (approximately 25 000 euro) (ООО Пятый Элемент, 2023). The author has worked in this company in 2020, and it encouraged writing this thesis on the topic related to real estate and exactly with this company. Therefore, this company was chosen for the comprehensive interview on the situation as well as for the creation of this paper. The contact person is on-the-job supervisor, Oleg Cherniatin who is a director of the company.

The company stands seized for several commercial buildings which are currently rented by the tenants. Buildings used for business purposes are known as commercial property or investment

property. Office spaces, retail establishments, warehouses, and more are examples of commercial structures. The purpose of this kind of real estate is to make money, either through capital gains or rental revenue through leasing (Certified Commercial Property Inspectors Association, 2019). “Fifth element” owns commercial buildings for retail stores – supermarkets, clothing stores and meat shop with a small restaurant. Previously the company owned some more constructions that were sold in 2019, and nowadays the organization does not sell the properties, but leases them and, hence, generates profit by rental revenues. Today almost all of the available investment properties are leased to the tenants who develop different kind of business (food industry, clothing industry, etc.) using the real estate (ООО "Пятый Элемент", 2022). However, some of the properties are empty.

The company's mission statement is: "We aim to deliver the property to clients while offering them a superior standard of service and real estate market experience." Indeed, the organization is committed to the highest standards, strategies, and performance required realizing all real estate ambitions (ООО "Пятый Элемент", 2022).

In order to get a comprehensive understanding of the company and industry, the following PESTEL analysis was done (Figure 1). The comprehensive PESTEL study of the real estate sector can assist buyers and sellers in making educated property-related decisions. Real estate constitutes, without hesitation, one of the most evolving, rapid, and aggressive sectors in the world currently. As a result, buying, selling, and managing real estate requires a unique array of abilities and expertise. Furthermore, the shifting economy, new laws and policies, and cutting-edge innovations contribute to the industry's unpredictability and volatility (David, 2023). Therefore, in order to start analyzing the company and its further investments, PESTEL analysis was conducted. The results prove economic instability in the country, which definitely results in negative consequences for the revenue of the “Fifth element”.

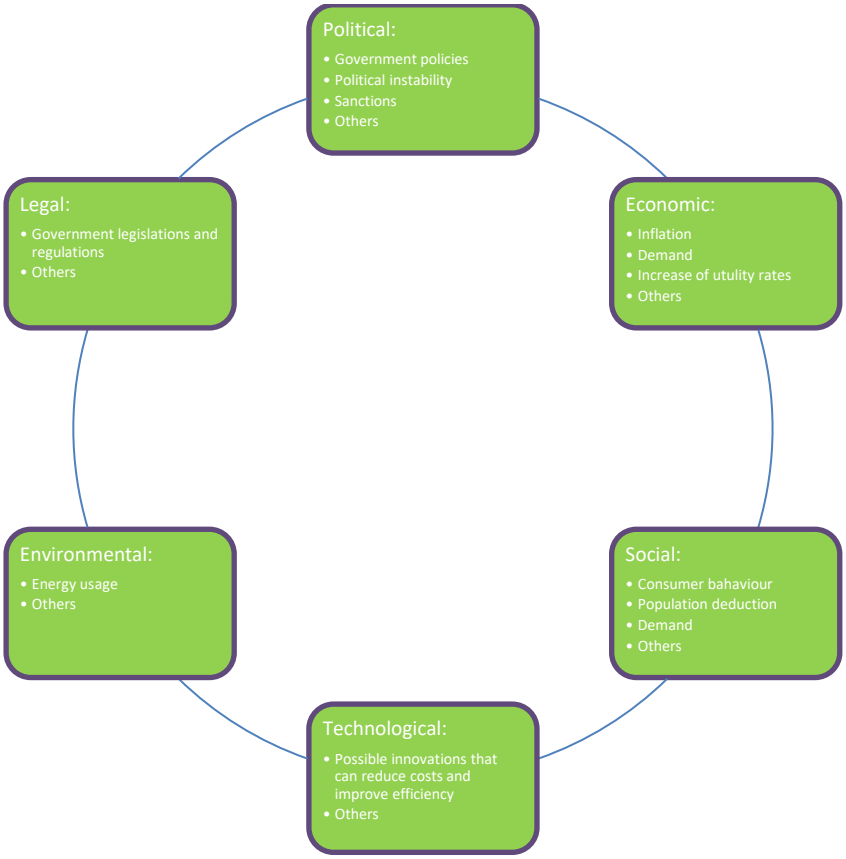

Figure 1. PESTEL Analysis

1.2 Research problem, objectives, questions

The thesis is project-based. It emphasizes practical application of created project. The thesis combines theoretical knowledge with hands-on work to address research questions discussed below. It aims to accomplish in-depth analysis of different kinds of resources on the chosen topic with further interpretation of it. It supports the relevance and reliability of the created project. The objective of the thesis is to discover whether blockchain investments and bitcoin mining opportunities are profitable in the field of real estate businesses, especially those located in Russia, and create a list of investments which will be utilized by the commissioning party in its business activities. The main questions of this thesis are: “Are the investments in Bitcoin and Etherium currently profitable?”; “Are mining opportunities available and beneficial for real estate businesses in Russia during current economic situation?”, “What are the challenges and opportunities of integrating blockchain into real estate business operations?” The project will be accomplished on the basis of in-depth analysis, qualitative as well as quantitative research.

This country was chosen due to its unstable financial markets during crisis making the research problem more attractive and thrilling to analyze. Obviously, there is nothing to research when the economy is thriving and the country is full of opportunities for people. Hence, current situation in Russia is perfectly fitting the scope of the research.

Additionally, the author of the thesis has worked in Russia in the commissioning company several years ago and it also made it possible to gain a deep insight into the real estate market and understand the possibilities better.

The research problem is the drop of price of both Bitcoin and Etherium in contrast with the significant price rise in 2021. This situation makes it difficult to predict future potential investments and, hence, mining opportunities, because the last depend on the market price of Bitcoin (Tovanich et al., 2022). Therefore, the exact aim of the research is not only to define the profitability but also to suggest the best point-of-entry for the investments as well as the potential point-of-exit. The ultimate goal is a creation of list of potential investments, which is presented in the end of the study.

In order to do that, the author uses the theoretical background explained in chapter 2. The most significant instrument in the thesis is the technical analysis of the graphs of both Bitcoin and Etherium, which makes it possible to suggest whether the investment will be profitable or not from the technical perspective. The technical analysis, which is based on the book of Steve Nison (2011), will also give the opportunity to understand the potential scope of profitability and use such instruments like candlesticks, Elliot waves and Fibonacci retracement, which will not only show the direction of the trend, but also the exact price target. This book is still used nowadays as a golden example of well-organised trustworthy theory. Therefore, the thesis provides a new perspective of old material and merges it with the new readings, introduces own investigation within the framework of current literature.

The research of the thesis focuses on financial predictions and the outcome is not the exactly predefined numbers. Cryptocurrency is a highly vulnerable instrument due to the fact that it is supported only by other investor´s predictions and insights. Hence, the prices stated in the thesis could not be 100% accurate, but the author of the thesis expects it to be precise enough in order to make a decision regarding the investments because the analysis is supported by the survey results as well as literature review. Moreover, the thesis does not provide investment recommendations and does not take the responsibility for other people´s investments or other market actions.

1.3 Thesis topic

The topic of the thesis is cryptocurrency investments. The purpose of this thesis is to share possible investments for real estate businesses and discuss the ways in which SMEs in Russia can use them in the future. The thesis elaborates on real estate industry as well as blockchain and mining opportunities. Moreover, the paper discusses blockchain types, opportunities and limitations. Based on this information the thesis aims to develop a list of recommendations for potential investments for SME “Fifth element” in case blockchain is considered to be an appropriate technology to respond to the needs of the company in current situation.

The thesis should closely review the graphs and evaluate the potential profitability levels. It also focuses on the survey and interview analysis in order to get more background information on the topic and minimise the mistakes. Considering the fact that blockchain does not constantly represent a successful technique for SMEs to enhance their business operations, errors in the analysis may lead to a setback for smaller businesses, squandering both financial capital and human resources on a pointless investment.

2 Theoretical framework

The theoretical background of this thesis is based on qualitative research regarding both real estate and blockchain topics. Additionally, the technical analysis of the charts of Bitcoin and Etherium is done as well as the survey in order to confirm and support the theoretical background. After the technical analysis, the conclusion can be drawn whether those coins will grow, and the investments in mining opportunities will be profitable or not. The theoretical background also includes the investigation of legal aspects in Russia.

The technical analysis of the charts is done according to the fundamental rules, described in the main book of the technical analysis method written by Steve Nison “Beyond Candlesticks: New Japanese Charting Techniques Revealed”. This book is the core book of trading since it is reliable and contains the most significant patterns of the market. Technical analysis described in this book fits flawlessly with Japanese candlestick patterns. Traders can take advantage of a potent combination of approaches in market analysis when supplemented with other instruments (Nison, 2011).

The main focus of the thesis is the graph chart analysis (Figure 2). Moreover, the author evaluates the bitcoin mining opportunities for the company. The last ones depend on the coin price due to the fact that the prices for the mining machines are not fixed, and volatile with the chart price of Bitcoin.

The most common opinion/theory is the drop of Bitcoin to the price of 10 000 USD (Hannah, 2023). The current price is 26 000 USD. Based on this, the null hypothesis is stated: investments in Bitcoin and/or Etherium are not associated with profitability, i.e. variables are independent. There is also an alternative hypothesis, which is the following: investments in Bitcoin and/or Etherium are associated with profitability, i.e. variables are dependent. The thesis analyses this theory through the technical analysis and takes the survey answers into consideration. Ultimately, the thesis will either reject or accept the null hypothesis (see Chapter 4).

Furthermore, there are no incorrect theories in stocks on crypto market. During financial analysis every trader acts on his/her own without any reference to other predictions. The thesis includes other opinions and theories but does not evolve or delve into them. Instead, the author analyses the market herself and makes predictions based on her own insights, utilising literature

and financial instruments, i.e. quantitative analysis. Moreover, the author of the thesis provides the points-of-entry and points-of-exit prices according to the graph.

Other issues to be discussed in the thesis:

1. Real estate and current situation in the industry in Russia.
2. Legal aspect of blockchain in Russia.
3. Blockchain types, opportunities and limitations.

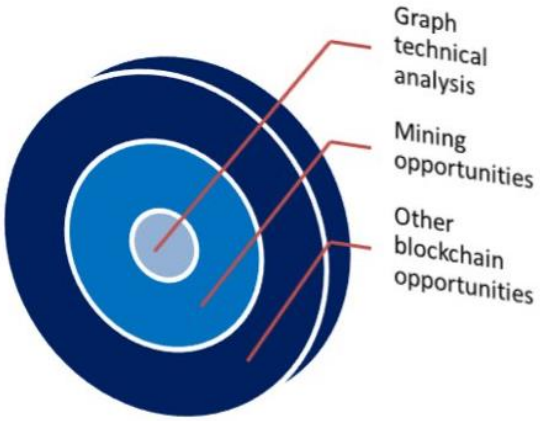

Figure 2. Thesis Focus

2.1 Real estate business definition

Real estate is a “property that includes land and anything permanently attached to it or built on it, whether natural or man-made” (Chen, 2022). Typically, there are several types of it: industrial, residential, commercial, land, and for special purposes.

In this thesis, commercial real estate is under the focus because of the commissioning party. Commercial real estate comprises property that is assigned to companies for commercial uses rather than people for living area. It includes different kinds of offices, grocery stores, restaurants and cafes. This type of real estate might be attractive since the proprietor requires less hands-on participation in the business. Commercial real estate mainly generates fewer profits due to its long - term investment nature, but this may be excellent for an entrepreneur later in the real estate career (Turner, 2015).

Nowadays real estate of any type is considered to be a very profitable option for businesses with substantial entry-investments. It offers an opportunity to have a steady income in non-crisis times also with leveraging positions. It diversifies portfolio for investors, which makes this kind of business mostly affordable and profitable (Chen, 2022). This means that rental properties enable a person, i.e. an entrepreneur, to acquire significant properties for considerably less money than the person would need to buy securities or other assets due to the fact that the proprietor is able to obtain financing from a bank or from an individual in an effort to maximize the possible return (Turner, 2023). Moreover, it usually does not require any other kind of investments except for the financial ones, i.e. personal time, implying in the fact that it is not going to be a full-time job but rather a side-hustle with some exceptions (Chen, 2022). Besides, this kind of investment is extremely personal – the owner is able to manage his/her property and its portfolio directly and personally without any pressure of the Board of directors.

Obviously, every type of business has its limitations, and rental properties are severely struggling during economic crises. Undoubtedly, events such as the 2007 global financial meltdown occurred, yet proprietors who were investing for long-term returns were not negatively impacted. The real estate market can fluctuate, but the brilliance of real estate is that demand never fades. Individuals always have a need for food and, hence, supermarkets are always in a high demand; therefore real estate, especially commercial one, is a wise long-term investment (Turner, 2023).

In this industry, debt strategies and value-added investments are now the focus of investors. Apparently, these trends will prevail throughout 2023 due to the fact that starting from January 1, 2023 there is an adjustment in the distribution of capital of financial institutions and other creditors. This will lead to high demand for loans and additional investments from outside the companies (TradeTalks, 2023).

According to the Aaron Jodka, National Director of Capital Markets Research for Colliers, the second half of the year is anticipated to see greater market stability. Regions of difficulty will arise throughout asset classes, providing investors with rare opportunity to purchase assets at a reduction. Moreover, according to Snisarenko (2023), CRM applications, real estate business applications, data management solutions, blockchain - based technology, environmental sustainability technologies, and multiple listing services for rentals are all expected to be significant developments in real estate technology in 2023. These factors prove the possibilities and opportunities for real estate companies, such as “Fifth element”, to stay up-to-date and achieve the maximum profitability of the blockchain and mining opportunities.

2.2 Current situation in the real estate industry in Russia

According to the analysts from the firm IZ Group (2023), the amount invested in commercial real estate investment in Russia in 2022 was a milestone for the whole history of observational data, at 487.2 billion rubles, which is 21% higher than in 2021. The major drivers of investment demand in 2022 were local entrepreneurs who acquired the assets of leaving European enterprises.

A high level of uncertainty, the prospect of sanctions pressure on corporations, dramatic changes in the economy, and the cost of debt have impacted investor behaviour in 2022 (Adekoya et al., 2022). Regional and worldwide geopolitical challenges, volatility in the markets, high inflation, as well as interest rate have driven the Russian economy into uncertain position (Brooks, 2022). Notwithstanding the bleak forecast, the result in terms of investment capacity was a record, with only a little percentage of foreign money. The percentage of foreign capital, as forecasted earlier, was the lowest in the history of observations, accounting for 3.3% of total investments (IZ.RU, 2023).

Analysing the specific region, where the commissioning party is located, it can be concluded that new conditions should be created in order SMEs in Karelia to be more profitable and effective. According to Mutalimov et al. (2020), major metropolitan agglomerations such as Khabarovsk and Primorsky Krai possess a higher small-business ecosystem. As a result of the small number of residents and unbalanced geographical distribution of people in those regions, Karelia is not considered to be a very attractive place for starting up a business.

In terms of sustaining a cautious approach of investors acquiring huge buildings the real estate market, the current year is going to be an echo of the past. Nevertheless, demand is expected by Russian analytics to rebound in mid-2024 as a result of increasing economic activity, the introduction of a considerable quantity of extra capacity, and a reduction in the number of unoccupied properties. At the same time, yield rates are expected to approach pre-crisis levels by the beginning of 2025 (Богоутдинов, 2023).

Speaking about the current situation in this industry, the poverty level should be analysed due to the fact that stability of the business depends on the customers´ ability and willingness to pay. According to the World Bank Group (2023), Russia's gross domestic product (GDP) is expected to contract by 3.6 percent in 2023. Moreover, worldwide prices for oil, gas, and coal had been rising since early 2021 but they "skyrocketed" in 2022 not only in EU, but also in Russia,

causing inflation to reach levels that were unprecedented in years (World Bank, 2023). This leads to a conclusion that purchasing power is not on its high levels, and is predicted to drop even more.

COVID has also influenced the industry in a negative way. An interesting research on industries in USA, EU and Russia has shown that companies located in EU and USA, which own commercial real estate, were earning a 0.02% less income during COVID phase, which did not happen in Russia (Balemi et al., 2021). According to the director of “Fifth element” (Appendix 1), the company started suffering in the last quarter of 2020. When COVID-19 regulations were loosed/removed in Russia in the end of 2020 and in the beginning of 2021, consumer demand has grown sharply, driven by funds accumulated over the previous year and strong credit expansion (World Bank, 2021). Oleg supports this opinion since the company was having issues with the demand and lower profits up until the end of 2020, after which the customer´s ability to pay has stabilised in his case (Appendix 1).

However, the sanctions are currently influencing a many industries, including real estate. There are examples of companies leaving Russian market, such as McDonalds, H&M, Coca-cola and others (Morton, 2022). All of these businesses were renting commercial buildings/properties from Russian real estate companies and obviously caused problems with low revenues after they left Russian market. Some companies like Leroy Merlin, have left the country after selling the businesses to the local management with an immediate repurchase options (Ташевская, 2023). To put it another way, the products of Leroy Merlin will not leave the market and Russians will still be able to obtain them. Moreover, the immediate repurchase option implies that the French company will have the right to return to Russian market immediately as soon as the circumstances will allow it to do that. This fact proves that some companies are keeping the options open. However, it cannot be assured if the companies will still be back in several years or have they left ultimately forever. Therefore, nowadays real estate companies are looking for additional side-hustles or investing opportunities while the properties are empty and do not generate income (Isidore, 2022).

Summarising the above mentioned points, the current economic situation in Russia is not attractive for investors nowadays. Hence, there are still a many problems in the real estate industry, which is detrimental to the progress of any company in the real industry.

2.3 Blockchain investments definition

Intense global growth of the financial industry has been one of the key characteristics of the twentieth and early twenty-first centuries. As the primary circulatory system of the global economy, financial systems are constantly growing, evolving, and adjusting to particular economic and technological constraints, ensuring an environment for a successful operation of financial relations (Mikhailov, 2019). One of the latest trending adjustments to the “new norm” of the modern online-oriented society is the invention of Blockchain.

Blockchain is a distributed, decentralized database (ledger) made out of records of data (blocks). The blockchain data does not have an owner but it is instead stored across the entire blockchain network with all participants. The distributed data cannot be exploited easily, as that would require controlling over 51% of the network (Relander, 2022).

In simple words, Bitcoin is a special algorithm which is not controlled by anyone. People worldwide are able to download the programming code of it and create their own programs by simply modifying the initial code free of charge. Moreover, it is theoretically possible to create a new coin or token, but it needs to become popular and gain acceptance in order the user to earn money from the creation of a new coin. Bitcoins may be used to purchase nearly anything. There are businesses which are willing to receive the virtual currency in exchange for conventional dollars that people may utilize for purchasing things. There are numerous organizations that offer an internet-based interface for converting bitcoins to national currencies. Furthermore, businesses can perform actions with bitcoins that it is impossible to do with fiat currencies. Implementing a specific kind of Bitcoin transaction, for instance, would allow companies to start a fundraising campaign. (Franco, 2014).

Moreover, not only modern games and start-ups are benefiting from the ledger. Reverse initial coin offers (ICOs) are a method for established companies to generate cash on the blockchain in order to shift their operations from a “centralized and fiat-based” system to a “decentralized and virtual” type. By decentralizing the infrastructure and transitioning to a tokenized economy, the business could profit from the many advantages of blockchain. Consequently, almost every company is able to implement this approach in reality in order to save costs and attract new customers who are willing to pay with Bitcoin and tokens (Goldberg, 2018). Moreover, this “decentralized and virtual” type of payments is definitely one of the most attractive for Russian citizens who are now living abroad. Due to imposed sanctions on Society for Worldwide Interbank

Financial Telecommunication (SWIFT) transactions, many Russians are not able to accomplish payments in EU or USA using a debit/credit card or cash. Even if these people are legally staying in EU/USA and even have a residence permit or citizenship of another country, they are still suffering from this problem. Therefore, Bitcoin is a great solution for it because it is decentralised and, hence, people of all nations are able to utilise it for any kind of transactions and payments. It is legal since it is not exposed by sanctions and easy due to immediate money transfer. The only requirement for it is the existence of account which is registered on the blockchain platform.

Blockchain investment implies investing money into any kind of cryptocurrency in order to generate income. This thesis focuses on the most widely known ones: Bitcoin and Etherium.

Bitcoin, like any other cryptocurrency, is a decentralized cryptocurrency that can be used as a potential substitute to formal legal currencies, i.e. Rouble in Russia or Euro in EU. Bitcoin, as opposed to conventional currencies issued by governments and financial institutions, has no centralized financial authority (Bollen, 2013). It was established in 2008 by a cryptologist known as "Satoshi Nakamoto"; however, the real name of this person remains undisclosed. Ranking number one on the list of cryptocurrencies, Bitcoin employs encryption algorithms and the market cap of it is $512 544 972 014 USD (TradingView, 2023). It relies on mining to validate every action on the blockchain network. It can be transferred between users on the bitcoin network. All transactions with Bitcoin are recorded on a public database, i.e. the blockchain (Danial, 2019).

Etherium, which is ranked second in terms of coin market cap as of 2018, is another prominent crypto-currency. Its market capitalization in 2023 is $217,997,466,540 USD (TradingView, 2023).

The major distinction between Etherium and Bitcoin is that Etherium aims to be the site which people visit in order to implement their decentralized projects. In reality, its purpose is to create a huge, decentralized machine that processes so-called smart contracts (see Chapter 4.4.2) (Mukhopadhyay, 2018). As a consequence, many different cryptocurrencies can operate on the Etherium – based platform. Despite the fact that the Ethereum network was developed in 2015, six years after the launch of Bitcoin, no other coins developed since then have been able surpass Ethereum as the next most valuable cryptocurrency. As a result, Ethereum remains the most comparable alternative coin to Bitcoin, despite the fact both currencies have been constructed on the distributed ledger and encryption principles (CryptoGazette, 2018).

2.3.1 Mining opportunities definition

In order to authenticate a set of transactions and add them to the enormous, open database of all prior Bitcoin transactions known as the "Blockchain," a procedure called mining must be used. The incentive for the transaction confirmation process is the creation of new Bitcoins. Hence, "miners" are those people who authenticate Bitcoin transactions and record them on the ledger (Houben, 2016). Miners validate new transactions right away as they are transmitted to the system, compile them into a group of transactions known as a "block," and then verify their legitimacy. Afterwards the information in the block, which comprises a variable number called "nonce," is passed through the special Secure Hash Algorithm with a 256-bit long output (SHA-256) hashing algorithm, converting the original data into a sequence of 256 bits known as Hash. (Cocco L. et al., 2016). A hash is an arbitrary arrangement of digits and letters which disclose the initial information when combined with the correct key. Those hashes are exceedingly difficult tasks to solve. It would take countless years for a usual phone or computer to find a solution for it (O'Sullivan, 2021). All this hard mathematical work with algorithms is done with the assistance of special machines. This thesis does not focus on the principles of algorithms, but rather on the output.

In other words, people purchase the special mining hardware, which creates the Bitcoins or any other mined cryptocurrency (Dannen, 2013). These machines require a vast amount of electricity power to keep it running making this business barely profitable in Europe due to high electricity rates. In order to be lucrative, the value of the generated coins must be greater than the cost of mining itself (O'Sullivan, 2021). However, electricity rates are lower in Russia. Hence, this business is profitable in this country (see Chapter 4.4.1).

However, mining also has its drawbacks. According to Chereshnia (2021), it was revealed that on average in Russia, 2.977 million tons of CO2 equivalent are emitted for the production of Bitcoin alone; and the total emissions from mining cryptocurrencies in Russia amount to 4.466 million tons of CO2 equivalent. It seems that the share of emissions from cryptocurrencies is approximately 0.2%, which is fairly not a high percentage rate. However, in case Russia decides to increase the amount of miners nationwide, this percentage could raise and have an impact on climate in the future. Therefore, every SME, which is adopting a mining machine, should think about the possible consequences and maybe even have the special treatments facilities in order to reduce the amount of emissions (Bondarev, 2020).

Further research on the topic of miners in a more precise form is presented in chapter 4.4.1.

2.3.2 Blockchain types

There are mainly four different types of blockchain; they are called Public, Private, Hybrid and Federate (Iredale, 2022). All of them are evaluated below.

The public blockchain is the first form of blockchain technology. Here is where cryptocurrencies such as Bitcoin emerged and helped introduce distributed ledger technology (DLT). It eliminates the side effects associated with centralization, such as decreased confidentiality and transparency. Due to its decentralized structure, it necessitates some technique of confirming the validity of data. This approach is a consensus process in which blockchain users agree on the present state of the ledger. Proof of work (PoW) and proof of stake (PoS) are two typical consensus approaches used also in mining.

Anybody with internet connection may log on to a blockchain platform to register as an approved client since public block chains are open, non-restrictive, and do not require additional permissions. The only drawback of it is the possibility of cybercriminals to obtain 51% or more of a public blockchain platform's computational power. If this happens, they will be able to instantly manipulate and modify the whole system with a huge amount of both external and internal data (Campbell, 2023). This type of blockchain is in focus in this thesis.

A private blockchain is a blockchain network that is managed by one organization. This sort of blockchain operates on a much smaller scale; often, private blockchains function on a limited network within a company or other entity (Campbell, 2023).

However, the drawback of it is the lack of anonymity due to its small internal scale. Moreover, the security level in this type of blockchain is low because of its decentralisation (Iredale, 2022).

The hybrid blockchain is a form of blockchain technology that includes components of both private and public blockchain. It enables businesses to build an encrypted, permission-based system alongside an open, decentralized network system, empowering the companies to manage people who have access to certain information preserved on a blockchain (Figure 3).

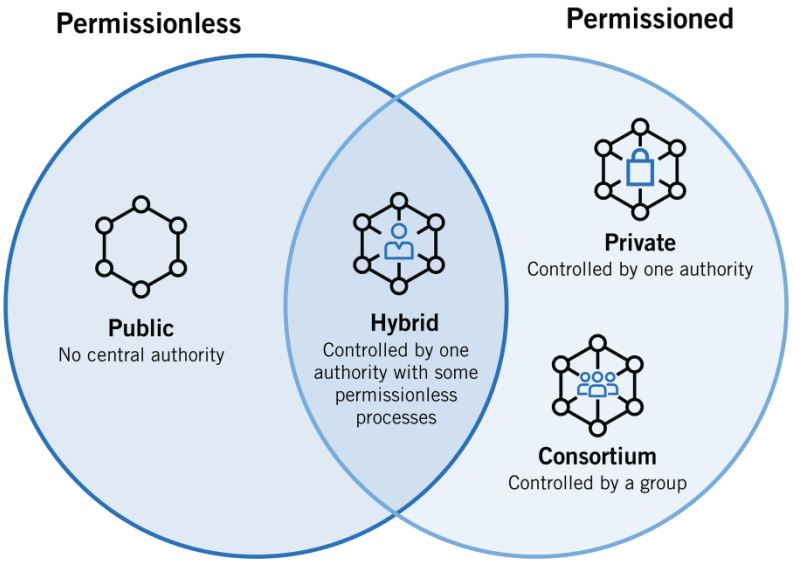

Figure 3. Types of Blockchain (Kathleen & Wang, 2021).

However, it should be mentioned that it requires time, effort and knowledge to build this kind of blockchain system in the company. In order to avoid the hazards associated with one party dominating the network on a private blockchain, a federal blockchain (also known as consortium) was invented. It is a private blockchain with restricted access to a specific group; it is more secured than a usual private type but less transparent (Campbell, 2023).

The comparison of three main types of blockchain is presented in Table 1 below.

	Public	**Private**	**Federal (Consortium)**
Management	No central authority	Managed by central institution (company)	Managed by central institution (government)
Transaction speed	Slow comparing to Private and Federal	Quick	Quick
Identification	Anonymous	Identifiable	Identifiable
Drawback	Cybercriminals	Lack of anonymity	Not transparent

Table 1. Comparison of Three Types of Blockchain.

2.3.3 Opportunities of Blockchain investments

Blockchain investments have a huge potential. Bitcoin is defined as an innovative technology that has a chance to disrupt a variety of businesses. Cryptocurrencies can be utilized as an encrypted repository of wealth due to the fact that they are unable to be printed out or confiscated (Reiff, 2021).

It cannot be denied that virtual currencies are currently expanding significantly, and a huge growth is expected in the next years. For those who are confident in the future of digital money, this prospect creates an alluring investment. Investing in bitcoin is an opportunity for people who trust the idea of making substantial profits while contributing to the advancement of technology. Moreover, cryptocurrency has no intermediaries, which makes this investment potentially safer than any other kind of investment (De Maria, 2017).

The supply of the majority of cryptocurrencies is constrained by mathematical equations. This prevents any political entity or government agency from diluting its intrinsic value via devaluation. Furthermore, considering to the cryptographic structure of cryptocurrencies, a government agency cannot impose taxes or seize coins without owner's permission. This feature attracts those who are concerned about hyperinflationary occurrences, bank crises, or other crisis scenarios (Reiff, 2021).

However, the greatest opportunity of any kind of investment is the huge potential of the profit which the investor can generate by buying the coin at a lower price and selling it at a higher one. This could be done through two types of price predictions – fundamental analysis and technical one (see Chapter 4).

Due to the fact that cryptocurrency is highly volatile, the traders can use it for their own benefits to generate profit. In a single week, coin values are able to fluctuate up to 50% which could definitely result in a huge profit for the investor. Some coins, such as Bitcoin in 2020, have experienced a price increase of more than 100% in a single day. It means that if the person has invested 1 000 USD, in the end of the day he/she will have 2 000 USD in the account. In the stock market this level of volatility could endure a whole year which makes cryptocurrency investment more profitable and attractive. This means that a huge profit can potentially be generated within one day. Moreover, cryptocurrencies and the blockchain are still relatively unknown to the general public; therefore as they gain popularity their value will rise. Consequently, if the investor predicts an enormous fluctuation in price of any coin, it can be bought “at the bottom

price" and sold after the price has increased. The price change multiplied by the amount of acquired coins can be defined as a profit for the investor (De Maria, 2017).

Moreover, the best way to prove the profitability of Blockchain is statistics. In 2021, enterprises from multiple sectors allocated approximately $6.6 billion on integrating blockchain technology into their business processes. In comparison with 2020, their revenue has increased by 50% (Nagar, 2022). Additionally, such global companies as Deloitte, state that cryptocurrency may ultimately lead to a more transparent procedure of signing contracts and acquiring properties in general, eliminate the danger of fraudulent transactions, and possesses the potential to accelerate up every step of the buying procedure (Nijland & Veuger, 2019). Therefore, blockchain specialists forecast that worldwide expenditures on blockchain in real estate will increase by 48% on yearly due to its proven efficiency and profitability.

Speaking about Blockchain opportunities in Russia, more and more sectors are integrating it into their business operations. Among the areas of application of the blockchain, which have already emerged to date, are government authorities, defence and security agencies, and international organizations.

2.3.4 Limitations of Blockchain investments

Obviously, there are several drawbacks and limitations of investing into any kind of cryptocurrency. As it was already mentioned, the crypto is highly volatile and due to this uncertainty, fluctuations in prices of up to 30% in one trading session either upward or downward are not unusual. It should be mentioned that trading stocks, futures, options or any other kind of financial instruments also include this financial risk and cryptocurrency is not an exception. In other words, there is always a high risk of losing money when leveraging positions. Hence, it is advisable to only invest the amount of money which can be lost without regret and/or going into debts (De Maria, 2017). Aggressive (speculating) trading these days dominates the bitcoin market. Bill Gates, Jamie Dimon, the CEO of JPMorgan, and other cryptocurrency doubters have expressed concern about the possibility of a bubble in cryptocurrencies (Reiff, 2021).

The next limitation is a huge unawareness about this topic which leads to a higher risk of investments. People are sceptical about digital currency of any type, and tend to underestimate the opportunities it has. Most of the potential users do not trust the ability to transfer money online using gadgets even though it is proven to be easier, faster, and more convenient. Since it

does not immediately engage with traditional currency, i.e. cash, individuals are apprehensive of it and persistently question its efficacy and reliability. Hence, there is a huge limitation of lack of education about this topic. However, it can be turned into an opportunity if people get the knowledge in investments in Blockchain because then the world will experience a less fluctuating crypto market. It will be more stable due to the fact that people will not panic because of unexpected news, and it will lead to more stability on the market overall. However, nowadays the market is experiencing the lack of education on the topic of cryptocurrency, and the investments into it are riskier than into any other kind of financial instruments.

Another limitation is insufficient consumer security rights and assurance. The country which uses conventional currency has central banks which control its monetary policy. The digital money governance, however, differs from that in some ways. Since Bitcoin is not governed by a central bank, no one can ensure that it will always be worth at least as much as it is now. The worth of Bitcoin, for instance, can immediately drop if a large number of traders opt to 'discard' the coins. This will undoubtedly result in significant losses for those who have spent hundreds of thousands of dollars in Bitcoin investments. Unfortunately, there are no protocols to follow in this case and no one is able to assist with compensation (De Maria, 2017).

Last but not least, cryptocurrency entails the threat of unexpected system collapse, interruptions in electricity, and even hardware disruptions. All these technical limitations make it impossible to restore the Bitcoins. Therefore, it is always recommended to create a back-up to avoid such a situation from occurring (Köhler & Pizzol, 2019).

2.3.5 Governance

One of the important aspects to be considered when investing in blockchain or mining is the legislation used by a country to regulate this relatively new sphere.

Due to the fact that “Fifth Element” is located in Russia, the legislation which should be taken into account is different. One of the main regulations of this country is the Code of Russian Federation (ГРАЖДАНСКИЙ КОДЕКС РОССИЙСКОЙ ФЕДЕРАЦИИ, 1996). Moreover, in 2022 Russia has commenced a new regulation regarding the increase of the utility rates, which is called a Resolution of the Government of the Russian Federation from 26.03.22 N474 (Mishustin, 2022). This legislation has a direct impact on the real estate, and, therefore, on the SME itself, and also should be taken into account. This resolution states, that the utility rates should be raised by

Russian republics accordingly, which obviously results in a lowered demand and purchasing power in the field of real estate.

The thesis also aims to analyse the legislation on blockchain. At the state level, the widespread use of blockchain technology in Russia is supported by the course towards the development of the country's digital economy, enshrined in the Program "Digital Economy of the Russian Federation". However, Prime Minister of the Russian Federation D. A. Medvedev noted that “the government does not have enough time to respond to the fast development of blockchain”, pointing out, in particular, the delay in law-making in regulating innovations. The expert community also draws attention to the lack of knowledge of such aspects of blockchain application as information security and data reliability in the blockchain network due to the freshness of the sector (Tsvetkova, 2017).

The Central Bank of the Russian Federation (CBR) began putting greater emphasis to the use of blockchain technology in 2015, which was mostly utilized for bitcoin money transfers. The CBR selected the advisory group to examine the consequences of deploying blockchain-based technology to handle financial transactions in the Russian Federation. The benefits associated with blockchain transactions embrace the rapidity with which every single transaction is completed, a small possibility of error, and the fact of access allowance to all people involved, which ensures their irreversible nature. Nonetheless, the prevailing attitude of Russian authorities toward cryptocurrency transactions is hostile: the CBR's chief stated that there are increasing dangers of suspicious activity involving cryptocurrency trades. Additionally, CBR considers cryptocurrencies to be equal to money, and it is against the law in Russia to use them as an alternative for the rouble (Karapetyan, M, et al., 2019).

The first initiatives to legitimize bitcoins and operations using them occurred in 2016. The Russian parliament (The State Duma) enacted the "About Digital Financial Assets" legislation in May 2018. Surprisingly, the Act's provisions did not include any regulatory requirements for bitcoin operations, instead introducing formal vocabulary and a definition of what coins and mining are. The Act addressed token trades, established rights concerning ownership and outlined token-based fundraising processes. The interesting fact about this law is that the term "cryptocurrency" was totally omitted. Therefore, the issue of authorizing bitcoin transactions and its distribution persisted. There is a possibility that the government does not want to threaten the country's official currency by the introduction of digital money. However, crypto businesses are not considered as illegal ones even though the legislation lacks information regarding these topics (Safonov, E. Et al., 2020).

However, there are also positive aspects. In order to assist enterprises and authorities in using decentralized ledger technology, the Skolkovo Foundation and Waves established a blockchain centre in 2019. The centre seeks to promote the adoption of blockchain in the country through producing ideas for practical applications of blockchain, analysing them, designing prototypes, sponsoring successful entrepreneurs, and assisting enterprises in implementing blockchain. Russia's undeniable benefit is reduced electricity rates as compared to EU rates, which becomes more crucial as the energy costs required for the functioning of blockchain technology rise. (Safonov, E. Et al., 2020). Moreover, Sberbank and VTB, two major banking companies governed by the state, are leading several blockchain initiatives in Russia at the moment. (Karapetyan, M, et al., 2019). One of them is the creation of the Fintech blockchain consortium in partnership with ten major banks of the country, including NSPK, Sberbank, VTB, Alfa-Bank, Gazprombank, Otkritie, QIWI, for a comprehensive study of distributed ledger technology and its capabilities.

The Moscow Exchange is a member of the Hyper-Ledger international blockchain consortium. Exchange experts are actively exploring the prospects for using blockchain solutions in the processes of trading, clearing, and settlement. Participation in the consortium provides the Moscow Exchange with access to international expertise and advanced developments in the field of blockchain technology. Additionally, the MEPHIUS Blockchain Technologies Development Center was created in 2017. The purpose of it is the creation and promotion of its own MEPHIUS blockchain platform, which allows developing business applications for the real sector on its basis economy (smart contracts) and issue cryptographic assets. All the above mentioned projects and activities lead to the conclusion that Russian government is striving to be a part of blockchain community.

Speaking about mining governance, it is also not completely legally regulated in Russia. Formally, it is not prohibited, therefore, in order to mine cryptocurrency without breaking the law, the company or an entrepreneur needs to register a legal entity and pay electricity bills and income taxes. However, in some regions, illegal mining centres are common. Rosseti has already reported that the growth of the cryptocurrency exchange rate threatens to overload their networks, due to the so-called "black miners", and they fix anomalous jumps in energy consumption in different regions, such as Pyatigorsk, Astrakhan and Pskov (Chereshnia, 2021).

Mining ventures and holders of cryptocurrency are taxed in accordance with Russian tax regulations. Legal entities are taxed in accordance with their business structure (income tax for corporations is typically 20%), while individuals are subject to personal income tax (flat rate of 13%).

Comparing to the European and American tax rates, Russian taxes are more attractive for miners and blockchain investors (Karapetyan, M, et al., 2019).

To conclude, the research on the Russian governance of blockchain gives reason to note high competitiveness of this sector, unique staffing, as well as favourable conditions for the development of blockchain technologies in Russian Federation. Despite the lack of legislation on blockchain, the entrepreneurs are able to start businesses in this field. Moreover, due to sanctions imposed on SWIFT which limit the opportunities for Russian citizens to accomplish payments abroad, Russians tend to open accounts on blockchain in order to pay via cryptocurrency. Therefore, the next 2–3 years should be considered as a “window of opportunity” for the formation of the prerequisites for the technological leadership of the Russian Federation in the cluster of blockchain technologies (Tsvetkova, 2017).

3 Research methodology

This chapter outlines the research purpose and method, including the objectives of the whole thesis. The questions mentioned in Chapter 1 serve as the foundation for methodological decisions of the author. The purpose of this chapter is to clarify the significance of the author's research techniques and the thesis aims, allowing readers to assess the breadth and limitations of the research.

3.1 Research purpose

The fundamental objective of a research paper is the research purpose. It is the justification for the research and what the researcher expects to achieve when carrying out the investigation. The research purpose controls the formulation of research questions, methodology, data gathering techniques, and data evaluation. The purpose of this thesis is to analyse the cryptocurrency and real estate markets in Russia and evaluate their compatibility in real life in a form of investments.

Moreover, exploration, description, and explanation of the thesis topic, prediction of future results, and assessment are numerous examples of research purposes. Last but not least, the research objective is to enhance expertise in a specific sector and have practical implications for real-world problems or challenges (Hassan, 2023).

The main questions of this thesis, as mentioned in Chapter 1, are: “Are the investments in Bitcoin and Etherium currently profitable?”; “Are mining opportunities available and beneficial for real estate businesses in Russia during current economic situation?”; “What are the challenges and opportunities of integrating blockchain into real estate business operations?” These questions are answered on the basis of technical analysis and a survey (see Chapter 3.2). The thesis is to determine whether blockchain investments and mining opportunities are viable in the sector of real estate businesses, particularly those in Russia. Another goal is to share possible investment opportunities for real estate businesses and discuss the ways in which SMEs can use them in the future.

Therefore, the exact aim of the research is not only to define the profitability, but also to suggest the best point-of-entry for the investments as well as the potential point-of-exit. Ultimate-

ly, the outcome of the thesis is the list of potential investments and mining opportunities for further practical implementation in the commissioning party.

3.2 Research method

The thesis is project-based. It emphasizes practical application of created project. The thesis combines theoretical knowledge with hands-on work to address research questions. It aims to accomplish in-depth analysis of different kinds of resources on the chosen topic with further interpretation of it. A research is conducted to provide context and theoretical grounding for the project and support the relevance and reliability of it. The objective of the thesis is to discover whether blockchain investments and bitcoin mining opportunities are profitable in the field of real estate businesses, especially those located in Russia, and create a list of investments which will be utilized by the commissioning party in its business activities. The author uses a mixed method approach by combining both qualitative and quantitative method of research.

The thesis is divided into two stages: the first one is the interview. The second stage is the technical analysis of the graphs and a survey, which is mainly documentation work and writing process.

The research has 2 groups under study: one in the real estate industry, the second in the blockchain market. This approach assists in understanding both sides of the coin for the thesis.

The first group under study consists of 1 person who is working in the commissioning party: the director of the “Fifth element” Oleg Cherniatin. This group has a narrow focus. Oleg expresses his opinion regarding the possibility and opportunity to invest. He was an important choice for the interview because he is a director of the company and all the financial decisions are made by him. Therefore, he is highly interested in the development of his company and in the increase of his income. He also has knowledge in the field of investments and a high level of expertise in real estate industry.

The second group under focus is answering the survey, and it is broader than the first group. The sample size (n) is 261 people. The survey includes five questions. These are “How old are you?”; “What is your gender”; “What is your educational background?”; “Do you think that the investment in bitcoin is profitable right now?”; “Do you think that the investment in Etherium is profitable right now?” Webropol was used to conduct the survey since it allows the author to

assess the results. The target of it is to get a side opinion from people without professional investing background, who instead have some interest/insight in blockchain.

Moreover, Statistical Package for the Social Sciences (SPSS) is used as a supportive tool in order to accept or reject the null hypothesis. The Statistics tool in SPSS includes a variety of basic statistical operations, such as frequency tables, cross-tabulation, and two-dimensional statistics. It is possible to run descriptive statistics, different kinds of analyses, as well as evaluate parameter patterns with a cohesive interface. It enables users to employ the hypothesis-testing method for the given data.
The SPSS software is accomplished with the usage of chi-squared test, analysing two variables: independent variable: investment (values: Bitcoin, Etherium) and dependent variable: profitability (values: Yes/No). The Chi-squared test is utilised to define if there is an association or dependence between two categorical variables. There are three preconditions that must be met before the test is done. First of all, the variables should be categorical. Secondly, the observations should be independent, meaning that the values for one variable should not be influenced by or dependent on the values of the other variable. Finally, the sample size should be reasonably large. There is no specific threshold, but it is generally recommended to have all expected frequencies greater than 1 and no more than 20 % below 5. SPSS automatically calculates the expected frequencies when performing a chi-square test. The software provides the minimum expected frequencies as part of the output. However, it is also possible to compute the expected frequencies for each cell manually using Formula (6). Smaller sample sizes may lead to inaccurate results (IBM Corp., 2020). Appendix 5 contains a table with checked preconditions for the chi-squared test in this case.

The thesis has stated predictions on the findings using hypotheses. These are based on the theory presented in Chapter 2. The most common opinion/theory is the drop of Bitcoin to the price of 10 000 USD (Hannah, 2023). Therefore, the null hypothesis is: variables are independent, i.e. investments in Bitcoin and/or Etherium are not associated with profitability. The thesis also has an alternative hypothesis, which is the following: variables are dependent, i.e. investments in Bitcoin and/or Etherium are associated with profitability. The hypotheses have been tested via SPSS software, and the results are presented in Chapter 4.2.

Primary quantitative data is used in the survey analysis and in the technical analysis of the Bitcoin and Etherium charts. This type of the research method was chosen due to the fact that it is impossible to find a solution regarding investments without testing the technical analysis with no decision-making input from other sources or investors´ predictions.

Moreover, the interview with the first focus group provides with the primary qualitative data. This information clarifies the initial basis of the real estate industry, its interest and necessity to invest in crypto or bitcoin mining as an additional income.

Finally, the decent literature review constitutes to the secondary qualitative data for the research. This type of research method is necessary for the thesis due to the fact that it supports the research process and is fundamental for predictions. It contains information regarding the industries, patterns on the markets, methods to analyse the charts as well as general information, which is a necessary basis for the hypotheses.

Speaking about the acquisition of the material, the population is the amount of people who could potentially have taken part in the survey. The sample is the amount of people who took part in the survey itself. As it was mentioned previously, the sample size of it is 261. Due to the fact that the author is a Double Degree student, the survey was published in students groups of both universities Kajaani University of Applied Sciences and Hochschule Heilbronn. Moreover, the link was published on the author´s Instagram account, where the author writes a trading blog and the audience is interested in investments. Hence, 1224 people have received the link to the survey, and the response rate is 21.3%.

The qualitative data is processed with the usage of classification method, while the quantitative data is analysed with SPSS and technical analysis with such instruments as Fibonacci retracement, Elliot waves, and Japanese candlesticks patterns.

Moreover, the technical analysis requires the usage of formulas, which are presented below. Those are used in Chapter 4.

“EMAt=[Vt×(1+ds)]+EMAy×[1−(1+ds)], (1)

where:

EMAt=EMA today

Vt=Value today

EMAy=EMA yesterday

s=Smoothing Factor = 2 / (Number of time periods + 1)

d=Number of days” (Fernando, 2023).

"High Swing – ((High Swing – Low Swing) × Fibonacci percentage)" (2)

(Wallstreetmojo Team, 2023).

"Low Swing + ((High Swing – Low Swing) × Fibonacci percentage)" (3)

(Wallstreetmojo Team, 2023).

Pay-off period = Total cost of investment / profit per year (Houy, 2016) (4)

ROI = (Net Profit / Cost of Investment) x 100 (5)

where

Net Profit = Total Revenue - Cost of Investment

Total Profit = Profit per year x Number of years (Corporate Finance Institute, 2023)

Expected Frequency = (Row Total * Column Total) / Grand Total (6)

4 Results

In this chapter, outcomes from an analysis of primary and secondary data will be discussed. Along with addressing the research questions of the thesis, the main findings from both survey and interview will be included. Moreover, this chapter contains the most significant chart analysis, which is the basis of the main findings. It is important to mention that the author of the thesis is mostly relying on the outcomes of the graph technical analysis due to previously mentioned reasons, but also including the survey and interview to have a full overview of the situation and possess different views with the parties concerned.

4.1 Commissioning party interview outcomes

The interview was conducted with a director of a commissioning party "Fifth element" – Oleg. He has a great experience in the real estate business, as the company was established in 2014, as well as in the financial markets for the past 15 years. Translated interview questions and Oleg´s answers are provided in the Appendix 1.

According to the director of the commissioning party, real estate market is not thriving currently due to sanctions which led to the fact that European companies have left the country, and the substitution could be barely found. This also proves the theoretical background analysis, which was discussed in chapter 2. Oleg has also mentioned negative influences of COVID-19 in 2020, meaning that the investment solutions are not only necessary during this crisis, but also in case of any other ones which may happen in the future.

The topic of blockchain and investments is not new to Oleg. He has been trading stocks for a long time and is also interested in cryptocurrency, but he was not able to delve more into this topic due to lack of time. According to him, investments or fast speculations can generate good money. Moreover, Oleg also considers mining machines to be a good investment; therefore, the author of the thesis takes a closer look at it in Chapter 4.4.1.

Speaking about other Blockchain opportunities, such as peer-to-peer transactions or Blockchain-as-a-service, the director has no previous knowledge about it; therefore, ideas presented in chapters 4.4.2, 4.4.3 and 4.4.4 are going to be completely new to Oleg.

4.2 Survey outcomes

In this chapter the survey results are to be analysed with the assistance of SPSS computer software. Descriptive statistics for the variables are presented in Appendix 3. It is a one-way frequency table used for the descriptive data of the variables in the survey results. Descriptive statistics are needed for summary statistics that provide a comprehensive overview of the characteristics and properties of a dataset. These statistics assist in summarizing and describing the main features, patterns, and distributions of the data. Appendix 3 provides the data on frequency distribution, i.e. the amount of people answered, percentage and cumulative percent. The tables show frequency of each unique value in a dataset and are useful for categorical variables to understand the distribution of categories.

Appendix 3, Table 2 contains general descriptive statistics considering the sample size n = 261. The mode value shows the value that appears most frequently in a dataset. The median provides insights into the range and spread of the dataset. If the median is close to the minimum or maximum value, it suggests that the dataset is heavily skewed or contains extreme values. Moreover, if the median and mean are close in value, it indicates a relatively symmetrical distribution. However, if the median is significantly different from the mean, it suggests a skewed distribution with outliers or extreme values.

Speaking about variable investments, the mode is 4.0 meaning that the most frequent value is “not investing” (Appendix 3, Table 2). This proves the novelty of the market and unawareness of this topic in general. Appendix 3, Table 2 proves a relatively symmetrical distribution since the mean and median values are close in value (Appendix 3, Table 2). It is also important to analyse Appendix 3, Table 3 regarding the descriptive statistics of variable investments. Frequency in this table represents the number of times a particular value appears in the dataset. Cumulative percent represents the cumulative proportion of values below a particular threshold. Appendix 3, Table 3 shows that 84 people represent 32.2% of the respondents and are not investing and 28.7% are investing in both Etherium and Bitcoin. The least amount of people (17.6%) is investing only in Etherium. This can be explained by the virtue of the fact that Bitcoin is more popular than Etherium. However, if people have knowledge of Bitcoin and cryptocurrency, they are more likely to be aware of Etherium and any other types of less popular coins. Therefore, cumulative percent of people investing in Bitcoin, Etherium or in both coins is 67.8 showing that the majority of people are investing in cryptocurrency (Appendix 3, Table 3).

Speaking about Bitcoin and Etherium profitability, the modes of both variables are 1.0 (Appendix 3, Table 2). It means that the most frequent answers in the survey are “Bitcoin investments are currently profitable”, since 146 people (55.9%) have chosen this option, and 137 people (52.5%) consider Etherium profitable. However, about one quarter of the respondents was not sure about the profitability of Bitcoin and one third about the profitability of Etherium, once again proving the novelty of this market and unawareness of it (Appendix 3, Tables 4 and 5).

Regarding the age, the mode is 2.0 meaning that the most frequent value is the age of participants of 26-35 (Appendix 3, Table 2). Hence, this age group is the majority in this survey. Appendix 3, Table 6 shows that 84 people represent 32.2% of respondents and are between the age of 26 and 35 years old. Additionally, the cumulative percent is 58.6, meaning that more than a half of the respondents were 35 years old or younger. The age category of 46+ was the least frequent among the respondents in the survey, accounting for only 12.6% of respondents.

According to Appendix 3, Table 2, the most frequent value regarding educational background is Bachelor´s Degree. About a half of the respondents has obtained this type of education. The least frequent value is high school (Appendix 3, Table 7).

Finally, female constitute to the majority of respondents, accounting for 51.6 valid percent. Male comprise 47.8 valid percent of the respondents (Appendix 3, Table 8). According to Appendix 3, Table 2, 6 people have not chosen any answer for this question but have participated in the survey anyway.

Appendix 4 provides with the information on cross-tabulation. It is used for analysing the relationship between two categorical variables. It provides a contingency table showing the frequencies or percentages of each combination of categories (IBM Corp., 2020). These are also useful for checking the preconditions for the chi-squared test (Appendix 5). According to Appendix 4, Table 9, there are no missing cases among the variables under study; therefore, the outcomes are valid and accurate. Appendix 4, Tables 10-13 show the expected frequencies for variables proving that the third precondition for the chi-squared test were met. Regarding other preconditions for the chi-squared test, they can be found below and in the Appendix 5, Table 14. As it was already mentioned, the variables should be categorical. In this thesis all the variables, such as investments, profitability, age, gender, and educational background, are nominal, which is a type of categorical variable, meaning that the first precondition is fulfilled. Secondly, the observations should be independent. In this thesis the random sampling method was utilized, which proves the independence of observations meaning that the second precondition is

met. Finally, the sample size should be reasonably large and each cell should have at least 5 observations, i.e. expected value, in the contingency table. In this thesis the minimums of expectancy value vary between 5.800 (Appendix 4, Table 12) and 9.900 (Appendix 4, Table 10) meaning that there is no cell with expected value less than 5 and the third precondition was fulfilled.

As it was mentioned earlier, the thesis is analysing independent variable: investment (values: Bitcoin, Etherium) with the dependent variable: profitability (values: Yes/No). The null hypothesis (H0) states: variables are independent, i.e. investments in Bitcoin and/or Etherium are not associated with profitability. The alternative hypothesis (H1) is: variables are dependent, i.e. investments in Bitcoin and/or Etherium are associated with profitability.

These are the general hypotheses, needed for the answer of the main questions of this thesis. On the basis of the statistical result, the conclusion can be drawn whether the Bitcoin and Etherium investments are profitable or not.

The Chi-Square Test of Independence was utilised due to the fact that all the preconditions were checked and fulfilled (Appendix 5). This type of test is frequently used to determine if there is statistical independence or association between two variables that are categorical. In this thesis, those variables are Bitcoin & Etherium investments and profitability. For examining the data, this test employs a contingency table, which is a data grouping structure. The Pearson Chi-Square is the most prevalent finding in the Chi-Square Tests table. It assists in either rejecting or accepting the H0.

Appendix 6 evaluates the dependence of associated profitability on the investments in Bitcoin. The minimum expected count is 9.870.The sample size (n) is 261. The value of the test statistic is 145.712. The degree of freedom is 6 (Appendix 6).

The corresponding p-value of the test statistic is asymptotic significance, which can be written as $p < 0.001$ (Appendix 6). Since the p-value is less than the generally accepted in statistics significance level $\alpha = 0.050$, the null hypothesis should be rejected and H1 can be accepted. To conclude, investments in Bitcoin are associated with profitability.

Appendix 7 evaluates the dependence of associated profitability on the investments in Etherium. The minimum expected count is 7.930. The sample size (n) is 261. The value of the test statistic is 178.285. The degree of freedom is 6 (Appendix 7).

The corresponding p-value of the test statistic is $p < 0.001$ (Appendix 7). Since the p-value is less than the generally accepted in statistics significance level $\alpha = 0.050$, the null hypothesis should be rejected and H1 can be accepted. To conclude, investments in Etherium are associated with profitability.

Consequently, both Bitcoin and Etherium are associated with profitability. The general H0 is rejected and H1 is accepted.

Next step in the analysis of the survey is the correlation between the educational background of the participants and their investments in Bitcoin and/or Etherium. Due to the fact that in modern society it is considered that educated people can be more successful in their lives (University of the People, 2023), it is interesting to discover if educated people are more likely to invest in cryptocurrency than those who only finished high school. The null hypothesis states that there is no dependence between the variables. The alternative hypothesis states that there is dependence between them. The acceptance or rejection of the H0 will offer more background information on the gatherings.

According to Appendix 8, the minimum expected count is 7.750. Therefore, the chi-squared test has been accomplished in SPSS. The sample size (n) is 261. The value of the test statistic is 4.580. The degree of freedom is 6 (Appendix 8).

The corresponding p-value of the test statistic is $p = 0.599$ (Appendix 8). Since the p-value is greater than the generally accepted in statistics significance level $\alpha = 0.050$, the null hypothesis should be accepted. To conclude, the investments in Bitcoin or Etherium are not dependent on the educational background of the participants, meaning that education does not influence the decisions regarding financial investments of the respondents in this survey.

Additionally, the correlation between the age and investing has been analysed in this thesis. As previously mentioned, Blockchain is a relatively new field, and it can be suggested that older people are less likely to invest in it due to lack of knowledge or experience in crypto world.

The null hypothesis states that there is no dependence between the age and investments. The alternative hypothesis states that there is dependence between them. According to Appendix 9, the minimum expected count is 5.820. The chi-squared test has been done in SPSS. The sample size (n) is 261. The value of the test statistic is 9.317. The degree of freedom is 9.The corresponding p-value of the test statistic is $p = 0.409$ (Appendix 9).

Since the p-value is greater than the generally accepted in statistics significance level $\alpha = 0.050$, the null hypothesis should be accepted. To conclude, the investments in Bitcoin or Etherium are not dependent on the age of the participants of this survey, meaning that cryptocurrency is equally accessible for people of all ages.

4.3 Graph analysis

This chapter focuses on the graph analysis of Bitcoin and Etherium. This information is not an individual investment recommendation, reflects only the personal opinion of the author, and cannot serve as a guide for investing in any financial instruments.

The main tools used are Fibonacci retracement levels, Elliot waves and candle patterns. The most important method of charts´ analysis to be used in this thesis is candlesticks (Nison, 2011).

By using various colours to visually indicate the magnitude of price changes, candlestick charts illustrate the direction of the price. The candlesticks are used by traders to make choices regarding trading by considering recurring patterns which assist in predicting the near-term direction of the price.

There are only two types of patterns in the financial markets: bullish and bearish (Mitchell, 2023). Bearish patterns suggest that the price will most likely decline, whereas bullish patterns suggest that the price will most likely increase. Bearish candles are coloured in red and the bullish ones – in green. Candlestick patterns are tendencies in price movement, not absolutes; hence no pattern is ever guaranteed to produce desired results. Each candlestick represents the range between the session's open and close prices. The session´s period can be hourly, daily, weekly, monthly, etc. The thesis is taking only daily and weekly charts into consideration due to the fact that these sessions are more likely to give the opportunity to make long-term forecasts (Nison, 2011).

For the purpose of visual proof, the author of the thesis will be providing the charts below from Trading View platform where the author is trading. The charts could be taken from any other broker or trading system; however, I have an account and an eligible access to the graphs on Trading View; thus, this system was chosen for the thesis.

Starting to analyse the candlesticks pattern, the author firstly determines the trend, which is obviously bullish, i.e. heading upwards (Figure 4). According to Nison (2011), the market is above the exponential moving average (EMA), which indicates a positive trend. The moving average is a blue line shown in Figure 4, which demonstrates how the cost of Bitcoin fluctuates periodically. This indicator helps the traders to understand the trend easily.

The market platforms usually calculate the EMA without traders´ assistance; hence, it is mostly unnecessary to know the formula of EMA. However, it is provided in Chapter 3 (Formula (1)) to show the importance of some calculations.

The Formula assists in calculation the position of the line for 1 specific day, and, therefore, it is very time-consuming for a trader to compute the EMA for every day in order to see the whole picture with the continuous line on the chart. Consequently, as it was already mentioned, traders do not calculate EMA on their own and the system is computing it itself. The sampling period used for the EMA analysis in this thesis is 5 months, starting from January 2023 till the end of May. This timeframe gives up-to-date information regarding the pricing trend and covers the whole period of the thesis work.

According to the chart analysis, green candle indications can be utilized to buy in such a situation, and bearish candle signals should be used to close long bets. The EMA also serves as a form of support as well as resistance levels. Support levels – in the case of Bitcoin - serve as the lower level on how far prices are anticipated to decline throughout uptrends. It is usually difficult for the stocks to break the level on the first try. Usually, some news, i.e. political or economic news, affect the breaking of the EMA line. If the stock breaks the EMA support level, in most cases it shows the weakness of the level, and the trend changes to the opposite one. Therefore, it is highly important to calculate the EMA correctly, because in the end it influences the buying decisions (Nison, 2011).

Figure 4. Bitcoin Daily Chart – Trend Analysis (Trading View, 2023)

Regarding the analysis of weekly Bitcoin chart, it is presented in Figure 5. It shows growing trend which started in 2021; price fluctuations in the price area of 28 791 and 69171 US Dollars during the time period of January 2021 and June 2022. The graph shows a decline of 58.38% in price during 2021.

Figure 5. Bitcoin Weekly Chart (Trading View, 2023)

According to Nison (2011), one of the most popular Japanese candlesticks patterns is Head & Shoulders (HS). This pattern can be usual or reverse. Figure 6 shows the usual HS pattern (Figure 6, orange colour) as well as the reverse HS (Figure 6, turquoise colour). The colours indicate the special “head” and “shoulders” of the pattern, whereas the blue line displays the “neck” of the figure, which serves as the level of support/resistance. This pattern is important due to the fact that it always shows the point-of-entry and usually breaks the trend. In other words, the usual HS forecasts the drop of price starting from the neck. The first target for this pattern is the price difference between the pick of the right “shoulder” and the neckline (Bulkowski, 2014). Figure 6 shows the first target with the purple dashed line. The point-of-entry in this case is the neckline. Reverse HS functions vice versa, and the target is also being displayed in Figure 6. As it is seen from the chart, the HS pattern has successfully achieved the first target in November 2022.

Figure 6. Bitcoin Weekly Chart –Head & Shoulders Pattern (Trading View, 2023)

However, this pattern has a second target, which is not always guaranteed. The second profit would be the price difference between the pick of the “head” and the neckline (Bulkowski, 2014). This is described by the green dashed line in Figure 6. Moreover, this target most frequently achieves only 61.8% of Fibonacci retracement. This is the next indicator to be used in technical analysis and is described below.

Horizontal lines called “Fibonacci retracement levels” reflect prospective areas of resistance and support in which price might alter the trend. The Fibonacci approach works effectively when the stock market follows a trend. When the market is heading upward, the intention is to purchase

on a decline near a Fibonacci support level. Likewise when the market is going down, trader might consider selling on a retracement at a Fibonacci resistance level. Given the fact that they are meant to foretell where market prices may be in the future, Fibonacci retracement levels have been described as a predictive technical indicator (BabyPips.com, 2022). Fibonacci retracement assists in identifying long and short market patterns, determining a target price and stop loss value for a particular asset, and it is also automatically established by the trading system.

However, trader can also calculate the levels on his/her own. The formulas are presented in Chapter 3. Formula (2) is used for the uptrend, while Formula (3) is used for the downtrend.

The Fibonacci retracement levels are also used in HS pattern. As it was already mentioned, the second target usually achieves the ratio of 61.8% on the Fibonacci retracement. Therefore, it is necessary to calculate this level in order to obtain the target price.

Using the Formula (3) for the downtrend,

-3 587 + ((31 455 – (-3 587)) x 61.8% =

-3 587 + (35 042 x 0.618) =

-3 587 + 21 655.9 =

18 068.9

The calculated 61.8% ratio corresponds with the Fibonacci levels provided by Trading View system (Figure 7).

Analysing the 61.8% level, it is proven that the price for Bitcoin has also achieved the second target of HS - 18 068.9 US Dollars – in June 2022 and even declined a bit more.

Figure 7. Fibonacci Retracement on Bitcoin Weekly Chart (Trading View, 2023)

Both of these indicators, i.e. HS and Fibonacci retracement, have shown that the target price has already been achieved. Moreover, this confirms that the pattern HS and Fibonacci function for Bitcoin correctly and can be utilised for further predictions.

The charts are generally drawing new patterns and moving forward due to different rules. The traders also use it in order to earn money, and a good analysis assists in that. It can happen that the market is in lateral movement, which means that the chart does not follow the general rules of Fibonacci, patterns, Elliot waves and other financial instruments. In these cases usually no new patterns are developed, and traders are not able to predict next movements. Lateral movement usually happens due to unexpected political or economic situation in the world, and it is generally not advised to trade during this period of time because the risks are increased (Shannon, 2008). However, Bitcoin chart definitely shows the appropriate serviceability and adequate performance; hence, it should be drawing new and new patterns after each subsequent. As it was already mentioned, according to Figure 6, the next pattern on the Bitcoin weekly chart is a small reversed HS coloured in turquoise. The target of this small pattern is also described in Figure 6.

Analysing the pattern with a Fibonacci retracement, the author got the results, described in Figure 8 below. Using the Formula (2) for mathematical calculation of Fibonacci level 61.8%, the author of the thesis got the following results:

39 805 – ((39 805 – 25 855) x 61.8%) =

39 805 – (13 950 x 0.618) =

39 805 – 8 621.1 =

31 183.9

This shows that the formula gives a bit more precise data on the 61.8% Fibonacci level. Therefore, the rise in price until 31 183.9 USD can be forecasted on the weekly Bitcoin chart.

Figure 8. Fibonacci Retracement on Bitcoin Weekly Chart; Reversed HS (Trading View, 2023)

In order to prove the validity of another financial instrument called Elliot waves on this chart, a quick analysis on the daily Bitcoin chart was accomplished (Figure 9). Daily charts are more volatile and, hence, less predictable but can be utilised in order to get an overview of the further short-term movements of the price (Nison, 2011).

The daily chart indicates a usual HS, the targets of which are 23 853 USD, i.e. green dashed line as a target calculated as the difference between the pick of the head and the neckline, or 24 813 USD, i.e. the purple dashed line as the target calculated as the difference between the pick of the right shoulder and the neckline (Figure 9).

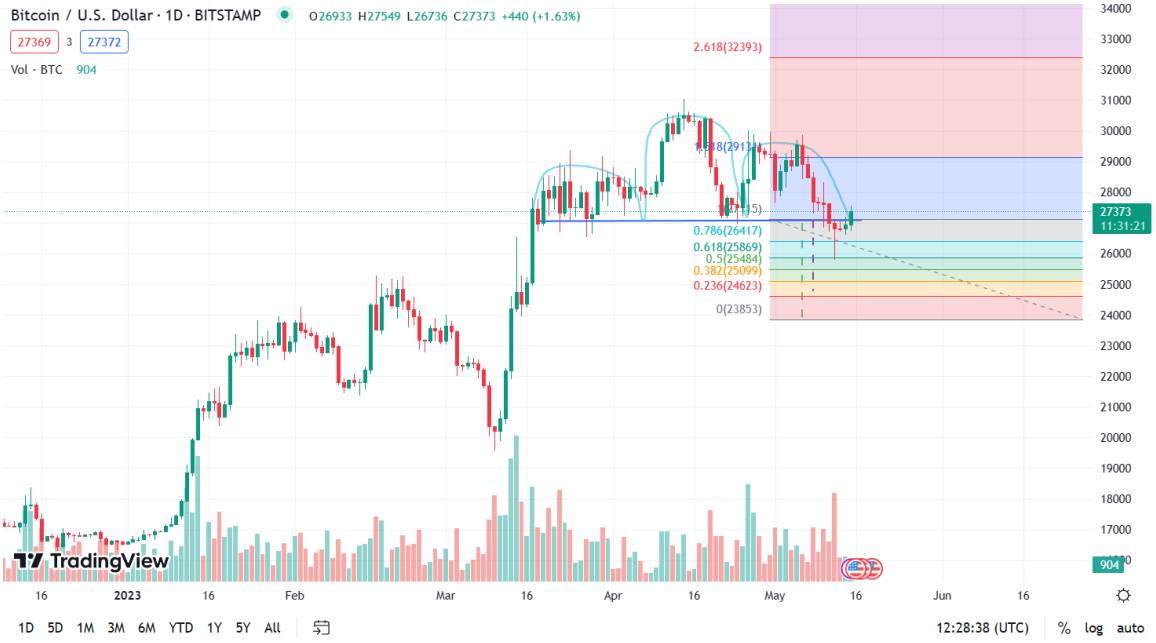

Figure 9. Bitcoin Daily Chart, HS (Trading View, 2023)

However, the chart does not indicate the long-term opportunity to invest, which means that the chart must have some corrections or draw a new pattern as soon as the price reaches 31 183 USD. Hence, a new technical analysis should be done at the point of the target reach. There is a probability that the price is able to go both directions and it is predominant to evaluate the risks again.

Consequently, in case the company would want to invest money in Bitcoin for a short period of time, $24 813 USD is a good point of entry. The point of exit would be 31 183 USD, according to the candlesticks pattern.

The last financial instrument to be used in this thesis for analysis is the Elliot waves. Technical analysis uses Elliott waves to forecast price changes. Motive (impulse) waves and corrective waves represent the main body of Elliott's wave concept. Three impulse waves and two retrace waves constitute a motive wave, which has five waves total. There are three waves that comprise up a corrective wave: A, B, and C. Wave B is a retrace wave, whereas Waves A and C are impulse waves (Corporate Finance Institute, 2023). The formula of Elliot waves is shown in Figure 10 below.

To recognize a motive wave, the trader should utilize the following fundamental rules. First of all, the second wave cannot exceed the first wave by more than 100%. Additionally, it is impos-

sible for the third wave to be the shortest one. Finally, the price range of the first and the fourth waves cannot be equal.

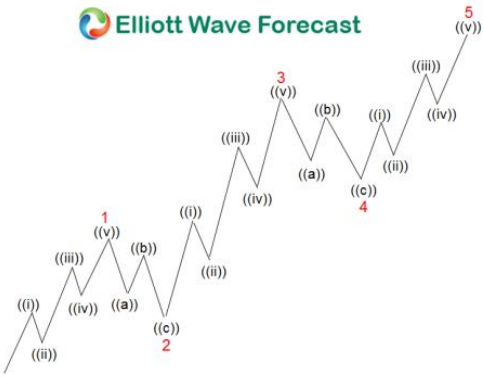

Figure 10. Elliot Waves Formula (EWFEric, 2020)

Bitcoin currently displays 5 Elliot waves (Figure 11). The impulse (motive) waves are coloured in turquoise colour, while correction waves – in orange.

Moreover, each impulse wave consists of 5 small waves; while each correction wave includes 3 small ones (Figure 12). The last dark green wave represents the ABC correction wave, which should lead the price for the main last correction to the 38.2% Fibonacci retracement level. After the last correction wave the combination of the waves is to be repeated (Shannon, 2008).

Figure 11. Elliot Waves Analysis (Trading View, 2023)

The Elliot waves analysis shows, that the market trend is going up due to the instant rise of price. Therefore, it can be predicted that there will be 4 more waves leading upwards until the last main correction. Unfortunately, this kind of analysis does not give the trader neither point of entry nor the point of exit. Nonetheless, it gives the trader the general overview on the market trend and proves the market ability to go higher.

Figure 12. Elliot Waves, Detailed Overview (Trading View, 2023)

As it was already mentioned, Elliot last correction wave should lead to the 38.2% Fibonacci retracement level. Therefore, using the Formula (2) for the uptrend,

31 052 – ((31 052 – 15 417) x 38.2%) =

31 052 – (15 635 x 0.382) =

31 052 – 5 972.57 =

25 079.4

Hence, the Elliot wave analysis shows the drop in price until approximately 25 079 USD. As it was mentioned earlier, the daily chart forecasts a small drop in price with the target of approximately 24 000 – 25 000 USD according to Elliot waves and candlesticks analysis (Figure 9 and Figure 13). It could be suggested, that the drop in price will happen before the rise of it to the target of 31 183 USD (Figure 8). Thus, it proves the volatility of the cryptocurrency market discussed in Chapter 2. Consequently, even due to forecasts made above, the market can easily

change its direction by drawing any other pattern. In order to reduce risks, the analysis of the charts should be updated every 3-5 days accordingly. It is impossible to consider all of the future factors in this thesis, which is considered as a limitation of the study (see chapter 6.2).

Figure 13. Elliot Waves – 38.2% Fibonacci Retracement Level (Trading View, 2023)

Speaking about Etherium investments, the thesis includes a short technical analysis of its chart (Figure 14). As it was stated earlier, Etherium is very similar to Bitcoin since it is considered to be his successful “young brother” (see Chapter 2). Hence, the graphs of these cryptocurrencies look alike.

If to compare Figure 14 and Figure 8, the conclusion can be drawn that the charts share the same patterns of HS. Hence, as the history of the price shows, Etherium is most likely to follow the directions of the price of Bitcoin. In case Bitcoin rises, Etherium is going to rise, too. Figure 14 confirms this statement.

The chart of Etherium draws the pattern of reverted HS, coloured purple in Figure 14. As mentioned previously, this pattern usually shows the change of direction and is a good sign of further rise in the price. Therefore, the targets of reverted HS are drawn with dashed lines: the first target is 2 327.2 US Dollars and the second one with lower likelihood is 2 868.1 US Dollars.

Figure 14. Etherium Weekly Chart (Trading View, 2023)

Using the Formula (2) for Fibonacci retracement, it is also possible to compute the 61.8% level:

2 868.1 – ((2868.1 – 1 786.3) x 61.8%) =

2 868.1 – (1 081.8 x 0.618) =

2 868.1 – 668.6 =

2 199.5

The Fibonacci retracement tool used from Trading View (2023) presents the 61.8% level at the price of 2 199.6, meaning that the above calculations are reliable. Hence, the price of Etherium is very likely to rise at least up until approximately 2 199 US Dollars, meaning that the point-of entry is the neck of HS which is 1 795 US Dollars, and the point-of-exit is 2 199.5 US Dollars.

Consequently, considering all the above mentioned calculations and evaluations, there is a high probability that both Bitcoin and Etherium will rise in their price. However, the price targets are short-term and cannot be considered as a recommendation for the long-term investment. Moreover, if the short-term investment decision is made, the technical analysis should be done accordingly every 3-5 days in order to get a more precise and up-to-date information.

4.4 Other blockchain opportunities for real estate companies

Despite the fact that blockchain investments were considered to be a beneficial opportunity for the company, chapter 4.4 offers other blockchain opportunities, which could be also profitable in the future. These include mining opportunities, smart contracts, blockchain transactions, P2P and blockchain-as-a-service.

4.4.1 Mining

A different way to generate passive income is through bitcoin mining, which offers low entry barriers, an emerging, but competitive market, as well as expansion potential. Market capitalization is the most commonly used indicator for determining how big the market is. The market capitalization of bitcoin is $512 544 972 014 USD (TradingView, 2023). On the other hand, the global real estate industry is valued at roughly $326.5 trillion, meaning that Bitcoin mining has an enormous potential for growth (Rhodes, 2021). As real estate profit margins continue to be compressed, and inflation continues to rise, investors are going to attempt to achieve diversification of their investment portfolios. Bitcoin and bitcoin mining will most certainly consume a large portion of these funds.

Due to the fact that the thesis does not suggest long-term investments in crypto (see chapter 4.3), the topic of mining is to be discussed on a more precise level because it is another possible profitable option for real estate companies. Moreover, this type of passive income is also becoming extremely popular among not only companies, but also solo investors (Sigalos, 2022).

The thesis focuses on the machine Antminer S19 XP 140Th due to the fact that “Fifth element” was already engaged with the producing company and during the interview suggested it to be the most acceptable and affordable option for the organisation (Appendix 1). The price of the machine fully depends on the Bitcoin´s stock price and its demand, and currently the price for it is 338 545 ₽, which equals 4,380.77 US Dollars per one machine (IBMM Technology, 2022).

The maximum power consumption of this machine is 3010W, and being a Bitcoin miner, it uses the SHA-256 algorithm. This algorithm is more secure than other hashing algorithms. It is a safe and reliable industry standard for mining cryptocurrencies. It is also fast to compute and resistant to attacks. In addition, the miner has a maximum hash rate of 140 Th/s, which is a good

indicator. The miner comes with four fans for cooling, which are located next to each other, able to maintain the temperature of the device necessary for operation, preventing it from overheating. Highly profitable coins include Bitcoin PSV and Binance BTC. Other coins that can be mined include Acoin, Curecoin, eMark, Joulecoin, Unbreakable and more. With a maximum power consumption of 3010w, the user gets an efficiency of 0.22j/Gh. The more energy is available for miner, the more coins it produces. However, it will also obviously lead to a surge in energy costs (IBMM Technology, 2022). Further the thesis will cover the energy rates in Russia.

Obviously, the main aspect which affects the profitability of miner is the income, which is calculated in US dollars per day. In other words, the machine is producing a part of Bitcoin in a day and the graph below shows the profit, which the miner gains in the end of the day with a running machine (Figure 15). This income directly depends on the stock price of the Bitcoin. If the stocks are rising, then consequently the profit per day is going to be higher (Houy, 2016).

In Russia there are two separate rates for the energy: for commercial businesses and for the private usage. Obviously, this thesis will focus on the first rate due to its commercial nature.

Currently the energy costs for commercial activities in Russia, Karelia, where the “Fifth element” is located, are 8 roubles / KWh, which is equal to 0.09 US dollars / KWh. The efficiency of 0.022j/Gh gives the profit of 11,64 $ per day. This value is calculated according to the Bitcoin´s stock price using a special calculator from Bitmain (2023). Due to the electricity costs, the income is lowered by 6.5 $ per day, which leaves the miner with a final profit of 5.14 $ a day, 154.26 $ a month and a 1,851.07 $ per year.

At a cost of 4 380.77 US Dollars, the machine will pay off in (Formula (4)):

4 380.77 / 1,851.07 = 2.4 years

This machine does not require any time effort of a miner or any other kind of effort. The Antminer S19 XP is working fully on its own and does not need any attention (Bitmain, 2023).

Moreover, it is also predominant to compare the pay-off period of mining machine to the pay-off period of the leased property. According to Oleg, the pay-off period of a leased property is 6 years. According to the prior calculations, the pay-off period of a mining machine is 2.4 years, which is noticeably less, meaning that mining business is theoretically almost twice more profitable than usual leasing.

The best way to calculate the profitability of mining is to compute Return on Investment (ROI). This value represents the return on investment as a percentage. A higher ROI indicates a more profitable investment (Klee, 2022).

Hence, using Formula (5), it is possible to measure the efficiency or profitability of investment into a mining machine. The ROI for the first year is the following:

Net Profit = $1,851.07 - $4,380.77 = -$2,529.70

ROI = (-$2,529.70 / $4,380.77) x 100 ≈ -57.8%

The ROI in this case is approximately -57.8%, indicating a negative return on investment. This means the investment has not been paid off completely in the first year of usage. However, due to the fact that the mining machine will pay off in 2.4 years as stated earlier, the ROI will be calculated also for the 2.4 years period in order to measure the efficiency of it after the pay-off point. ROI for the 2.4 year after investment is the following:

Total Profit = $1,851.07 x 2.4 = $4,442.57

Total Cost of Investment = $4,380.77

ROI = ($4,442.57 / $4,380.77) x 100 ≈ 101.41%

The ROI over the 2.4-year period is approximately 101.41%. This indicates that the investment has generated a return of around 101.41% within 2.4 years, indicating a profitable investment. Therefore, based on these calculations, the investment can be considered profitable with a ROI of approximately 101.41% over a 2.4-year period, indicating a profitable investment in a long-term run.

However, one thing to be considered by the miner is the following. Above calculations have been made according to the Bitcoin price of approximately 27 000 US Dollars. At this price, the day profit is 5.14 US Dollars and, hence, the ROI will be positive in 2.4 years as calculated before.

However, it was already mentioned that the earnings of a mining machine depend on the price of Bitcoin. Therefore, this scenario should be discussed. If the Bitcoin price will fall twice in price, dropping to 13 000 US Dollars, the earnings per day will be twice lower, resulting in 5.82 US Dollars. Considering the same electricity costs of 6.5 US Dollars, the miner will have to pay more than he earns in order to cover the utility expenses. The daily income is negative, indicat-

ing a loss rather than income. In such a case, the ROI calculation will always be negative, indicating that the investment will never be profitable in such circumstances.

According to previously done technical analysis, the Bitcoin is not going to drop to the price of 13 000 US Dollars; therefore, the likelihood of the above mentioned scenario is extremely low but nevertheless should be taken into consideration by the risk management department of the company. Therefore, theoretically, it is a good side-hustle.

Figure 15. Profitability of Antminer S19 XP 140TH (Bitmain, 2023).

4.4.2 Smart contracts

One of the most useful and applicable solutions of Blockchain in real estate are smart contracts. According to Peranzo (2023), a smart contract is a “concept that facilitates to set up the rules and agreements that govern business transactions.” In other words, it is an electronic code that establishes a series of commitments based on prewritten terms that have been mutually agreed upon by both sides of the payment. These applications run on a distributed ledger platform - blockchain. The smart contract's records are unable to be interfered by or amended by anyone else once a transaction has taken place, which is its strongest feature (Huh & Kim, 2020). As a result of this, smart contracts are viewed as trustworthy solution for operations involving participant confidentiality, anonymity, and transparency (Peranzo, 2023). However, companies may be still questioning whether they should switch to smart contracts. Indeed, conventional legal agreements have been successful for many years, but these digital solutions could be particularly interesting for real estate companies.

First of all, smart contracts remove the intermediaries. The closing costs for property deals are be extremely high since there are so many different people engaged in the process, including brokers, lawyers, and other intermediaries. Blockchain and smart contracts minimize the necessity of a large number of individuals to be connected to the process. By developing a piece of

code, this revolutionary technology has been demonstrated to automate procedures requiring proof of identity or mortgage permissions, which will shorten the lengthy and exhausting procedure of creating and signing the contract between two parties in the real estate industry (Peranzo, 2023). Hence, the associated expenses will be greatly decreased by the aforementioned methods and give an opportunity to effectively engage in business while paying less in transaction fees.

Secondly, smart contracts are available online worldwide. The leasing terms, such as rent, an administration fee, and the amount and duration of payments, are programmed into an agreement by the landlord in order to start the smart contract procedure (Thota, 2019). Once an agreement has been made, the tenant evaluates the terms of the lease on the web platform before electronically executing the smart contract – signing it. When the contract is digitally signed by the proprietor of the property, it becomes a smart contract that is enforceable in court (Peranzo, 2023).

Last but not least, these contracts cannot be lost, damaged or rewritten. It makes this system safer and more attractive for modern businesses (Thota, 2019). All the data is stored on the ledger, and Bitcoin preserves and protects information related to a property or land — title documents, property register number, technical information, and joint ownership data. Everything is accessible constantly with real-time information as well as rapid confirmation (Redolfi, 2021). Many traditional property registry organizations have an extended delay between contract signing and purchase registration, resulting in no transparency of the transaction. It happens because most systems for registering land ownership are still using paper documentation, only a few countries are slowly transitioning to an electronic format. The data is archived in several physical locations, i.e. offices. Information might therefore disappear or get lost as a consequence, meaning it might not be submitted to the online database in the end at all. The procedure takes patience and time. Any paper record must be manually evaluated, including the handwritten signatures of the people involved (Holden, 2018). This leads to the fact that, according to World Bank (2023), only 30% of land rights are registered or recorded worldwide. Other 70% of registrations are illegal. Therefore, the usage of new blockchain technology represents a true achievement for real estate agents, investors and the government.

4.4.3 Blockchain transactions

The use of distributed ledgers for money transfers is one of its most prevalent implementations. A prime example of this involves embracing and concluding transactions in digital currencies. The main benefit is that payments are made more quickly, safely, and affordably than through intermediaries such as banks (Huh & Kim, 2020).

These kinds of transactions are typically carried out using open blockchain, like Bitcoin. The coins are used to make payments. A payment confirmation in Bitcoin usually takes approximately up to ten minutes (Redolfi, 2021).

One key benefit for a SME is the ability to quickly complete international payments by using digital currencies, while more conventional methods of money transmission can take a while (Thota, 2019). However, speaking about internal transactions, blockchain payments do not have advantages. Bitcoin transactions require about 10 minutes completing one transaction, while the completion of a transaction in VISA takes only a few seconds. It could be considered as a long-lasting transaction; however, in order to enhance technology and resolve problems in this field, ongoing advancements are produced (Bitcoin, n.d.).

For transaction purposes, crypto wallets can be utilised. Each participant on a blockchain network is assigned a pair of credentials. The first one is a private key, which is used to generate a transaction's electronic signature and a key that is publicly accessible. In addition to storing your digital currency, Bitcoin wallets also encrypt it with a special private key, making sure that only the owner of the account and the person provided with the code may access it. It is similar to a password for a bank account that is accessible online. A crypto wallet allows businesses to store, send, and receive various coins. Some wallets strictly handle basic operations, while others incorporate extra functionality such as an opportunity to lend the digital currencies the business holds and earn interest on the holdings. Transaction fees while utilizing crypto-wallets often range from 0% to 1%. This happens due to the fact that, unlike card purchases, cryptocurrencies like Bitcoin are not dependent on a banking institution to ensure each transaction. As a result, there are no additional fees. However, blockchain transactions also have drawbacks. The main one is the low bandwidth. The Bitcoin network is now only capable of a maximum of seven transactions per second, compared to VISA's 2000 and Twitter's 5000. Moreover, due to the significant volatility of cryptocurrencies in general, it is more difficult for businesses to accept digital money without incurring on risk related to prices. Prior to embracing bitcoins as pay-

ment, SMEs must thoroughly study and analyse the dangers and advantages, as well as the viability of the stated coin and the activities of the company (Curry, 2023).

4.4.4 P2P and P2P lending platforms

P2P transactions are “peer-to-peer” payments, which make making trades between market participants possible directly, without relying on a third party to handle all transactions. These transactions, unlike Bitcoin, are managed by corporations. In other words, there are people behind the process, who supervise all contacts among their clients, act as mediators in times of disagreement, and receive payment for all of this. By default, no human intervention is necessary in the transaction, but in case of dispute, those people will be involved (Marshall, 2017).

P2P connects the individuals who are behind the transaction orders. This means that if a pair of orders to purchase and sell Bitcoin has been identified, the exchange software does not execute the sale or purchase promptly but instead matches the two parties so that they can perform the transaction directly (Marshall, 2017).

Moreover, there are so-called P2P lending platforms, which allow companies to pursue real estate investments without possessing a large sum of money or a mortgage. Investors and borrowers, who are interested in funding real estate campaigns, are matched in P2P lending platform. A project is suitable for any real estate operation, including an apartment capital, an upcoming project, or repairing and reselling an existing property. With the assumption that they will repay the investor according to the loan's conditions with interest, borrowers utilize the financing for funding their project (Ovadia, 2022). Everything is executed online with the assistance of smart contracts, which makes it extremely easy and accessible for any SME.

4.4.5 Blockchain-as-a-service

Blockchain-as-a-service (BaaS) is the establishment and operation of cloud-based networks by a third party for firms who build blockchain applications. It minimizes the requirement for an organization to build its own blockchain network – with the assistance of Baas, the businesses are able to boost the company's operations, and entrepreneurs can "rent" access to a specified amount of distributed processing power (Wood, 2021). In the expanding realm of blockchain

technology, these external services are a fairly recent innovation. The usage of blockchain technology has expanded far beyond its most well-known use in bitcoin transactions, addressing secure communications of every type. As a consequence, there is an increase in the demand for hosting providers (Frankenfield, 2021). BaaS is considered as an important milestone in the larger blockchain industry and offers such services as record keeping, documentation traceability, execution of business contracts and data monitoring tools (Wood, 2021).

5 Literature review

In this chapter literature review used in the thesis is discussed. The purpose of it is to analyse and evaluate the literature used in the thesis as well as to reveal any gaps in the sources and analyse the contradictions between older and newer literature.

Table 19 below shows all the types of publications collected and used in the research. Table 20 shows the years of publications.

Publication type	**Total**	**Percentage (%)**
Article	27	36.5
Journal report	17	22.9
Webpage	12	16.2
Blog post	9	12.2
Book	7	9.5
Interview	1	1.4
Survey	1	1.4
Total	**74**	**100**

Table 19. Literature Review: Publication Types

Year of publication	**Total**	**Percentage (%)**
1996	1	1.4
2008	1	1.4
2011	1	1.4

2013	2	2.8
2014	2	2.8
2016	3	4.2
2018	3	4.2
2019	7	9.5
2020	5	6.8
2021	10	13.5
2022	15	20.3
2023	23	31.08
N.d.	1	1.4
Total	**74**	**100**

Table 20. Literature Review: Year of Publication

As shown above, most of the data was collected from articles and journal reports. Moreover, most of the sources were published in 2022 and 2023 due to the fact that Blockchain is a relatively new topic, and the thesis is aimed to report up-to-date information. However, one of the sources was published in 1996 – it is The Code of the Russian Federation dated 26.01.1996 N14-ФЗ, which is the main legislation of Russia. Hence, this source was especially important for this thesis and is the core of the governance part. The only not dated source is the official website of Bitcoin, which was valuable indeed due to the choice of the topic of the thesis.

Moreover, the thesis provides a new perspective of old material and uses about 26% of literature, which was published 3 years ago or earlier. The thesis merges it with the new readings, which constitute 72% of sources, and introduces own investigation within the framework of current literature (Table 20). This choice of literature offers the possibility to critically assess the information on the topics of real estate and blockchain and present a valuable outcome.

Thus, a conclusion can be drawn that older literature provides the readers with limited information on both topics while the newer one offers an enormous amount of additional data,

which is more relevant and updated. For instance, newer articles and reports offer a vast amount of information regarding mining Bitcoins and its legislation in Russia, while older sources mostly present the data about Bitcoin but do not delve into the topic of mining due to lack of governance and accessible knowledge. Additionally, newer literature does not deny or refute the information given in older sources. Instead, it deepens the existing knowledge, adds more relevant data and proves the fact that Blockchain is a new evolving sector and has a huge potential of growth because people continue studying this topic and are interested in developing it.

The author of the thesis is applying her existing knowledge into practice while combining and expanding it with the literature sources. The research is located within the combination of two topics: real estate, which is a huge already developed market, and blockchain, which is a completely new sector with a fast-growing market. Real estate sector currently has some problems caused by COVID-19 and political and economic crises and Blockchain has the capacity to mitigate the consequences of those challenges if to combine these fields. The research done by the author confirms these statements. Therefore, the thesis can be considered as reliable, relevant, and trustworthy.

6 Conclusion

The following chapter focuses on discussion, reliability, validity and limitations of the research. The answers to the research questions are revealed in this part. Furthermore, this chapter aims to present the main recommendations for the commissioning party.

6.1 Discussion

“Are the investments in Bitcoin and Etherium currently profitable?”

Based on the research, the investments in Bitcoin and Etherium can be currently considered profitable. The analysis was done with the assistance of chart candle patterns, Fibonacci retracement, Elliot waves and statistical tests via SPSS.

The technical analysis suggests that both cryptocurrencies have potential for price increases in the short-term. For Bitcoin the suggested point of entry is $24 813 USD with the recommended exit point being $31 183 USD. As for Etherium, the analysis indicates a pattern known as "reverted HS," which usually signifies a change in direction and suggests a rise in price. The targets for Etherium are drawn at $2 327.2 USD and $2 868.1 USD, with a high likelihood of reaching at least $2 199 USD. However, it's important to note that these price targets are short-term and should not be considered as recommendations for long-term investments. Additionally, it is advised to conduct regular technical analyses every 3-5 days for more accurate and up-to-date information because the chart must have some corrections or draw a new pattern as soon as the price reaches its target. It means that there is a probability that the price can go both directions and it is predominant to evaluate the risks once again.

Moreover, the survey was conducted in order to get more background information from people with interest in investing. The null hypothesis stated that there is no association between Bitcoin and Etherium investments and profitability. The statistical tests performed in SPSS indicated that investments in both Bitcoin and Etherium are associated with profitability. The null hypothesis was rejected. Furthermore, the statistical tests showed that investments in blockchain are not impacted by age or educational background of people, meaning that the investments are accessible for everyone. Therefore, those SMEs which were considering implement-

ing investments strategies in their business operations have an outstanding opportunity to benefit from it right now.

To conclude, summarising all the above mentioned research and calculations, there is a high probability that both Bitcoin and Etherium will rise in their price, and both companies and solo traders have an opportunity to earn from it. The short-term nature of the price targets, nonetheless, excludes the usage of this thesis as the advice for long-term investments. The research proves the profitability of investments and the list of them can be utilised by the commissioning party (Appendix 2). Further recommendations are given in Chapter 6.3. Additionally, the technical analysis should be carried out in accordance every 3-5 days in order to obtain more accurate and recent data.

"Are blockchain mining opportunities available and beneficial for real estate businesses in Russia during current economic situation?"

Pursuant to the research done, mining opportunities are available and can be beneficial for real estate businesses in Russia during current economic situation if applied correctly. This business offers low entry barriers, an emerging competitive market, as well as a huge expansion potential. The market capitalization of bitcoin is $512 544 972 014 USD, meaning that Bitcoin mining has an enormous potential for growth. As real estate profit margins continue to be compressed, and inflation continues to rise, investors are going to attempt to achieve diversification of their investment portfolios. Bitcoin and bitcoin mining will most certainly consume a large portion of these funds.

Additionally, this income directly depends on the stock price of the Bitcoin. If the stocks are rising, then the profit per day is also increasing. Bitcoin mining does not have a direct dependence on the political or economic situation in the country, which makes this side-hustle safe and reliable. However, there is no doubt that Bitcoin price can be manipulated and influenced by politicians or high-profile political news, and this risk should be considered by the risk management department.

Generally speaking, ROI of a bitcoin mining machine is approximately 101.41% over a 2.4-year period, indicating a profitable investment in a long-term run. The pay-off period of a leased property is 6 years, meaning that mining business is theoretically almost twice more profitable than usual leasing. Despite the fact that bitcoin mining machines require a vast amount of electricity power to keep it running, this business is quite lucrative in Russia due to its low electricity rates. Hence, the list of investments created in this thesis contains mining opportunities since it

is proven to be relevant and lucrative (Appendix 2). . Further recommendations are given in Chapter 6.3.

Last but not least, it is essential to be aware of the specific regulations governing blockchain mining activities in Russia. Government policies, permits, and environmental regulations can influence the feasibility and profitability of mining ventures, which, in turn, can affect real estate dynamics. Mining activities can have environmental implications and it is important for every SME, which is adopting a mining machine, to think about the possible consequences and undertake appropriate measures.

“What are the challenges and opportunities of integrating blockchain into real estate business operations?”

According to the research findings, integrating blockchain into real estate business operations offers various potential benefits, but it also comes with certain challenges. Blockchain technology and its applications in real estate are relatively new, and regulatory frameworks may not be fully developed or adapted to accommodate them. Compliance with existing regulations and addressing any legal uncertainties can be a challenge. Moreover, implementing and maintaining blockchain solutions require technical expertise. Cryptocurrency entails the threat of unexpected system collapse, interruptions in electricity, and even hardware disruptions. Besides, if cybercriminals obtain 51% or more of a public blockchain platform's computational power, they will be able to instantly manipulate and modify the whole system with a huge amount of both external and internal data. All these technical limitations make it impossible to restore the Bitcoins. Therefore, it is always advised to create a backup in order to avoid such a situation from occurring.

However, the adoption and utilization of blockchain technology in the real estate sector can also have a positive aspect. Blockchain can offer a transparent record of real estate transactions, while ensuring trust among stakeholders and excluding the need for intermediaries. This can lead to streamlined processes, faster transactions, and cost savings. Furthermore, Blockchain smart contracts are available online worldwide. These contracts cannot be lost, damaged or rewritten. It makes this system safer and more attractive for modern businesses. Last but not least, these contracts are used in P2P lending platforms, which allow companies to pursue real estate investments without possessing a large sum of money or a mortgage. Investors and borrowers, who are interested in funding real estate campaigns, are matched in P2P lending plat-

form. A project is suitable for any real estate operation, meaning that any SME can easily benefit from them.

While the integration of blockchain into real estate business operations offers significant opportunities, it's important to carefully evaluate the specific needs, challenges, and readiness of each organization. Conducting thorough research, collaborating with experts, and considering the legal and regulatory aspects are crucial for successful implementation. The list of investments, provided in Appendix 2, can be utilised by the company as a basis for integration of blockchain opportunities into real estate business operations. Further recommendations are given in Chapter 6.3.

6.2 Reliability, validity, limitations

The research is based on both qualitative and quantitative method. The qualitative data is processed with the usage of classification method, while the quantitative data is analysed with SPSS and technical analysis with such instruments as Fibonacci retracement, Elliot waves, and Japanese candlesticks. This approach reduces the amount of mistakes due to methodological triangulation, constant data confirmation by the virtue of combination of both research methods as well as different tools in technical analysis. All the data has been supported not only by the choice of literature, but also by in-depth analysis, interview and the survey. It demonstrates an excellent and critical use of a variety of sources as well as working approaches.

The data itself is trustworthy, reliable and accurate. The majority of the findings were collected from the academic articles and journal reports. Moreover, the thesis is based on seven books which are the core of investments, trading and blockchain in general. All sources are relevant and reliable. The thesis provides a new perspective of old material, merges it with the new readings and introduces own investigation within the framework of current literature. This choice of literature offers the possibility to critically assess the information on the topics of real estate and blockchain and present a reliable outcome. Considering the above, it may be concluded that all the data presented and the research can be considered trustworthy. All the outcomes are based on a trustworthy research and were justified; hence, they can be considered reliable; and can be easily integrated into the working community.

In order to critically evaluate the thesis, the limitations of the study are presented in this chapter. First of all, it is important to mention the underlap of people who are interested in block-

chain for the survey. It is physically impossible to ask all interested people all over the world, therefore, that is the limitation of the research. This affects the results in a way that the outcome of the survey is never 100% accurate. Hence, this thesis did not rely only on the results of the survey but was confirmed and supported with the technical analysis of the chart as well as qualitative research.

Technical analysis also has its limitations as any other financial instrument. Cryptocurrency is a highly volatile market. Consequently, even due to forecasts made in this thesis, the market can easily change its direction by drawing any other pattern. In order to reduce risks, the analysis of the charts should be updated every 3-5 days accordingly and discussed with a risk management department. It is impossible to consider all of the future factors in this thesis due to restricted time frame. Hence, information provided in this thesis is not an individual investment recommendation. It reflects only the personal opinion of the author, and cannot serve as a guide for investing in any financial instrument. In order to obtain an individual financial recommendation, it is advisable to consult with financial experts.

Finally, regarding the topic of bitcoin mining, it is predominant to note that the depreciation rate of mining hardware should be taken into account when calculating ROI. It can vary depending on several factors, including usage intensity, environmental conditions, maintenance practices, and technological advancements in the mining industry. In reality, it will impact the overall profitability of the mining operation, and it is crucial to consider it when calculating the ROI for mining investments. To determine the deterioration rate of a specific mining hardware like the Antminer S19 XP 140TH, it is recommended to consult the manufacturer's documentation or the manufacturer directly due to lack of reliable information on the open sources.

Briefly speaking, the advantages and drawbacks of blockchain opportunities and investments in it in the real estate industry have been investigated and suggestions for further effective implementation were provided. To conclude, despite the limitations of this research paper, the findings can be conceived to encompass all of the study's questions and successfully achieve the researcher's thesis's objective. This thesis is relevant and can be beneficial for businesses interested in blockchain investments and bitcoin mining.

6.3 Recommendations for the commissioning company and for the further research

As the relevance of cryptocurrencies expands and more businesses express interest in integrating this technology into their daily operations, more research is required on the practical application of blockchain and blockchain mining technologies in the real estate sector. Prospective research can be done to conduct a thorough examination of the results after technology adoption and implementation of all the strategies. The study did not identify the practical outcomes after the investments and mining implementation but created a list of recommendations for the commissioning party and further researches (Appendix 2). It is proven by the previous research to be profitable; hence, the company can utilise it in its business activities. It contains Bitcoin and Etherium investments with explained points-of-entry and points-of-exit as well as its profit in dollars and percentage. Moreover, the company receives the mining opportunities recommendations list with relevant information regarding prices, costs, point-of-loss, pay-off period and possible income generated by mining hardware. Finally, the list contains smart contracts and P2P section, where direct recommendations regarding integration of these blockchain opportunities are given. The list of investments aims to develop working community in the field of blockchain and real estate due to the relevance of the topic and usefulness of its application. It is particularly important in current circumstances in Russia based on theoretical background.

Due to the fact that the methods of this study were strongly based on literature, technical analysis and quantitative analysis, the suggestions for the further research can be probably done for master studies, where the research regarding the implementation part of blockchain investments and mining opportunities can be accomplished together with the company who is strongly interested and already investing in blockchain on a regular basis, so the implementation part will be the acquisition of the machines and their integration into business operations. The further development can also be done with the company which is already utilizing the mining machines and investing in crypto, so the profitability can be calculated according to the real-life date with a working machine in the company. These results could be compared to the current thesis in order to receive more precise outcome and be able to evaluate it.

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Appendices

Appendix 1: Interview (text is translated from Russian).

Author: *How would you describe the situation in the commercial real estate market nowadays in Russia?*

Oleg: It seems like the market is now reviving a bit after the COVID and sanctions, but still facing a lot of problems. International companies have left the properties after the sanctions were exposed. So many companies nowadays are suffering because the properties are empty. Of course, Turkish, Chinese, Egyptian and new Russian retailers – mostly clothes – are entering the market, but they are paying less than the international companies did. So the market is not really doing great, especially in Segezha – it is a small city, and I can see that a lot of buildings are empty, entrepreneurs are not getting income at all. I would suggest that Moscow or Saint Petersburg is feeling better, but "Fifth element" is in Segezha, and there is no chance to relocate right now: that is why I was interested in your thesis topic.

Author: *How COVID-19 has affected this market and your company?*

Oleg: I guess the company started suffering in the last quarter of 2020. There were a lot of regulations and limitations, so the people were not really visiting the stores which were renting my properties. When COVID-19 regulations were loosed in Russia in the end of 2020 and in the beginning of 2021, consumer demand has grown, and the customer´s ability to pay has stabilised. I guess that happened not only to my company, but to the whole market in general.

Author: *You currently possess several properties, have all of them already paid off? Do you mind sharing the initial cost of investment or ROI?*

Oleg: Yes, all of the properties have been acquired by my company in 2010 – 2012. According to the financial statements, the average pay-off period of leased property is 6 years in my case. Of course, we are talking about profitable periods of time with no COVID or hard political situations. So yes, all of the properties have paid off several years ago and all the income now is the entire profit of my company. However, I would not like to share the initial cost of investments.

Author: *Have you ever dealt with Bitcoin and Etherium investments before?*

Oleg: Yes. I am trading stocks for almost 15 years now and I was also interested in crypto, but did not have time to dig deeper, to be honest. So I am not a complete beginner in this topic.

Author: *Do you think it will be profitable for your business? Why?*

Oleg: Yes, why not? As a trader I would definitely say that investments or fast speculations can bring a lot of money, I just need to investigate on the topic and understand the point.

Author: *Have you ever heard of "mining"?*

Oleg: Yes, I was even thinking of buying a mining machine in 2021. But then I saw the charts of Etherium and Bitcoin, which are the basis for the price of the machines, and saw the potential of a price drop, so I decided not to buy the machines now. And of course they have fallen in price three times, so that was a wise decision.

Author: *Were there any ideas about obtaining a specific mining machine?*

Oleg: Yes, I was thinking of Antminer S19 XP 140^{th} . A good one.

Author: *Are there any specific reasons you want to try mining?*

Oleg: Low electricity rates in Russia – they are currently at are 8 roubles / KWh. This ensures high profitability. Also there are low income taxes in Russia – only 13% (compared to Europe). Besides, the machine does all the work – you are not involved in the process at all, you just collect money. Easy and profitable. Moreover, I also have one empty property right now, which is not generating income for me. There is electricity inside, and no problem to place the machine. If you find mining an appropriate investment, then I will be definitely able to consider it afterwards because I have space and resources for it.

Author: *Have you already researched on the legislation regarding mining?*

Oleg: Not really, but I do not think there is specific legislation towards mining. This topic is really new to Russia, and we do not even have a proper legislation for crypto itself. It will take some time to create those laws. But it is totally legal.

Author: *Have you ever heard of Smart contracts, P2P transactions and other blockchain opportunities?*

Oleg: I have heard about P2P, but I have no idea how to use it on a business scale. If you will investigate that in your thesis, it would be great and interesting.

Appendix 2: List of potential investments for the commissioning party.

1. Bitcoin short-term investment.
    - Point-of-entry: $24 813 USD
    - Point-of-exit: $31 183 USD. The trend can continue its direction upwards; a new updated technical analysis should be conducted later, when the price reaches the first target.
    - Profit in case of investment of 100 000 USD: 25 672 USD
    - Profit in case of investment (%): 25.7
2. Etherium short-term investment.
    - Point-of-entry: $1 795 USD
    - Point-of-exit: $2 327.2 USD and $2 868.1 USD, with a high likelihood of reaching at least $2 199 USD.
    - Profit in case of investment of 100 000 USD: 29 649 USD
    - Profit in case of investment (%): 29.6
3. Bitcoin mining.
    - The price of 1 mining machine: 338 545 ₽, which equals 4,380.77 US Dollars.
    - Income per 1 machine: 11,64 $ per day
    - Electricity costs: 6.5 $ per day
    - Final profit: 5.14 $ a day, 154.26 $ a month and a 1,851.07 $ per year.
    - Pay-off period: 2.4 years

- Point-of-loss: if Bitcoin price reaches 13 000 US Dollars, the earnings per day will be twice lower, resulting in 5.82 US Dollars. Electricity costs are considered to stay the same.

4. Smart contracts and P2P.

    - Utilize smart contracts as the substitution of paper contracts.
    - Integrate smart contracts in the P2P lending platform
    - Integrate e-wallets
    - Perform cryptocurrency international payments
    - Integrate BaaS as record keeping, documentation traceability, execution of business contracts and data monitoring tools.

      The detailed explanation of those bullet points can be found in Chapter 4.

Appendix 3: Descriptive statistics of variables.

Statistics

		Age	Gender	Education	Investments	Bitcoin_Profitability	Etherium_Profitability
N	Valid	261	255	261	261	261	261
	Missing	0	6	0	0	0	0
Mean		2,2759	1,4863	2,1609	2,7165	1,6552	1,6475
Median		2,0000	1,0000	2,0000	3,0000	1,0000	1,0000
Mode		2,00	1,00	2,00	4,00	1,00	1,00

Table 2. General Descriptive Statistics Table (n = 261)

Investments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Investing in Bitcoin	56	21,5	21,5	21,5
	Investing in Etherium	46	17,6	17,6	39,1
	Investing in both Bitcoin and Etherium	75	28,7	28,7	67,8
	Not investing	84	32,2	32,2	100,0
	Total	261	100,0	100,0	

Table 3. Descriptive Statistics for Variable Investments (n = 261)

Bitcoin_Profitability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Consider Bitcoin investments profitable	146	55,9	55,9	55,9
	Not sure	59	22,6	22,6	78,5
	Consider Bitcoin investments not profitable	56	21,5	21,5	100,0
	Total	261	100,0	100,0	

Table 4. Descriptive Statistics for Variable Profitability of Bitcoin (n = 261)

Etherium_Profitability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Consider Etherium investments profitable	137	52,5	52,5	52,5
	Not sure	79	30,3	30,3	82,8
	Consider Etherium investments not profitable	45	17,2	17,2	100,0
	Total	261	100,0	100,0	

Table 5. Descriptive Statistics for Variable Profitability of Etherium (n = 261)

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	69	26,4	26,4	26,4
	26-35	84	32,2	32,2	58,6
	36-45	75	28,7	28,7	87,4
	46+	33	12,6	12,6	100,0
	Total	261	100,0	100,0	

Table 6. Descriptive Statistics for Variable Age (n = 261)

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High school	44	16,9	16,9	16,9
	Bachelor´s Degree	131	50,2	50,2	67,0
	Master´s Degree	86	33,0	33,0	100,0
	Total	261	100,0	100,0	

Table 7. Descriptive Statistics for Variable Education (n = 261)

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	132	50,6	51,8	51,8
	Male	122	46,7	47,8	99,6
	Do not want to answer	1	,4	,4	100,0
	Total	255	97,7	100,0	
Missing	-1,00	6	2,3		
Total		261	100,0		

Table 8. Descriptive Statistics for Variable Gender (n = 261)

Appendix 4: Crosstables for variables under study

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Investments * Etherium_Profitability	261	100,0%	0	0,0%	261	100,0%
Investments * Bitcoin_Profitability	261	100,0%	0	0,0%	261	100,0%

Table 9. Case Processing Summary (n = 261)

Investments * Bitcoin_Profitability

Crosstab

			Bitcoin_Profitability			
			Consider Bitcoin investments profitable	Not sure	Consider Bitcoin investments not profitable	Total
Investments	Investing in Bitcoin	Count	52	3	1	56
		Expected Count	31,3	12,7	12,0	56,0
	Investing in Etherium	Count	9	23	14	46
		Expected Count	25,7	10,4	9,9	46,0
	Investing in both Bitcoin and Etherium	Count	68	6	1	75
		Expected Count	42,0	17,0	16,1	75,0
	Not investing	Count	17	27	40	84
		Expected Count	47,0	19,0	18,0	84,0
Total		Count	146	59	56	261
		Expected Count	146,0	59,0	56,0	261,0

Table 10. Crosstable for Variables Investments and Bitcoin Profitability (n = 261)

Investments * Etherium_Profitability

Crosstab

			Etherium_Profitability			
			Consider Etherium investments profitable	Not sure	Consider Etherium investments not profitable	Total
Investments	Investing in Bitcoin	Count	10	36	10	56
		Expected Count	29,4	17,0	9,7	56,0
	Investing in Etherium	Count	45	1	0	46
		Expected Count	24,1	13,9	7,9	46,0
	Investing in both Bitcoin and Etherium	Count	70	4	1	75
		Expected Count	39,4	22,7	12,9	75,0
	Not investing	Count	12	38	34	84
		Expected Count	44,1	25,4	14,5	84,0
Total		Count	137	79	45	261
		Expected Count	137,0	79,0	45,0	261,0

Table 11. Crosstable for Variables Investments and Etherium Profitability (n = 261)

Age * Investments

Crosstab

			Investments				
			Investing in Bitcoin	Investing in Etherium	Investing in both Bitcoin and Etherium	Not investing	Total
Age	18-25	Count	14	10	24	21	69
		Expected Count	14,8	12,2	19,8	22,2	69,0
	26-35	Count	23	11	21	29	84
		Expected Count	18,0	14,8	24,1	27,0	84,0
	36-45	Count	12	20	21	22	75
		Expected Count	16,1	13,2	21,6	24,1	75,0
	46+	Count	7	5	9	12	33
		Expected Count	7,1	5,8	9,5	10,6	33,0
Total		Count	56	46	75	84	261
		Expected Count	56,0	46,0	75,0	84,0	261,0

Table 12. Crosstable for Variables Investments and Age (n = 261)

Education * Investments

Crosstab

			Investments				
			Investing in Bitcoin	Investing in Etherium	Investing in both Bitcoin and Etherium	Not investing	Total
Education	High school	Count	12	6	10	16	44
		Expected Count	9,4	7,8	12,6	14,2	44,0
	Bachelor´s Degree	Count	29	27	37	38	131
		Expected Count	28,1	23,1	37,6	42,2	131,0
	Master´s Degree	Count	15	13	28	30	86
		Expected Count	18,5	15,2	24,7	27,7	86,0
Total		Count	56	46	75	84	261
		Expected Count	56,0	46,0	75,0	84,0	261,0

Table 13. Crosstable for Variables Investments and Education (n = 261)

Appendix 5: Preconditions for the chi-squared test.

Variables/preconditions	Categorical variables	Independent observations	Sample size
Investments	Yes, "investments" is a nominal variable, which is a type of categorical variables. **Fulfils the precondition.**	Simple random sampling method was utilised, observations were independent. **Fulfils the precondition.**	n = 261. None of the cells in a chi-square test have an expected count less than 5, and the minimum expected count in all crosstables varies between 5.82 and 9.87 (Appendix 6 and 7), indicating that the preconditions for the chi-square test are met. **Fulfils the precondition.**
Profitability	Yes, "profitability" is a nominal variable, which is a type of categorical variables. **Fulfils the precondition.**	Simple random sampling method was utilised, observations were independent. **Fulfils the precondition.**	n = 261. None of the cells in a chi-square test have an expected count less than 5, and the minimum expected count in all crosstables varies between 5.82 and 9.87 (Appendix 6 and 7), indicating that the preconditions for the chi-square test are met. **Fulfils the precondition.**

Table 14. Preconditions for the Chi-squared Test (n = 261)

Appendix 6: Table for Chi-Square Test: Investments in Bitcoin.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	145,712[a]	6	<,001
Likelihood Ratio	162,369	6	<,001
Linear-by-Linear Association	40,766	1	<,001
N of Valid Cases	261		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,87.

Table 15. Chi-Square Test: Investments in Bitcoin (n = 261)

IBM SPSS version used: 27.

Appendix 7: Table for Chi-Square Test: Investments in Etherium.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	178,285[a]	6	<,001
Likelihood Ratio	203,041	6	<,001
Linear-by-Linear Association	8,739	1	,003
N of Valid Cases	261		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 7,93.

Table 16. Chi-Square Test: Investments in Etherium (n = 261)

IBM SPSS version used: 27.

Appendix 8: Table for Chi-Square Test: Education and Investments.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4,580[a]	6	,599
Likelihood Ratio	4,608	6	,595
Linear-by-Linear Association	1,056	1	,304
N of Valid Cases	261		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 7,75.

Table 17. Chi-square Test: Education and Investments (n = 261)

IBM SPSS version used: 27.

Appendix 9: Table for Chi-Square Test: Age and Investments.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9,317[a]	9	,409
Likelihood Ratio	8,917	9	,445
Linear-by-Linear Association	,006	1	,938
N of Valid Cases	261		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 5,82.

Table 18. Chi-squared Test: Age and Investments (n = 261)

IBM SPSS version used: 27.