

2021

UNIVERSITY OF PRIMORSKA  
FACULTY OF MANAGEMENT

BACHELOR THESIS

BACHELOR THESIS

VIKTORIJA TRAJANOVA

VIKTORIJA TRAJANOVA

KOPER, 2021

UNIVERSITY OF PRIMORSKA  
FACULTY OF MANAGEMENT

Bachelor thesis

INCORPORATION OF CRYPTOCURRENCY IN  
FINANCIAL MARKETS

Viktorija Trajanova

Koper, 2021

Mentor: prof. dr. Stefan Bojnec

## **SUMMARY**

This bachelor thesis describes the meaning of cryptocurrencies and its significance. The paper gives an overview of the types of cryptocurrencies available on the market, the difference between sovereign money and cryptocurrencies, and how to trade with them in North Macedonia. Additionally, the thesis consists parts where it is clearly described the Blockchain and Bitcoin as first and most popular cryptocurrency. At the second part, we made a primary quantitative research with questionnaire where we gathered data from different respondents. The collected results were analyzed and presented in graphs with additional description.

*Key words:* Cryptocurrency, money, Bitcoin, Blockchain, North Macedonia.

## **POVZETEK**

Diplomska naloga opisuje pomen kriptovalut in njene različne vrste. Prispevek daje pregled vrst kriptovalut, ki so na voljo na trgu, razlike med državnim denarjem in kriptovalutami ter kako z njimi trgovati v Severni Makedoniji. Prikazana in opisana sta Blockchain in Bitcoin kot prva in najbolj priljubljena kriptovaluta. V drugem delu smo izvedli primarno kvantitativno raziskavo z uporabo anketnega vprašalnika, kjer smo zbrali podatke različnih anketirancev. S pomočjo izvedene ankete zbrane podatke smo analizirali in predstavili grafično z dodatnim opisom.

*Ključne besede:* Kriptovalute, denar, Bitcoin, Blockchain, Severna Makedonija.

UDC: 336.74:004(497.7)(043.2)



## CONTENT

<b>1. Introduction</b> .....	1
1.1 Definition of the problem and theoretical propositions .....	1
1.2 Goals and purpose of the thesis .....	1
1.3 Methods for achieving the goals .....	2
1.4 Assumptions and limitations .....	2
<b>2. What are cryptocurrencies and why do they exist?</b> .....	4
2.1 Advantages of cryptocurrencies .....	4
2.2 Disadvantages of cryptocurrencies .....	6
<b>3. How do cryptocurrencies work?</b> .....	7
3.1 Blockchain .....	7
3.1.1 What is Monero? .....	8
3.1.2 Different brands .....	9
3.1.3 Monero market .....	9
3.1.4 Oscillation values .....	9
3.2 Difference between cryptocurrencies and sovereign money .....	9
<b>4. Types of cryptocurrencies</b> .....	11
4.1 Bitcoin .....	11
4.1.1 How Bitcoin works .....	12
4.1.2 Exchange Bitcoin for other currencies .....	13
4.2 Other types of Cryptocurrencies .....	14
4.2.1 Ethereum .....	14
4.2.2 IOTA .....	15
<b>5. Trading with cryptocurrencies in North Macedonia</b> .....	19
<b>6. Regulations of cryptocurrencies</b> .....	20
6.1 Prohibition and regulation .....	20
6.2 Prohibition on the use of cryptocurrencies in Republic of North Macedonia .....	21
6.3 Regulation of the cryptocurrencies in the EU .....	21
6.4 Regulations of cryptocurrencies in Serbia .....	21
6.5 Cryptocurrency regulations in China .....	22
<b>7. Cryptocurrency performance during Covid-19</b> .....	24

**8. Research methods** ..... 27

    8.1 Research questions ..... 27

    8.2 Hypotheses ..... 27

    8.3 Research results ..... 28

    8.4 SWOT analysis derived from survey results ..... 31

        8.4.1 Strengths ..... 32

        8.4.2 Weaknesses ..... 32

        8.4.3 Opportunities ..... 33

        8.4.4 Threats ..... 33

**9. Conclusion** ..... 34

**Reference list** ..... 36

**Annex** ..... 41

## **FIGURES**

Figure 1: Plots of Bitcoin price data before and during COVID-19 pandemic.....	25
Figure 2: Familiarity of respondents with the concept of cryptocurrencies .....	28
Figure 3: Respondents opinions on the long term profitability of investing in cryptocurrencies .....	29
Figure 4: Can ordinary money be replaced with cryptocurrencies?.....	30

## **TABLES**

Table 1: Current price and circulating supply of Bitcoin, Ethereum and IOTA.....	17
Table 2: SWOT analysis derived from survey results.....	31

## ABBREVIATIONS

AML	Anti-Money Laundering Directive
BTC	Bitcoin
DLT	Distributed Ledger Technology
ETH	Ethereum
EVM	Ethereum Virtual Machine
MIT	Massachusetts Institute of Technology
NBRNM	National Bank of the Republic of North Macedonia
NBR	National Bank of the Republic of Serbia
PBOC	People's Bank of China
XMR	Monero

## **1. INTRODUCTION**

This Bachelor thesis is composed of two parts, the first part is secondary data from different source while, the second part is primary data gathered from quantitative research. Main point of discussion is cryptocurrency and its significance and importance.

### **1.1 Definition of the problem and theoretical propositions**

Thinking back at the time, when this type of currency firstly appeared on the market, nobody thought that they will develop to such an extent. Some financial experts think that one day in near future cryptocurrencies will completely replace the sovereign money. It is hard and almost impossible to predict if some digital currency will fall or rise because these currencies are not owned by anyone.

Cryptocurrencies have become one of the most interesting and profitable ways in investing money and have enabled people to make quick and easy money. Cryptocurrencies are developing fast, but in some countries (mostly poorly developed ones), it is not yet able to trade with them.

The main problem has been that a very few persons understand what Bitcoin or cryptocurrency is, its importance and the way it can be used. We can admit that nowadays it is very popular in some more developed countries such as the United States, Germany, France, and Japan, but it is not so popular in North Macedonia.

The first bitcoin appeared in 2008 and after thirteen years it is still unknown term and untrusted source for investing. Though in some countries it is very popular, here in North Macedonia it is still not a legal means of payment.

The cryptocurrency market is constantly evolving and new virtual currencies are emerging every day. Also, big problem of cryptocurrency is high volatility, i.e., uncontrolled price movement. Because virtual currencies are decentralized and unmanaged, the price depends on the supply and demand itself, and therefore there can be large oscillations in very short deadlines.

### **1.2 Goals and purpose of the thesis**

The entire cryptocurrency exchange is currently quite developed and at the same time unstable. There is a lot of interest among potential investors. The whole blockchain technology is evolving and there is a new cryptocurrency almost every day.

The cryptocurrencies are in purgatory. We will aim to explain which cryptocurrency will likely fail, and which will more likely succeed. In addition, we will try to better explain how population in North Macedonia understands the terms cryptocurrency and Bitcoin and how interested are they in investing.

Goals:

Goal 1: To better understand how cryptocurrencies work.

Goal 2: To explore the uses and various types of cryptocurrencies available in the market.

Goal 3: To identify and explain the benefits and flaws of cryptocurrencies.

Goal 4: To understand the importance and the role of cryptocurrencies in the field of investment and financing together with an overview of international regulations about them.

### **1.3 Methods for achieving the goals**

This bachelor thesis is consisted of two parts. First part or theoretical part is made up with secondary data. From these sources we gathered data for the current situation of cryptocurrencies, its significance and importance, different types of cryptocurrencies etc.

In that group of secondary data sources, we used: research papers, web pages, documents from web sites, forums, laws and regulations, books.

In the second part or empirical part, we used quantitative method of research. To gather data, we used survey with fourteen questions and our respondents were mostly people that have knowledge about cryptocurrencies, people who already invested or are planning to invest in cryptocurrencies, all that carried out on the territory of North Macedonia.

Both parts together will be the basis for further analysis.

### **1.4 Assumptions and limitations**

We choose interesting, but at the same time challenging topic. Main limitation in this bachelor thesis is that we had hard time searching for trustworthy data.

First and probably the biggest limitation was searching and finding people that know anything about the term cryptocurrencies. The number of people who know the significance and how they work is small, especially on the territory of North Macedonia. At the beginning, we tried to make

an interview, but when we considered that the number of people who have actual knowledge in cryptocurrencies and Bitcoin, we changed it with survey which gave to us a clear picture.

When we talk about data limitations, there are numerous numbers of books available for buying online from Amazon but, there is no delivery from Amazon in North Macedonia. So, we bought only a few books available online and only two of them were translated in Macedonian language. In addition, there is also lack of previous research studies, there is small number of relevant research studies that are compatible with the chosen topic.

Lastly, one of the limitations is also the COVID-19 pandemic. There were many obstacles the in observation how cryptocurrencies are thriving. Because of this situation some of the cryptocurrencies changed their price so many times.

## **2. WHAT ARE CRYPTOCURRENCIES AND WHY DO THEY EXIST?**

It is hard to establish one exact definition for cryptocurrencies. Different people have different definitions, but we can say that cryptocurrencies are widely known worldwide. In the last decade, they became an interesting invention that hit the traditional financial market and banking system. However, the cryptocurrencies are developing very fast and its days of glory are yet to come.

We will consider as a starting point the year 2008, when the global economic crisis started and the entire banking system was on the brink of collapse. The governments were the ones rescuing the banks, and the price was paid by the taxpayers, who were almost dependent on the entire banking system. Let's paint a picture: Imagine the bank as a human which owns your saved money and when you decide to take out the money from the bank, they tell you that they can return only part of the money because the other part has been spent. This happens because the banks work with part of our invested money, so in case of a system error, if we want to withdraw our money from a bank, they will not allow us to take the entire amount because the part of the money is currently on the market (Lazev 2018).

What happens to the fiat currencies that include Denar, Dollar, Euro and how safe is the investment? The value of these currencies depends on the policy of the state or the government. Inflation can occur, i.e. if you have six hundred denars with which you can buy ten euros, in case of inflation those six hundred denars will be worth one euro or in case of deflation they will be worth one hundred euros, depending on the political strategy of one state. So, the only thing whose value was not under government or banking influence, is gold. At that point cryptocurrencies have occurred. At the height of the financial crisis an anonymous person appears under the pseudonym Satoshi Nakamoto and presents the masterpiece called Blockchain or Bitcoin, the first decentralized cryptocurrency, a currency neither a bank or a government can influence (Lazev 2018).

The main problem has been that a very few persons understand what Bitcoin is, its importance and the way it can be used. We can admit that it is very popular in some more developed countries such as Japan, France, Germany, the United States but it is not so popular in North Macedonia.

### **2.1 Advantages of cryptocurrencies**

The advantage of cryptocurrencies has put in focus the advantages that this type of system has over the traditional banking system. The advantages that have emerged can be divided into two categories and there are economy and individual benefits.

“The economic advantages are:

- Reduced transaction costs.
- Faster transaction processing time.
- Non-refundable payment.
- Contribution to economic growth.
- Financial involvement outside the European union.” (European Banking Authority 2014, 18)

Virtual currencies can reduce transaction costs because it is out of process transactions expelled by a third party or intermediary. In the traditional system, the bank represents an intermediary that charges a percentage on each transaction performed. One of the main reasons for the reduced costs is also that there is no regulatory framework to guarantee security and coverage of transactions as is the case in the traditional system. Transactional fees also do not exist between different virtual currencies, nor between countries. The relatively short time to confirm and complete the transaction represents the next advantage of virtual currencies. The approval of virtual currency transactions is non-stop, compared to a traditional system in which no transactions are carried out on non-working days. Performance speed of the transaction is not tied to the geographical location, moreover the virtual currency is potentially global, and any modern device for communication with Internet access can execute transactions.

By using cryptocurrencies, traders avoid the return of transactions, especially those which are based on alleged non-performance of the contract. When it comes to fiat currencies, some traders have complained of many initiated consumer charges based on false claims that the product has not been delivered. As this presents an advantage to traders, on the other hand presents a negative side to customers because they are not protected from error or fraud caused by merchants.

Considering that miners appear in the process of creating blocks, their activity has sparked the development of specialized mining hardware and commercial mining services such as mining pools and security hard drivers has increased. Business opportunities also appear on the trading platforms needed to conduct the trade between virtual and fiat currencies. The focus has been on the I/t sector, although if progress would be made it could be felt in the financial sector as well.

In certain regions where the financial network is not well developed so users have high risk, regions where residents do not have the opportunity to replace the national currency for other foreign exchange funds or there are administrative problems. The virtual currency scheme provides the ability for individuals to achieve a desired goal, which is access to trade and performance transactions.

Individual advantages are:

- Security of personal data.
- Limited interference by public authorities (European Banking Authority 2014).

Users who use virtual currencies do not leave any data that can be used for possibly identity theft or printing fake credit cards or owning credit cards at all.

Given that this is a decentralized system in which there is no central institution that records and has access to transactions. Although this is an advantage due to the anonymity of the occasion transaction, it is also a big problem in financing criminal activities.

## **2.2 Disadvantages of cryptocurrencies**

The above listed advantages must be weighed against the disadvantages and even the risks to the users of the cryptocurrencies, whether they act as consumers or as owners of virtual currency. Because there are currently no safeguards for virtual currency users, they are exposed to all risks. The European Banking Authority has identified approximately 70 risks that may be associated with growth of the cryptocurrencies (Kapsis 2020).

Some of the fundamental risks are:

- Lack of transparency.
- Absence or ambiguity of the legal system.
- Lack of continuity and potential illiquidity.
- Network dependence.
- Anonymity (pseudo anonymity).
- High volatility.
- Financing of criminal activities.

Even the basic rules of operation of virtual currencies can be difficult to understand for some users. Most of the time, especially for small cryptocurrencies, the information available is strongly limited. When it comes to decentralized virtual currencies, we cannot certainly determine who should provide the necessary information to users at all. "Currently, even if there is a legal status for virtual currencies, the key participants are not regulated or supervised". (Central Bank 2015, 21) Users are exposed to organize fraud, robberies, or bankruptcies of virtual currencies. When cryptocurrencies are used as a payment method of goods and services, users are not protected by any law that would ensure their refund. Such transactions ultimately always represent a loss for the user (Kapsis 2020).

### **3. HOW DO CRYPTOCURRENCIES WORK?**

The whole technology on which Bitcoin is based is called Blockchain. The more detailed principle of operation how cryptocurrencies work is the following:

Let's say you live in a city of two thousand people, where each of them pays one Bitcoin for each transaction made. The postman of the city brings you a book full of two thousand transactions made by your neighbors, including you, and it is your job to verify that each transaction is valid. Once you have checked all the transactions you will be rewarded with fifty Bitcoins. In case you want to do the same thing faster, you have the option to call one or more neighbors to help you and share the profits evenly. After you finish checking, if you have your transaction, you write it in the book, you pay one Bitcoin for it, and you send the book to your neighbor for checking. After a few years, the population of the city increases to five thousand, which means that the next book that the postman will bring you will contain five thousand transactions, and you will be rewarded with twenty-five Bitcoins for the same work. The population of the city continues to increase on the same scale, and the reward decreases, and finally the last Bitcoin is earned.

Because the city continues to function, transactions are made between residents again, but now the percentage of transactions made by residents has increased to ten Bitcoins. So, if the investors want to keep doing the same thing, they will be rewarded with a certain amount of Bitcoin, enough to motivate them to keep working. This is how the whole process of earning Bitcoin works, only in the real world the work will be done by the computers instead of real people (in this case citizens of small city).

#### **3.1 Blockchain**

Industry involves innovations with upcoming digital technologies, and blockchain is one of them. Blockchain can be incorporated to improve security, privacy, and data transparency both for small and large enterprises. Blockchain is a technology that has gained much recognition and can enhance the manufacturing and supply chain environment (Javaid et al. 2021).

Blockchain is a distributed ledger technology which aids decentralized, distributed computing in a trustless environment. The attention gained by blockchain is primarily due to its most popular application i.e., Bitcoin which effectively seeks to conduct financial transactions in a peer-to-peer model without the support of conventional banking system (Nasir et al. 2022, 137).

“Researchers have classified the Blockchain into three types:

- Public Blockchain: it allows anyone to create, modify, and validate the blocks, and every node can participate in the consensus process. Every user having similar resources possesses equal authority in creating a new node. It is also known as Permissionless or Public Permissionless blockchain.
- Private Blockchain: it allows only a set of certified users in the network to make, modify, and create transactions inside the ledger. Only a limited number of users can be allowed in the consensus and new block generation. It is also referred to as Permissioned or Private Permissioned Blockchain.
- Hybrid blockchain: This type of Blockchain is a mixture of public and private Blockchain that makes a balance between these two and offers attributes of both. It allows each user to participate in the consensus mechanism but allows only certain users to create a new node explicitly designed. It is also considered a Public Permissioned Blockchain.“ (Alam et al. 2021)

One of the critical standards of blockchain innovation is to give customers real security. Unexpectedly, Bitcoin relied on a decentralized cryptocurrency to show itself to a wider crowd, assuming it required virtual money in a time free of government obstruction. Tragically, along the way, Bitcoin is volatile with several vulnerabilities including a non-quantitative and volatile blockchain.

All exchanges and addresses are made up of blockchains, making it easy for anyone to interface videos and discover clients’ private subtleties dependent on their current records. Some administrative and non-governmental organizations are now using blockchain review to review bitcoin. Because of these blemishes, engineers are looking for blockchain electoral breakthroughs with better security and speed. One of these activities is Monero, generally developed by XMR Exhaust.

### ***3.1.1 What is Monero?***

Monero is a protection-based cryptocurrency project that expects to provide better security than other blockchain biological systems. This innovation transmits data to the shield client through wrapped addresses and shading tags.

The secret address alludes to the creation of a solo exchange site. No location can be stuck in an exchange. The coins went to a completely unique location, which makes a whole cycle gloomy to the outside viewer (Velinov 2019).

### ***3.1.2 Different brands***

Shading marks, again, are intended to consolidate account keys with public keys, to form a “ring” of different marks accordingly. This means that the excitation specialist cannot associate the tag with a particular record. Unlike cryptography (a numerical method for obtaining crypto projects), there are no new children on the shading block. Its standards were examined in a 2001 document by Weizmann Establishment and MIT.

Cryptography has certainly won the hearts of many blockchain designers and blockbusters, but it is still a start-up gadget with a modest bunch of jobs. Since Monero is already using innovations to test shading, she set herself apart as a real task (Voozon 2021).

### ***3.1.3 Monero market***

Monero’s market resembles another cryptocurrency. With an exceptional chance to get, at that point Kraken, Poloniex and Touch Phoenix are just a few trades. Poloniex initially accepted this, lagging Bath Phoenix, the last specialist.

An outstanding aspect of XMR is that anyone can participate in mining as an individual or by joining a mining pool. Any computer with fundamentally better handling power can have Monroe blocks with a few hiccups (Voozon 2021).

### ***3.1.4 Oscillation values***

Although it has a solid organization for cryptocurrencies, it is not so unique in terms of unpredictability. Truth to be told, all altcoins are extremely volatile. This should not be a problem for a thriving trader as the factor makes them productive to buy anyway. The moment costs drop and they sell.

Due to its ability to offer reliable protection, XMR has been accepted by many people so that its coins can be easily traded with different monetary standards (Velinov 2019).

## **3.2 Difference between cryptocurrencies and sovereign money**

When we are trying to explain some differences between these two common types of financial funds, we are reflexively thinking of their physical form. However, there are many other differences that are not physically visible.

“Sovereign currencies are issued by central banks which, in fact, have a monopoly on the process of their creation and take care of maintaining their value. Sovereign currencies have three key characteristics that can be considered as “money”:

- they are a medium of exchange (i.e., a means of payment) at least in the country where they are issued,
- they are a unit of calculation (a measure of value expression),
- serve as a custodian of the value of economic agents (i.e., can be kept for savings).” (NBRNM 2017b)

“Unlike sovereign currencies, cryptocurrencies are not money because they do not have the three key features of money. Only in some countries can be used as a means of payment, i.e., to have the function of an exchange medium, but to a limited extent but it is not the subject of payment and exchange in North Macedonia. According to NBRM, cryptocurrencies do not meet the other two characteristics of sovereign currencies, they are not a unit of account (for example, there are no economic agents who use cryptocurrencies as a unit of account in compiling their financial statements) and are not a custodian of value (i.e., the market price of cryptocurrencies expressed in a sovereign currency depends on the supply and demand of exchange platforms and shows high volatility in a short period of time).” (NBRNM 2017a)

## **4. TYPES OF CRYPTOCURRENCIES**

Cryptocurrency is the most widely adopted blockchain technology. Numerous competing currencies such as Dogecoin or Litecoin emerged after the enormous success of Bitcoin and adopted similar data model. Ethereum is a cryptocurrency different from Bitcoin due to its account-base model opposed to transaction-based model of Bitcoin. Apart from asset management and cryptocurrency, several ledgers support smart contracts or user defined computations. Furthermore, Ethereum have numerous applications ranging from complex investment funds to crowdfunding campaign (Bhushan et al. 2020).

### **4.1 Bitcoin**

Recently, one of the most famous digital network currencies, based on the so-called peer-to-peer electronic cash system, is called Bitcoin (bit as a unit for information). Bitcoin is based on the open-source protocol and is distributed via peer-to-peer (P2P) networks. This currency is not owned by any bank in the world. Bitcoin was invented by the Japanese Satoshi Nakamoto, in 2009. At the beginning, the Bitcoins were preferred by the anarchists, the fighters for the broad privacy rights, liberals and all those which do not have a positive attitude towards central banks or banks in general. Great fans of such non-institutional money became Americans who were disappointed with the financial system that could not have prevented the financial crisis in 2008 (Stojanoska 2013, 20).

The states, but also the bankers are not the happiest due to the existence of bitcoin, especially because it is a way to avoid payments on taxes, because the money is transferred “from hand to hand” without any intermediary, thus the banks remain without commission, interest, etc.

Because of these reasons China has banned the use of virtual currencies since 2009. It should be borne in mind that BTC is an experimental new currency that is in active development. Despite that it becomes much less experimental as its use grows and nowadays is one of the oldest cryptocurrencies, it should be given that, however, Bitcoin is an invention that explores ideas that have never been tried and tested. Therefore, its future cannot be predicted by anyone.

It is important to remember that this is reworking of the social systems of organization that have so far failed. Outdated hierarchical systems from the 18th century are being replaced by flat networking-based architectures - whatever it was a network like the Internet or any application running it, or Bitcoin itself. Currency is not only the first application. When you have a network that can offer you neutral trust, you can build countless applications on it, without having to ask

for anyone's permission. Bitcoin is much more than a currency. When we say that Bitcoin is the "Internet of Money" we do not mean the word "money", but the "Internet" (Antonopoulos 2016, 3).

#### ***4.1.1 How Bitcoin works***

There are four ways to collect:

- mining,
- exchange,
- provision of goods and services,
- direct online purchases (Ogunbadewa 2013, 7).

Marinceva (2017) wrote that Bitcoin users launch a P2P user program on their computer and in that way communicate with other similar programs that other users start on their computers. In that way a "lottery" is created: the software on the computer of every peer-to-peer client launches a mathematical algorithm, trying to generate numbers less than the constantly changing target numbers. Every ten minutes a user manages to be rewarded with a sum of virtual money. This virtual money is stored in the bitcoin wallet, installed on the user's computer. Because of the way who helps to come to such virtual money, it resembles the former search for gold, passionate bitcoin "seekers" are also called "miner", and the process is called "mining".

Bitcoin can be used for payment different needs on the internet. The "miners" pay by sending bitcoin money to the P2P address of the recipient, and it is an array of alphanumeric encrypted characters. It is impossible to dispose of other people's bitcoins and spend the same money more than once because security cryptographic techniques are used.

It is important to be known that the address of owners of bitcoin does not contain any information about the owner of the money, but it is a record with a length of 33-34 characters which consists of letters and numbers (for example: 1AUwPZ6SVkgOriou56Wi7tLM124igTtE9Ej). The user of bitcoin can have multiple addresses which means creating a new pair of keys for encryption (Marinceva 2017).

Mining is the process of enabling a bitcoin network to use computer resources in a substitute for the ability to earn bitcoin. The more computing power the user offers, that is more likely to succeed in getting bitcoin. The term 'mining' is taken from the activity that is performed by persons to collect minerals or precious metals.

All the miners in the network are trying to solve the same problem at the same time. When one miner manages to solve a problem and finds a new blockchain block, he is rewarded with a certain amount of bitcoin because it helped the system. "The number of bitcoins created in this way has

been adjusted as a predetermined schedule in which the prize is halved each time an additional 210 000 blocks.” (Kroll, Darvey and Felten 2013, 4)

The first block was mined in early 2009, called Block 0, also known as Block stop. Since then, the reward for each new mined block has been 50 bitcoins if the miners did not mine an additional 210 000 blocks. After that, the prize for the next block was 25 bitcoins. With each subsequent block, the problem to be solved becomes more difficult. The mid-range computers were able to solve the default problem in 2009, while now specialized mining equipment is needed to be able to solve the problem first. Since it takes ten minutes to get a new block, the reward for mining is halved every four years.

A much easier option on how to get bitcoin is a bitcoin exchange. The process is simple and is not much different from changing money in the real world. In order to make an exchange, it is necessary to open an account in an online exchange office, to pay a certain amount on its real currency, and ask the exchange office to pay bitcoin to your online wallet address, but with a certain fee prescription by the exchange office. According to the data from <https://coinmarketcap.com>, the exchange office that performs the largest percentage of transactions is Binance. The current 24h transaction volume is 967,547,362\$, which is a percentage of 9,31% of the total transaction volume (Coin Market Cap 2021).

#### ***4.1.2 Exchange Bitcoin for other currencies***

Bitcoin has value only because people voluntarily accepted this as a way of payment for “real” products and/or services. However, they can be exchanged for real conventional currencies. Gavin Anderson, leading developer of the bitcoin project, says that “the idea of money to create and control everyone instead of the central bank’s elites seem to become very popular all over the world”. He explains that he never met the “original” bitcoin developer or knows anything about him, because Satoshi Nakamoto has not been active in this bitcoin story since 2010. New “miners” are winning bitcoin every day, given the fact that the whole story is grounded in anonymity, it is simply not known how many “miners” exist now.

Currently, users of bitcoin P2P process data according to a rate showing participation of more than 50,000 PCs graphic processors. The virtual money is created through precise protocols by which they are rewarded participating in improvement and maintenance on the network. Otherwise, anyone planning to join in the story to get rich by “mining” will discover that the system is designed to become even more difficult with the involvement of an increasing number of people in it.

Namely, everything is designed in such a way that the generated “task” is more difficult, the more it grows the number of P2P networks. However, despite that more and more users are joining, bitcoin continues to “print” every ten minutes. But, to get involved in the system you need a collar processing power of the computer, which would mean significant expenses for paying bills for electricity, but also costs for the purchase of powerful computers (Stojanoska 2013, 21).

## **4.2 Other types of Cryptocurrencies**

Besides the most famous and most known cryptocurrency Bitcoin, there are many other cryptocurrencies. The experts think that there will be many more soon. The first-generation cryptocurrencies are presented by Bitcoin while, the second is Ethereum and the third generation is IOTA.

### **4.2.1 Ethereum**

Ethereum is an open blockchain platform that allows everyone to build and use decentralized applications running on blockchain technology. Just as in the case of bitcoin, no one controls or owns Ethereum, but unlike the bitcoin protocol, Ethereum is designed to be customizable and flexible (Burger 2018).

“Ethereum is a decentralized virtual machine that runs programs called user-requested contracts.” (Atzei et al. 2017) So Ethereum is a user-programmable blockchain. Instead of giving users a predefined set of operations (which is the case with bitcoin) (Patel et al. 2020). “Ethereum allows users to create their own operations of any complexity. In this way, Ethereum serves as a platform for many different types of decentralized based applications on the blockchain, including but not limited to cryptocurrencies.” (Burger 2018) In the heart of Ethereum there is an Ethereum virtual machine (“EVM”), and “EVM” programs are written in bit code which works on a simple stack machine (Patel et al. 2020).

“Developers don’t usually write EVM code. Instead of that, they can be programmed in a JavaScript-like language called Solidity.” (Bhargavan et al. 2016, 3) “A virtual is an emulation of a computer system by another computer system. Virtual machines can be created using hardware, software, or both. In the case of Ethereum, it is both.” (Dannen 2017, 48)

Smart contracts were first introduced on this platform, since then they have attracted a lot of attention and usability. When once a contract is made it gets its address, and each contract contains a certain amount of virtual money (Ethera). The virtual money used by Ethereum is called Ether, and it is important because represents the main internal crypto fuel of Ethereum and it is used to

pay transaction fees. Therefore, users who want to create a smart contract must set the conditions they want to meet, and in return they offer a certain amount of money. “The contract consists of two parts: a private warehouse and a quantity of virtual money which it contains. There are conditions in the private warehouse that need to be met.” (Luu et al. 2016)

“Smart contracts can be divided into five categories, which describe their intended purpose application domain.

- Financial.
- Recorded.
- Games (games of luck and skill).
- Wallet (key handling, sending transactions, money management).
- Library (these contracts implement general purpose operations).” (Brenner et al. 2017, 7-8)

Ethereum, like all blockchain technologies, uses an incentive model that maintains security. Miners group transactions that users send into blocks and try to add them to the blockchain to collect fees. Solving the puzzle is also called proof of work here. Once one miner manages to solve the puzzle, the other miners discard their attempts and update their copy of the blockchain. A miner who successfully solves a puzzle is rewarded with a transaction fee in a new block, as well as a new Ether (Atzei et al. 2017, 5).

Unlike bitcoin, in which only the first miner receives compensation, with Ethereum there is also the possibility that more miners receive compensation. Just like bitcoin, Ethereum has its drawbacks, especially when it comes to smart contracts. Due to the introduction of a programming language in the issue, there are possible ways to take advantage of system weaknesses to carry out an attack, that is, steal money from a contract.

Taking all the above into account. Ethereum represents a step forward compared to bitcoin and is a true leader in second generation virtual currencies by introducing its smart contract. The application of smart contracts is applicable to other areas such as law, credit companies or accounting and auditing (Dannen 2017, 48).

#### **4.2.2. IOTA**

“IOTA is a distributed book that aims to offer a solution to the problem of scalability and high fees that have affected blockchain technology.” (Tennant 2017, 1) IOTA represents the next generation of distributed books that uses a new invention at its core, called “Tangle”. IOTA is designed specifically for the IoT (Internet of Things) industry.

“IoT represents a network of physical devices, vehicles, household appliances and other items, which allows you to connect these things and exchange data.” (Liyanage et al. 2020) To be useful as a payment network, IoT must provide a method by which the transaction is considered safely confirmed, that is when it is accepted by public consensus. There are two approaches to achieving consensus in a loop (tangle), and these are currently implemented coordinator and distributed approach. The coordinator is the entity that controls IOTA’s foundation, which enters zero value transactions every two minutes, called milestones. Using milestone IOTA is currently safe against attacks, because it confirms transactions that were done in the last two minutes. Although IOTA announces that it will fully move to distributed access, it is not yet clear whether this will affect changes in security (Vermesan and Friess 2013, 197).

As for the distributed approach, Tangle’s main idea is this: for publishing transactions users must work on approving other transactions. Hence the users who issue transactions contribute to network security. Transactions receive a certain level of confirmation of trust, and this level is an indicator of acceptance of the transaction in the system. And in IOTA there is a transaction of origin, which is confirmed directly or indirectly by all other transactions. If there is no direct confirmation path between the two transactions, and exists at least twice over the other transactions, then those two transactions are indirectly confirmed. “Genesis is described as the following (Popov 2017, 2).

At the beginning of Tangle, there was an address with a status that contained all the tokens. The Genesis transaction sent all these tokens to several other addresses of the founders.” (Popov 2017, 2)

It is necessary to emphasize that all the tokens were created in the process of creation, so in the future there will not be a single additional token. The cost of the transaction, unlike blockchain technology, is zero in tangle. The existence of a transaction cost in a blockchain is caused by the need for miners to use electricity and expensive equipment to validate transactions. The IOTA foundation is already expanding its business, so collaborations have been signed with Volkswagen, which has confirmed expectations that the car protocol will be ready and available for users early in 2019. Proof of Concept suggests that Tangle should be installed in Volkswagen vehicles. Cooperation has also been signed with the capital Taiwan, Taipei. Cooperation has been agreed, which includes the creation of a “Digital Citizen Card” project (Nikkilesh 2018).

This system should protect users from identity theft. The IOTA foundation has also introduced the public to a new project they have been working on since 2015, called the market data. This concept aims to enable a decentralized data market in order to open data silos that currently store data under the control of several entities. Data is one of the most important components in the machine economy and the connected worlds.

From all the above we can confirm that IOTA does not want to become another in a series of virtual currencies, but their goal is to connect data and information from around the world to their platform, so that they can be traded. It is also necessary to emphasize that this data would be available directly from user to user, without the need to involve a third party that would conduct the trade. This way of connecting could be a turning point in the way of data usage, especially if we consider that tangle can be implemented in each device that can connect to the Internet of Things as previously explained. Summarizing all, one should be careful in making hasty conclusions because this technology is currently in its beginnings, so there is a lot of uncertainty around the whole issue.

**Table 1: Current price and circulating supply of Bitcoin, Ethereum and IOTA**

Name	Price	Market Cap	Volume (24h)	Circulating supply
Bitcoin	\$45,845.45	\$861,515,604,541	\$32,529,635,824	18,788,293 BTC
Ethereum	\$3,147.85	\$368,482,000,865	\$22,863,274,324	117,134,131 ETH
IOTA	\$1.11	\$3,188,297,261	\$76,703,445	2,779,530,283 IOTA

Source: Coin Market Cap 2021.

“\*Market Cap- The total market value of a cryptocurrency’s circulating supply. It is analogous to the free-float capitalization in the stock market.

Market Cap= Current price \* Circulating supply

\*Volume (24h)- A measure of how much of a cryptocurrency was traded in the last 24 hours

\*Circulating supply- “The number of coins that are circulating in the market and are in public hands. It is analogous to the floating share in the stock market.” (Coin Market Cap 2021)

From this table we can see that Bitcoin holds the first place as one of the most expensive cryptocurrencies at a price of enormous \$45,845.45 and we can see that in the last 24 hours on day 17<sup>th</sup> of August were traded \$32,529,635,824 of cryptocurrencies. The second in the table is Ethereum as a cryptocurrency with solid price from \$3,147.85 we can see that also the market cap and the volume are smaller than those on Bitcoin. But the number of Ethereum owners or circulating supply is visibly larger with number of 117,134,131 ETH.

Finally, the third-generation cryptocurrency IOTA. IOTA have affordable price of only \$1,11. We can see that the market cap and the volume are very different and are much smaller than the ones of Bitcoin and Ethereum. Because of its cheap price and it's not-so-great popularity IOTA has smaller circulating supply. The main reason for that is because IOTA is coming from the third generation of cryptocurrencies and doesn't have stable place on the crypto market or does not respect enough trust from buyers.

It is important to be mentioned that, the data in the table is changing every day because that is how cryptocurrency market works. The data is originally from the 17<sup>th</sup> of August, 2021, and we can say that it is changing every second, but we still don't know who and in which way controls them.

## **5. TRADING WITH CRYPTOCURRENCIES IN NORTH MACEDONIA**

Cryptocurrencies as a digital currency made a huge differentiation in the “world” of finances. Although they hit their great popularity, in some countries they are still not allowed. An example for country from that rank is North Macedonia.

The NBRNM came up with a statement where they repeatedly instructed the people to be careful about the offer coming through the electronic media for buying and trading digital (crypto) currencies. In order to increase the knowledge of trading and buying cryptocurrencies, NBRNM has organized a free online course for bitcoin and the way of trading with this digital currency.

According to NBRNM, digital currencies are gaining momentum worldwide and the interest for them is growing, driven by high returns, without having a clear picture of what exactly investments in cryptocurrencies mean and what are the risks they carry. Some digital currencies have elements of pyramid schemes, such as One Coin with several European countries issuing warnings or launching investigations into investing in One Coin. On the other hand, some cryptocurrencies, such as bitcoin are accepted and used in certain countries (NBRNM 2017a).

It is important to be mentioned that crypto-funds are not a legal means of payment in North Macedonia, i.e., it is not allowed to pay with crypto-funds. According to the existing regulations, payments can be made in the domestic currency – Denar. On the other hand, non-cash payments in the country are made in denars through a transaction account of the participants in the payment operations in the country (NBRM 2021).

According to the NBRNM they cannot issue digital (crypto) currencies. Traditionally, sovereign currencies issued by central banks are issued as banknotes and coins. But with the general development of technology and the application of the so-called “distributed bills technology” in central banking. Some central banks already have active projects to determine the need to issue sovereign currencies in digital form, known as central bank digital currency. For example, the European Central Bank is currently conducting a survey and analysis to determine the potential benefits and risks of issuing a digital euro, on this basis of which it will decide on its (non) issuance (NBRNM 2021).

## **6. REGULATIONS OF CRYPTOCURRENCIES**

The rapid growth of the value of cryptocurrencies has brought many risks. Among other things, cryptocurrencies are used for other not so legal things, for example: criminals are using cryptocurrencies for paying their criminal activity and for making transactions on the black-market. Furthermore, because cryptocurrencies are from international and decentralized nature, combined with the lack of proper regulation, makes it impossible to monitor transactions from the point of view of tax institutions. As a direct consequence, tax evasion of capital gains through cryptocurrency trading is a common practice. Furthermore, the use of cryptocurrencies is used for money laundering and terrorist financing (Ilievski, Perkusic and Jozipovic 2017a).

For these reasons, countries around the world have griped appropriate actions, and their perspectives have differed considerably. While countries such as Republic of Croatia, opted for legalization and taxation of cryptocurrencies, other countries including ours, undertook activities to ban the trading and possession of cryptocurrencies.

There are numerous European countries that made legal regulations of blockchain technology. According to Aleksandar Matanovic, France and Portugal are countries that have a correct attitude towards that area, but here is also Estonia. Estonia is trying to be the center of Europe through regulations in the sense of trying to motivate companies dealing with cryptocurrencies and blockchain to register there and to work from there. They do it through a licensing system that is cheap and simple. Outside Europe, Japan is one of the first countries to adopt regulations in that area (Komarcevic 2020).

### **6.1 Prohibition and regulation**

Banning and restricting the use of cryptocurrencies, i.e., innovative technologies, is not a new concept. The ban gives a clear warning about the possible risk of cryptocurrencies and thus actually reduces the obligations of the country to defend every citizen when they decide to enter transactions as consumers in this area. However, with banning cryptocurrency trading, states are giving up on potential tax revenues and excluding themselves from overall development in this area. In addition, this set of legal frameworks indirectly encourages illegal activities and limits the possibility of cooperation with financial service providers, in terms of preventing illegal activities, preventing money laundering and terrorist financing (Jozipovic 2020).

## **6.2 Prohibition on the use of cryptocurrencies in Republic of North Macedonia**

North Macedonia is country in development and it is one of the many countries that still have problems with accepting the financial innovation called “cryptocurrency”. For that reason, Macedonians do not have legal rights to own cryptocurrencies or to invest in them. For every step taken in that field, the government will condemn as an illegal and it will have consequences or sanctions.

On the other hand, it is well known that cryptocurrencies are widely used as a subject for money laundering and financial assets at the black-market and terrorists but, these two reasons can be sanctioned and subject to law. In some countries cryptocurrencies are already using for buying goods and services, investing in them and trading with them. In North Macedonia it is still not legally regulated and it is strongly prohibited. The main reason for that is because Tax Regulative in North Macedonia cannot track the income that investors or consumers are receiving from cryptocurrencies. That means money gained from investing is subject to taxation. From this we can conclude that North Macedonia is ready for legalization of this decentralized currency, the basic legal framework for taxation of cryptocurrencies in North Macedonia already exists but it just needs to be worked out well (Ilievski, Perkusic and Jozipovic 2017b).

## **6.3 Regulation of the cryptocurrencies in the EU**

Unlike the Macedonian attitudes about cryptocurrencies, the EU recognized the importance of cryptocurrencies and how they are developing and decided to regulate this new means of financing. They understood that with regulating cryptocurrencies they will prevent illegal money transfers, especially those in the area of cross-border transactions (Ilievski, Perkusic and Jozipovic 2017a).

In order to prevent the illegal activities of cryptocurrency usage, EU decided to implement specific rules and regulations regarding cryptocurrencies. They developed new version of AMLD, with this directive digital wallets will have responsibility to ask potential users for identification before giving them access to services. That is going to be easier way for identifying users and at the same time to prevent the risk (Ilievski, Perkusic and Jozipovic 2017a).

However, this directive does not prohibit making transactions with usage of private wallets. In addition, some consider AMLD to be a major invasion of privacy and safety. This view since the concept of quasi-anonymity has been shaken by the reporting requirements of numerous intermediaries and service providers for the possession and trading of cryptocurrencies. Lastly, digital wallets are available to consumers in much the same way as opening a bank account (Ilievski, Perkusic and Jozipovic 2017a).

## **6.4 Regulations of cryptocurrencies in Serbia**

Since we provided an interesting data for cryptocurrency regulations in North Macedonia and countries from European Union, we searched for information about cryptocurrency law and regulations in country that is not in the European Union and have some similarities with North Macedonia. That is why we decided to choose Serbia as neighbor country of North Macedonia.

Serbia is among the first countries that decided to regulate the trade in cryptocurrencies. Although, the Law of cryptocurrency came into force in December 2020, in the meantime, NBRB passed a Decision on the implementation of provisions relating to the getting of licenses for the provision of services related to virtual currencies (Aydin 2021).

Bearing in mind the fact that their regulations do not recognize cryptocurrencies, it is difficult to identify money flows. There are several internet services that mediate in buying and selling cryptocurrencies, those services offer the purchase and sale of certain types of cryptocurrencies in exchange for Dinars with a commission of 5 to 6%, and the purchase service ends with forwarding to a digital wallet located on foreign servers. According to the above, virtual currencies in Serbia are not legal tender, and the purchase and sale of cryptocurrencies by banks and authorized exchange offices in Serbia is not allowed (Jovanic 2021).

In addition, business related to cryptocurrencies is currently regulated in Serbia only from the aspect of the application of the Law in Prevention of Money Laundering and Terrorist Financing, and it is under supervision of National Bank of Serbia (Komarcevic 2020).

## **6.5 Cryptocurrency regulations in China**

When cryptocurrencies started to develop on a higher level, China was the first country that decided to ban them and prohibited by law their trading. We can clearly say that China is a central focal point for any cryptocurrency business. The Chinese government has been particularly vocal and persistent in attempting to block all forms of cryptocurrency trading. In order to stop and block everything related to cryptocurrencies China has also blocked websites that provide access for buying cryptocurrencies and shut down payment services that accept cryptocurrency together with Bitcoin included. However, there are still some creative investors and traders that are searching for solutions to be an integral part in the global cryptocurrency marketplace, despite the attempts from the government to stop them (Paper Owl 2019).

In that rule, virtual currency included prepaid of cyber-games. By distinguishing bitcoin from centralized virtual currency, the more recent Notice expressed a regulatory intent that the use of Bitcoin would not be bound by those regulations (Yang 2016).

In 2016 People's Bank of China or "PBoC" announced that China would issue its own digital currency as soon as possible (Yongli 2016). Issuing cryptocurrencies is going to be from big help to the central bank, because it will reduce the risk of false money, it going to be easier to track money transfers, it will provide anonymity, privacy and safety to the individuals.

"However, China has the world's largest population of Internet users, with 298 million people online." (Xinhua 2009) Although is a highly developed country it still has problem with deciding while cryptocurrency will be banned or unbanned. The media called it a "Chinese drama" that is going on and off every day without potential solutions and end results. From some reasons nobody would say that something like this can be expected from China, because it is a country with great mass production and home of great minds and big manufacturer companies.

## **7. CRYPTOCURRENCY PERFORMANCE DURING COVID-19**

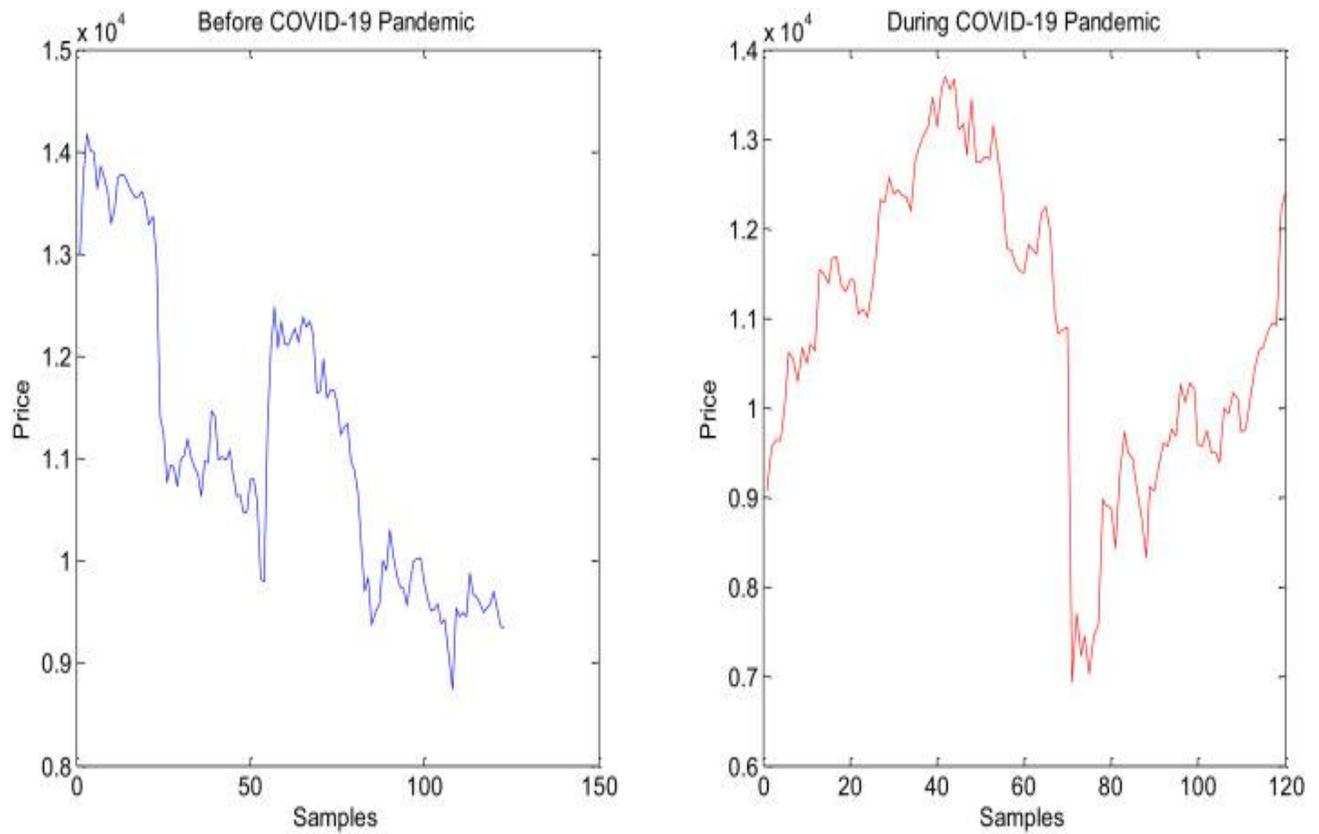
Previous one and a half year, the world civilization spent every day in fear for their lives. Every country was affected by pandemic called COVID-19, some of them less and some of them more.

That crisis did not affect only people and health care system but also the financial markets, which includes the cryptocurrency market. Because of that we are continuously comparing things before and after pandemic. The world and entire civilization started a new chapter and because of that we became witnesses of some great changes.

During the pandemic the prices of different cryptocurrencies could grow high to the ceiling and in the next few hours to fall very low. Some cryptocurrencies reached their glory but for others it was not that easy. From our point of view, during that crisis people were scared and they did not know if that is the right time for investing in cryptocurrencies, but on the other hand because most of the people were in lockdown, they used the time for learning something more about cryptocurrencies and how to invest in them.

From that reason, Lahmiri and Bekiros (2020) have made a research and their own calculation about the cryptocurrency stability before and during the pandemic start. Because the pandemic started in December 2019, they considered as a pre-pandemic spans September 2019 to December 2019 and the pandemic period from January 2020 to April 2020. In their research they gathered data from Yahoo finance comprised of 123 and 120 samples in the pre-pandemic and pandemic periods.

In order to provide better information and clear statistical data, they explored the evolution of the informational efficiency in 45 cryptocurrency markets and 16 international stock markets before and during COVID-19 pandemic. In total, they performed 36 statistical tests to check the differences between markets (Lahmiri and Bekiros 2020).



**Figure 1: Plots of Bitcoin price data before and during COVID-19 pandemic**

Source: Lahmiri and Bekiros 2020.

From the figure we can clearly see that in first sample from the pre-pandemic chart there are not many big oscillations, the price of Bitcoin increases and lowers at reasonable level. On the other hand, in the second sample during the pandemic, the price of Bitcoin is experiencing a so-called shock. At one point the price reaches its highest level, while after that it goes deep down.

“Additionally, in the season of Covid-19 pandemic, procurement of goods through online platforms generated an additional \$900 billion in the first quarter of 2021. In addition, the amount of money spent on digital commerce is expected to grow to \$11.6 trillion by the end of the year.” (Coin Market Cup 2021)

According to a new MasterCard study (Coin Market Cup 2021), the use of digital payment technologies, including mobile money, Bitcoin, and other cryptocurrencies, has increased, especially during the Covid-19 pandemic. Their survey found that about 84% of consumers now have access to digital payment alternatives, including QR codes, biometrics, digital currencies, etc.,

compared to what was available on the market a year ago. Also, it is expected that about 90% of customers will be able to use at least one “new payment method” by 2022.

Throughout the pandemic, with Covid-19, healthcare organizations and governments have put some restrictions such as curfew, restricted movements, wearing masks, closed malls, and catering facilities in preventing the spread of the virus. That is why consumers all over the world decided to shop online and on that way in parallel the number of e-payments increased during the time of quarantines and lockdowns. In this era of cryptocurrencies, customers don't need to wait in lines in the banks, to pay their bills, to buy some goods and services or to apply for credits or to apply for a new credit or debit card. People that were forced to live abroad used this method the most because they were trying to send money to their beloved family as soon as possible. However, banks failed to provide them with good-quality services, but cryptocurrencies and mobile money solutions won the battle and succeed (Coin Market Cup 2021).

## **8. RESEARCH METHODS**

Primary research of respondents' attitudes about the influence of cryptocurrencies and their future on a representative sample of (number) respondents. Collected data and research results are shown in graphs and further analyzed. A survey entitled "The impact of cryptocurrencies to traditional markets: Customer's perspective" for the purpose of writing this thesis was made via Google forms, and respondents were selected randomly. The data were collected by a questionnaire published on Macedonian Facebook group "Cryptocurrency and Bitcoin".

The goal of the survey itself was to gather respondents' views on the increasingly current topic of cryptocurrencies and to see how much they are popular among the respondents from different backgrounds, genders, age, and to see how familiar are they with the term cryptocurrency, what is the impact of the cryptocurrency on traditional ones, will they invest in some cryptocurrency or whether they already invested and what is their experience. Subjective opinions of the respondent were processed, analyzed, and described in more details in the next chapter of this paper. It is important to know that the questionnaire was completely anonymous.

Sample:

Simple random sample: 70 people from North Macedonia who already invested or are interested of investing in Cryptocurrencies

### **8.1 Research questions**

1. What are cryptocurrencies and how do they look?
2. How familiar are people with cryptocurrencies in North Macedonia and whether they would invest in them?
3. What is the difference between cryptocurrencies and sovereign currencies (money) and how many types of cryptocurrencies do exist?

### **8.2 Hypotheses**

Hypothesis 1: More than 60% of the population in North Macedonia are familiar with the term cryptocurrency and its significance.

Hypothesis 2: Over three quarters of the population find investing in cryptocurrencies as a long e-term payback.

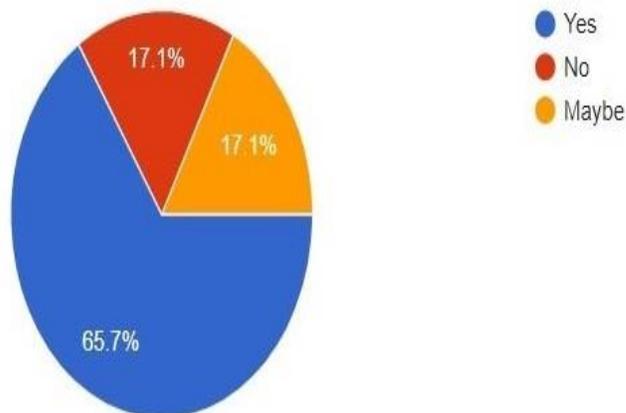
Hypothesis 3: Half of the population believe that ordinary currencies will be replaced by cryptocurrencies in the future.

### 8.3 Research results

#### Questionnaire analysis

Hypothesis 1: Population in North Macedonia are familiar with the term cryptocurrency and its significance.

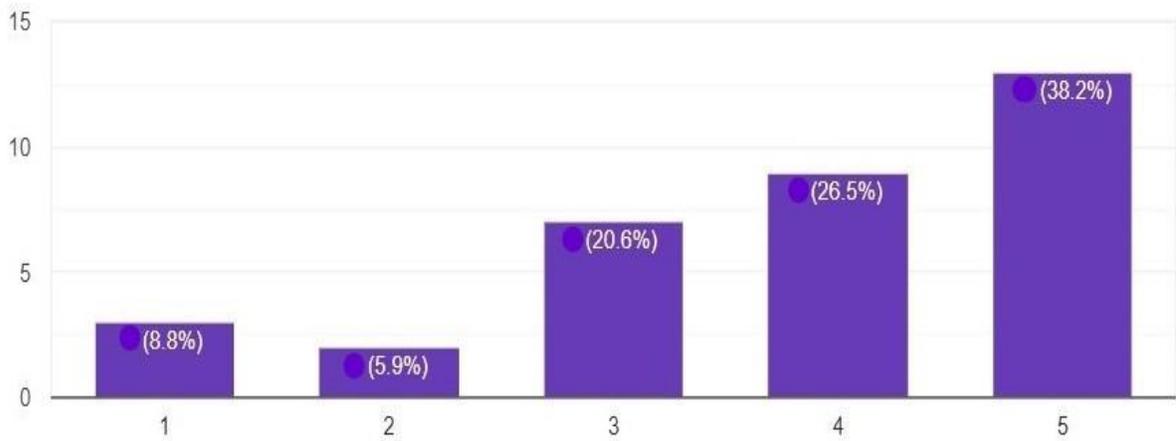
It was interesting to find out that more than 60% of the respondents in North Macedonia are familiar with the term cryptocurrency and its significance. Interesting because cryptocurrency is not so popular in North Macedonia as in the other European countries. On the other hand, this percentage is correlated with the age of the respondents, we think that younger people are more familiar than the older ones, which is proved with the similar percentage of 62.9%.



**Figure 2: Familiarity of respondents with the concept of cryptocurrencies**

Hypothesis 2: Over three quarters of the population find investing in cryptocurrencies as a long e-term payback.

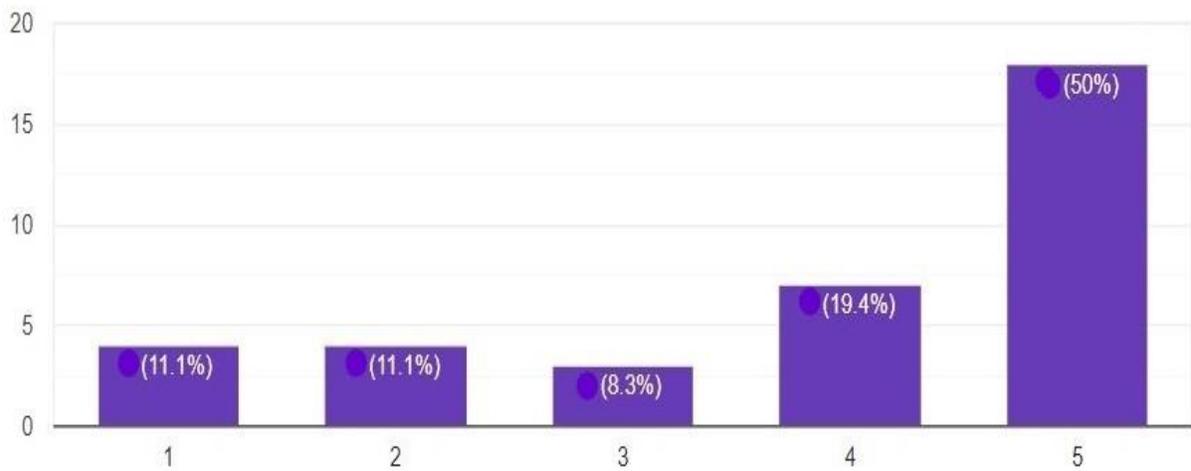
Investments in cryptocurrencies mostly within this survey are considered profitable in the long run. Only small number of 8.8% do not consider investing in cryptocurrencies to be profitable in the long run, while as many as 38.2% of them believe that investing in the cryptocurrency market is profitable in the long run. But, not to forget the data that 20.6% either believe or do not believe that cryptocurrency will be profitable in long term. With this statement we can say that our hypothesis is confirmed.



**Figure 3: Respondents opinions on the long-term profitability of investing in cryptocurrencies**

Hypothesis 3: Half of the population believe that ordinary currencies will be replaced by cryptocurrencies in the future.

Whether cryptocurrencies can replace money is one of the most frequent question today, on which many experts still do not have a concrete answer, or whether they deny such a development or confirm it without any arguments. With this questionnaire, half of the respondents confirmed that in the future the money will be either partially or completely replaced by cryptocurrencies. With that statement we can say that this hypothesis is confirmed.



**Figure 4: Can ordinary money be replaced with cryptocurrencies?**

## 8.4 SWOT analysis derived from survey results

In order to better understand how cryptocurrency is accepted from the citizens in Republic of North Macedonia, we made SWOT analysis. In this analysis we pointed out the strengths, weaknesses, opportunities, and threats, also in the analysis was used data from YouTube videos where Macedonian Bitcoin experts talk about their experience.

**Table 2: SWOT analysis derived from survey results**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>- New, interesting way of buying and paying for goods and services</li> <li>- Easier than the traditional banking system</li> <li>- Safe</li> <li>- Fast money transfer</li> <li>- No need to line up in the banks</li> <li>- Great security</li> <li>- Do not share personal data about the buyers</li> <li>- Challenging subject which attracts young people to invest</li> <li>- Not regulated by the government</li> </ul>	<ul style="list-style-type: none"> <li>- Not regulated by law in North Macedonia</li> <li>- Lack of knowledge</li> <li>- Small number of cryptocurrency owners</li> <li>- Special mining equipment</li> <li>- Long time needed for accepting this type of currency</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>- Reduced time</li> <li>- To simplify complexity of traditional financial markets</li> <li>- Biggest opportunity to earn money</li> <li>- To get a job in Crypto industry</li> <li>- The Covid-19 pandemic will increase Cryptocurrency users</li> <li>- Increased trust in potential investors</li> </ul>	<ul style="list-style-type: none"> <li>- Sanctions and penalties for trading with cryptocurrencies</li> <li>- Difficulties with understanding how it can be used</li> <li>- Insufficiently accepted by people</li> <li>- People are scared</li> <li>- Legal regulation barriers</li> </ul>

### **8.4.1 Strengths**

As we mentioned before the primary data for this thesis was collected by method of survey. From the table above we can concretely say that plus and minus sides are almost equal. The concept of traditional banking system is physical oriented, that means waiting in line in the banks and making it more complex with all documents needed. There are no physical stores for cryptocurrencies so, it is easier and faster for money transfer. Also, in this Covid-19 pandemic it is safer to use cryptocurrencies than the sovereign money or let's say to be part of the traditional banking system. The respondents of the survey think that the cryptocurrencies are new, innovative, and interesting way for paying and buying for goods and services. Because it is on some way new currency, it attracts more young people that know more about technology, instead of the older ones, but this can be case only in North Macedonia, in highly developed countries cryptocurrency buyers are also elder people.

One of the most questionable things about cryptocurrency is the security, but the respondents believe that they don't share personal data and it is highly secured and prevented from theft. Finally, we know that the traditional financial market and banking system is controlled by the government and its legislative, but it is not the case with cryptocurrencies. Together with all different things that are going on nowadays, it seems to be attractive for the respondents the independence of this currency.

### **8.4.2 Weaknesses**

We are going to begin with the first and most important threat: "Trading with cryptocurrencies is not regulated in North Macedonia". Because of that reason, people don't know how to trade or buy cryptocurrencies, but those who already invested in cryptocurrencies bought them from international sources and store them on wallets that cannot be tracked.

The number of cryptocurrency owners is clearly small in comparison with other countries where cryptocurrency law is implemented and they can buy goods and services with Bitcoins or other cryptocurrencies. The population in North Macedonia is in some way limited and not interested in new things which are quite popular in other countries. From that reason the time for accepting and getting used to new things such as cryptocurrency takes longer.

In addition, besides buying there is also mining of cryptocurrencies. From 50 respondents only two of them have equipment for mining cryptocurrencies, the reason for that is the expensive technology needed for mining.

### ***8.4.3 Opportunities***

Cryptocurrencies became such a thing because of the possibility to earn money from them. Macedonians have interesting mindsets and they are too interested when new way of earning money comes on the market. All of them will invest if there is certainty that they will earn money. The second thing is that this currency will open new job positions and will become an opportunity for influencers and bloggers to earn money by creating interesting and useful content. That content will help to increase the trust among potential investors, people will be knowledgeable and it will be easier to implement in their daily life and to replace their old habits.

The Covid-19 situation escalated many times in North Macedonia and because of that reason the government introduced quarantine. The rate of online purchase has increased enormously so, that can be a great opportunity for cryptocurrencies. They can be easily implemented on the market and can increase the number of potential users and buyers.

### ***8.4.4 Threats***

Every new thing that appears on the market is intimidating and untrustworthy. The reason why people are scared to invest is because they are not sure if they will earn or lose. Because of its complexity and wide range, there are difficulties in understanding how they work, so it will slow down the process of adaptation and implementation. Sanctions and penalties are the reason why people are scared for investing in these assets. Because the cryptocurrencies are becoming more popular every day, the government decided not so long ago, to increase the sanctions for investing or buying cryptocurrencies, it is considered as an illegal act.

## 9. CONCLUSION

We are witnessing some of the biggest innovations that are experiencing great changes and improvements every day. One of those innovations is cryptocurrency. Cryptocurrencies represent the digital display of values that does not contain the properties of money, so it is not money. To be honest, no one has ever expected such a way of earning or investing. The development of cryptocurrencies became a threat to the sovereign money that we now use every day and are a necessary means of subsistence. With that development of cryptocurrencies there is also a threat to the banks around the world. It is believed that soon cryptocurrencies will develop to the point that they will completely replace the work of banks and at the same time the government will not be able to control them.

There are many people who have already earned a lot by investing in cryptocurrencies, but there is an even greater number of people who do not accept cryptocurrencies and are not sure that they can profit from them.

Bitcoin is the first, well known and most purchased cryptocurrency, that is why when people hear cryptocurrency associates them with Bitcoin. According to several sources, there are three generations of cryptocurrencies, as we mentioned before Bitcoin is the first cryptocurrency and it represents the first generation of cryptocurrency. The second generation is Ethereum and the third is IOTA. However, cryptocurrencies do not end here, there are many types of cryptocurrencies and new ones are coming out every day.

The main reason why the process of accepting cryptocurrencies is so slow is that people doubt in its stability. The price of cryptocurrencies is rising and falling every day and there is no such factor that can control it, so no one can guarantee that if you invest in them you will earn.

In addition, cryptocurrencies are computer files that can be easily replicated just like other files such as a images or texts, but to prevent this it is needed special technology on which cryptocurrencies work. There is a progress in the technology for saving data in such a way that once saved, other users cannot change it or manipulate with them.

Generally known, cryptocurrencies do not have uniform regulation in the world, but each state separately has their own regulations. Therefore, there are large differences in regulation in different countries. The first and only country to legally regulate cryptocurrencies was Japan, and so it became a leader and heaven for development and trade.

Although cryptocurrencies are mentioned a lot in the media including website, TV, social media, and is developing fast, this type of technology and payment is still in its early beginnings. It will

take long time of testing to make this type of technology applicable in the overall financial system, and even in other systems.

Although the number of cryptocurrency users is growing, it is still small number compared to the number of credit card users and the use of USD, EUR and other money. Nevertheless, the Bitcoin system represents an exceptional conceptual and technical achievement. It can also be used by existing financial institutions. Also, there are no obstacles for even state governments to use this technology on their own.

There are different regulations in different countries all around the world. Highly developed countries have accepted the cryptocurrencies since the very first beginning and established specific regulations for them. On the other hand, poorly developed countries such as Macedonia and Serbia are still relying on traditional banking system and traditional financial markets.

To better understand how cryptocurrencies work, did consumers accepted them or do they know how to trade with them, we made a quantitative research. Through questionnaire survey we gathered data and graphically through hypotheses presented the results. Most of the respondents were aware of cryptocurrency's popularity nowadays, they accept the fact that one day the sovereign money will be completely replaced by the cryptocurrencies.

## REFERENCE LIST

- Alam, Shadab, Mohammed Shuaib, Wazir Zada Khan, Sahil Garg, Georges Kaddoum, M. Shamim Hossain and Yousaf Bin Zikria. 2021. *Blockchain-based Initiatives: Current state and challenges*. Computer Networks. <https://doi.org/10.1016/j.comnet.2021.108395> 27. 7. 2021.
- Antonopulos, A. M. 2016. *The internet of money*. 1<sup>st</sup> edition. CreateSpace Independent Publishing Platform in California, US.
- Atzei, Nicola, Massimo Bartoletti, Tiziana Cimolii. 2017. *A survey of attack on Ethereum Smart Contracts SoK*. <https://eprint.iacr.org/2016/1007.pdf> 06. 6. 2021.
- Aydin, Fatma. 2021. *Gurcan Partners: Cryptocurrency regulations in Serbia*. <https://gurcanpartners.com/en/cryptocurrency-regulations-in-serbia/> 17. 8. 2021.
- Bhargavan, Karthikeyan, Nikhil Swamy, Cedric Fournet, Natalia Kulatova and Antoine Delignat-lavaud. 2016. "Formal Verification of Smart Contract." *Proceedings of the 2016 ACM Workshop on Programming Languages and Analysis for Security* . <https://hal.inria.fr/hal-01400469/document> 19. 8. 2021.
- Bhushan, Bharat, Preeti Sinha, Martin K. Sagayam, and Andrew J. 2020. *Untangling blockchain technology: A survey on state of the art, security threats, privacy services, applications and future research directions*. Computers & Electrical Engineering. <https://doi.org/10.1016/j.compeleceng.2020.106897> 25. 6. 2021.
- Brenner, M., K. Rohloff, A. Miller, P. Y. A. Ryan, V. Teague, A. Bracciali, M. Sala, F. Pintore, M. Jakobsson. 2017. *Financial Cryptography and Data Security*. Malta: Springer Science and Business Media LLC.
- Burger, Thorsten. 2018. *Crypthor: What is Ethereum?* . <https://crypthor.net/what-is-ethereum/> 05. 8. 2021
- Coin Market Cap. 2021. *Coin Market Cap*. <https://coinmarketcap.com/> 16. 7. 2021.
- Coin, Idol. 2021. *MasterCard: There is Increased Use of Digital Payment Technologies During Covid-19 Pandemic*. <https://coindol.com/mastercard-digital-payment/> 30. 6. 2021.
- Central Bank. 2015. *European Central Bank Report: Possible cryptocurrency advantages and disadvantages*. European Central Bank.
- Dannen, Chris. 2017. *Introducing Ethereum and Solidity*. Brooklyn. [http://inblockchain.info/wp-content/uploads/2019/12/InBlockchain\\_info\\_SOL\\_training.pdf](http://inblockchain.info/wp-content/uploads/2019/12/InBlockchain_info_SOL_training.pdf) 16. 6. 2021.
- European Banking Authority. 2014. *Opinion on virtual currencies*. <https://www.eba.europa.eu/sites/default/documents/files/documents/10180/657547/81409b94-4222-45d7-ba3b-7deb5863ab57/EBA-Op-2014-08%20Opinion%20on%20Virtual%20Currencies.pdf?retry=1> 05. 7. 2021.

- Ilievski, Andrej, Marko Perkusic and Sime Jozipovic. 2017a. *Law and prevention of money laundering*. [Http://lawreview.pf.ukim.edu.mk/wp-content/uploads/2021/02/9.-Sime-J.-Marko-P.-Andrej-I\\_.pdf](http://lawreview.pf.ukim.edu.mk/wp-content/uploads/2021/02/9.-Sime-J.-Marko-P.-Andrej-I_.pdf) 25. 7. 2021.
- Ilievski, Andrej, Marko Perkusic, and Sime Jozipovic. 2017b. *Law review: CRYPTOCURRENCIES AS (I)LEGAL TENDER IN North Macedonia*. [Http://lawreview.pf.ukim.edu.mk/wp-content/uploads/2021/02/9.-Sime-J.-Marko-P.-Andrej-I\\_.pdf](http://lawreview.pf.ukim.edu.mk/wp-content/uploads/2021/02/9.-Sime-J.-Marko-P.-Andrej-I_.pdf) 25. 7. 2021.
- Javaid, Mohd, Abid Haleem, Ravi Pratap Singh, Shahbaz Khan and Rajiv Suman. 2021. *Blockchain technology applications for Industry 4.0: Aliterature-based review*. [Https://www.sciencedirect.com/science/article/pii/S2096720921000221?via%3Dihub](https://www.sciencedirect.com/science/article/pii/S2096720921000221?via%3Dihub) 24. 7. 2021.
- Jovanic, Tatjana. 2021. *Pravni fakultet: Cryptocurrencies as a new challege*. [Http://pravnofakultet.rs/wp-content/uploads/2021/06/20-Tatjana-Jovanic.pdf](http://pravnofakultet.rs/wp-content/uploads/2021/06/20-Tatjana-Jovanic.pdf) 22. 6. 2021.
- Jozipovic, Sime. 2020. *Prohibition and regulation of cryptocurrency*. Split: Faculty of Economics.
- Kapsis, Ilias. 2020. *Blockchain and cryptocurrencies:essential tools in a two-tier financial system*. *Capital Markets Law Journal* 15 (1): 18-47
- Komarcevic, Dusan. 2020. *Radio Slobodna Evropa: Serbia and the law of cryptocurrencies*. [Https://www.slobodnaevropa.org/a/srbija-kriptovalute-zakon/30777938.html](https://www.slobodnaevropa.org/a/srbija-kriptovalute-zakon/30777938.html) 22. 6. 2021.
- Kroll, J. A., I. C. Darvey and E. W. Felten. 2013. *The economics of bitcoin mining. Or bitcoin in the presence of adversaries*. Washington: Princeton University.
- Lahmiri, Salim and Stelios Bekiros. 2020. *The impact of COVID-19 pandemic upon stability and sequential irregularity of equity and cryptocurrency*. [Https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7517433/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7517433/) 05. 6. 2021.
- Lazev, Darko. 2018. *BankoMetar: Cryptocurrencies*. [Https://www.bankometar.mk/kriptovaluti/?fbclid=IwAR19KqCQH7VsBH0OqHg5ttNHbc268ufgW47GvoXIfp-aNMfJsTHpPyN9NCM](https://www.bankometar.mk/kriptovaluti/?fbclid=IwAR19KqCQH7VsBH0OqHg5ttNHbc268ufgW47GvoXIfp-aNMfJsTHpPyN9NCM) 17. 7. 2021.
- Liyanage, Madhusanka, An Braeken, Pardeep Kumar, and Mika Ylianttila. 2020. *Willey: IoT Security: Advances in Authentication*. [Https://www.wiley.com/en-us/IoT+Security%3A+Advances+in+Authentication-p-9781119527923](https://www.wiley.com/en-us/IoT+Security%3A+Advances+in+Authentication-p-9781119527923) 08. 8. 2021.
- Luu, Loi, Chu Duc-Hiep, Olickel Hrishi, Saxena Prateek and Hobor Aquinas. 2016. *Making Smart Contracts Smarter. CCS '16: Proceedings of the 2016 ACM SIGSAC Conference on Computer and Communications Security*. New York: Association for Computing Machinery. 254-269.

- Marinceva, Ekaterina. 2017. *DarikNews: What is Cryptocurrency and Bitcoin?*  
<https://dariknews.bg/novini/bylgariia/kakvo-e-kriptovaluta-bitkojn-i-kakvo-mozhem-da-si-kupim-s-tiah-2049377> 03. 8. 2021.
- Nasir, Muhammad Hassan, Junaid Arshad, Muhammad Mubashir Khan, Mahawish Fatima, Khaled Salah and Raja Jayaraman. 2021. *Scalable blockchains- A systematic review*.  
<https://doi.org/10.1016/j.future.2021.07.035> 22. 7. 2021.
- NBRM. 2021. *Do central banks issue digital currencies?* <https://www.nbrm.mk/ns-newsarticle-dali-centralnite-banki-izdavaat-digitalni-valuti-en.nspix> 05. 7. 2021.
- NBRNM. 2017a. *National Bank of the Republic of North Macedonia*.  
<http://lawreview.pf.ukim.edu.mk/> 28. 8. 2021.
- NBRNM. 2017b. *NBRM: What are the differences between cryptoassets and sovereign money?*  
<https://www.nbrm.mk/ns-newsarticle-koi-se-razlikite-megu-kripto-sredstvata-i-suverenite-valuti-pari-en.nspix> 28. 8. 2021.
- Nikkilesh, DE. 2018. *CoinDesk: City of Taipei confirms its testing Iota and Blockchain for id*.  
<https://www.coindesk.com/city-of-taipei-confirms-its-testing-iota-blockchain-for-id/>  
 07. 8. 2021.
- Ogunbadewa, A. A. 2013. *The 'Bitcoin' Virtual Currency: A safe haven for money Launderers?*  
 Cardiff, Wales: Cardiff Law school.
- Paper Owl. 2019. *People in China and the cryptocurrency ban*.  
[https://papersowl.com/examples/people-in-china-and-the-cryptocurrency-ban/?fbclid=IwAR03hKaFT\\_jWC8Oo9lYp8KZIDNzeTWdgJxq6ge\\_SVaa4qsR6ZTpDzy](https://papersowl.com/examples/people-in-china-and-the-cryptocurrency-ban/?fbclid=IwAR03hKaFT_jWC8Oo9lYp8KZIDNzeTWdgJxq6ge_SVaa4qsR6ZTpDzy)  
 13. 7. 2021.
- Patel, Dlinen, Sukumar Nandi, Deven Shan, Chirag N. Modi, Kamal Shah, Rajesh S. Bansonde. 2020. *IC-BCT 2019*. Springer Science and Business Media LLC. Mumbai.  
<https://dokumen.pub/ic-bct-2019-proceedings-of-the-international-conference-on-blockchain-technology-1st-ed-9789811545412-9789811545429.html> 25. 7. 2021.
- Popov, Serguei. 2017. *The Tangle*. 2.  
[https://assets.ctfassets.net/r1dr6vzfxhev/2t4uxvsIqk0EUau6g2sw0g/45eae33637ca92f85dd9f4a3a218e1ec/iota1\\_4\\_3.pdf](https://assets.ctfassets.net/r1dr6vzfxhev/2t4uxvsIqk0EUau6g2sw0g/45eae33637ca92f85dd9f4a3a218e1ec/iota1_4_3.pdf) 11. 7. 2021
- Stojanoska, Ankica. 2013. *Ekvilibrium*.  
[http://eccfp.edu.mk/files/biltens/ekvilibrium\\_oktomvri\\_1.pdf](http://eccfp.edu.mk/files/biltens/ekvilibrium_oktomvri_1.pdf) 28. 6. 2021.
- Tennant, L. 2017. *Improving the Anonymity of IOTA Cryptocurrency*.  
<https://www.semanticscholar.org/paper/Improving-the-Anonymity-of-the-IOTA-Cryptocurrency-Tennant/490d38d18dea9a61570ce4bc4cb8b1a3a7d527f2> 22. 7. 2021.

- Vermesan, O. and P. Friess. 2013. *Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems*. Aalborg: River Publisher.
- Velinov, A. 2019. *CryptoPoradnik: Monero- Information, Description, Data*.  
<https://www.kryptoporadnik.pl/mk/kryptowaluta-monero-informacje-dane-opis/> 24. 7. 2021.
- Voozon. 2021. *Voozon: Critical standards in Bitcoin and Blockchain technology*.  
<https://www.voozon.com/mk/critical-standards-in-bitcoin-blockchain-technology/>  
14. 7. 2021.
- Xinhua. 2009. *Ministry of commerce people's Republic of China: China bars use of virtual money for trading in real goods*.  
<http://english.mofcom.gov.cn/aarticle/newsrelease/commonnews/200906/20090606364208.html> 19. 8. 2021.
- Yang, Misha. 2016. *SSRN: Cryptocurrency in China: Light-Touch Regulation in Demand*. SSRN.  
[https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2792477](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2792477) 01. 8. 2021.
- Yongli, Wang. 2016. *Finance Sina: The Far-reaching Impact of the Introduction of Digital Currency by PBoC*. <http://finance.sina.com.cn/zl/bank/2016-01-22/zl-ifxnuvxc1587128.shtml> 24. 7. 2021



## **ANNEX**

Annex 1: Questionnaire survey



## **Questionnaire survey**

Questionnaire survey: Incorporation of Cryptocurrency in traditional financial markets:  
Consumer's perspective

In preparation for my Bachelor's degree thesis on Faculty of Management Koper, I prepared a questionnaire to conduct research on the attitudes of the respondents in the impact of cryptocurrencies on traditional financial markets.

This survey is completely anonymous and it will be used only for the preparation of diploma thesis.

1. Gender:

- Male
- Female
- Prefer not to say
- Other: \_\_\_\_\_

2. Age:

- Under 18
- 18 - 29
- 30 - 49
- 5

*Annex 1*

3. Status:

- Student
- Full-time employee
- Unemployed
- In retirement
- Other: \_\_\_\_\_

4. Degree of completed education:

- High school
- Bachelor's degree
- Master's degree
- PhD

5. Monthly income:

- Less than 500€
- 500€ - 1000€
- 1000€ - 2500€
- More than 2500€



6. Are you familiar with the term cryptocurrencies?

- Yes
- No
- Maybe

7. Do you find investing in cryptocurrencies a long e-term payback?

Not really    1        2        3        4        5        Doubtlessly

8. Investing in cryptocurrencies is a source of “easy and “quick earnings:

Disagree    1        2        3        4        5        Agree

9. Have you ever heard of Bitcoin or other cryptocurrencies?

- Yes
- No
- Maybe

10. Have you ever bought any of the cryptocurrencies?

- Yes
- No

11. Which cryptocurrency have you bought? (If you have not purchased cryptocurrency skip this question)

- Bitcoin
- Ethereum
- Dogecoin
- Stellar
- Ripple
- Polkadot
- Cardano
- Other: \_\_\_\_\_

12. How do you store your cryptocurrencies? (If you have not purchased cryptocurrencies skip this question)

- Desktop wallet
- Mobile wallet
- Hardware wallet
- Paper wallet

13. Do you think that one day ordinary currencies will be completely replaced by cryptocurrencies?

I don't think so   1   2   3   4   5   Yes, I think so

14. Do you consider yourself prepared to receive a paycheck in cryptocurrencies in future?

- Yes
- No
- Maybe