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Table of contents

Acknowledgement	3
List of figures	8
List of tables.....	8
Abbreviation register.....	9
1 Introduction.....	10
1.1 Aim of thesis	11
1.2 Research questions	11
1.3 Thesis composition.....	11
2 Cryptocurrency fundamentals	13
2.1 Definition of money	13
2.2 Definition of cryptocurrencies.....	15
2.2.1 Development	16
2.2.2 Cryptocurrency as a unit	17
2.2.3 Cryptocurrency as a technology.....	18
2.3 The most used cryptocurrencies and their features	20
2.3.1 Litecoin	21
2.3.2 Ripple	21
2.3.3 Blockchain	21
2.3.4 Exchange rate	23
2.4 E-Wallets	23
2.4.1 Online wallets	24
2.4.2 Offline wallets.....	24
3 Characteristics of cryptocurrencies	26
3.1 Positive factors	26
3.1.1 Adjustable supply.....	26
3.1.2 Decentralization	26
3.1.3 Mobile payments.....	27

3.1.4	Fast international transactions	27
3.1.5	Anonymity	28
3.1.6	Low to zero fees	28
3.1.7	No chargebacks.....	29
3.2	Negative factors	29
3.2.1	Security breaches.....	30
3.2.2	Volatility	30
3.2.3	Tax havens	31
3.2.4	Rising transaction fees.....	31
3.2.5	Government scrutiny (Slovak and Austrian regulations)	32
3.2.6	Processing time.....	33
3.2.7	Low acceptance in comparison to incumbent currencies	34
4	Cryptocurrency stakeholders	35
4.1	Consumer	35
4.1.1	Statistics.....	35
4.2	Business	36
4.2.1	Statistics.....	37
4.3	Banks	39
4.4	Exchanges	39
5	IT and currency acceptance models.....	40
5.1	Technology acceptance models.....	40
5.1.1	TRA: Theory of reasoned action	40
5.1.2	Theory of planned behavior.....	41
5.1.3	Technology acceptance model (TAM).....	41
5.1.4	TAM 2.....	42
5.1.5	UTAUT: Unified theory of acceptance and use of technology	44
5.1.6	IDT: Innovation Diffusion Theory.....	45
5.2	Currency acceptance models.....	46

5.2.1	Greenway's and Down's currency acceptance model	46
5.2.2	Extension of Greenway's and Down's model by Luther	46
5.2.3	Money as memory model by Kocherlakota and Wallace.....	48
6	Empirical framework	49
6.1	Thesis structure.....	49
6.2	Research purpose.....	50
6.3	Research approach.....	51
6.4	Research strategy.....	51
6.5	Research objective.....	53
6.6	Validity and reliability	55
6.7	Research questions and propositions.....	56
6.8	Sample and data collection processes	57
6.8.1	Austria.....	58
6.8.2	Slovakia.....	58
6.8.3	Respondent's profiles.....	58
7	Study findings	60
7.1	General perception of cryptocurrencies	60
7.2	Advantages from business point of view	61
7.2.1	Transactions and efficiency derived from decentralization	61
7.2.2	Advantages for e-Government	62
7.2.3	Use cases for cryptocurrencies.....	62
7.2.4	PR.....	64
7.3	International relevance	64
7.3.1	Differences between countries	65
7.4	Disadvantages.....	67
7.4.1	Bad PR	68
7.4.2	Rising costs and architecture of Bitcoin	68
7.4.3	Implementation	69
7.4.4	Volatility.....	70

7.4.5	Security	70
7.5	Banking sector	70
7.6	Blockchain	72
7.8	Analysis of academic models	73
7.8.1	Analysis of TRA and TPB	73
7.8.2	Analysis of TAM and TAM 2	74
7.8.3	Analysis of IDT	75
7.8.4	Analysis of UTAUT	76
7.8.5	Greenways's and Down's currency acceptance model	77
7.8.6	Extension of Greenway's model.....	79
7.8.7	Money as memory	80
8	Future of cryptocurrencies.....	81
8.1	Revisited model for adoption.....	82
8.1.1	Drivers towards usage	83
8.1.2	Moderating variables	84
8.1.3	Negative factors.....	85
8.1.4	Positive factors	85
8.2	Testing propositions	88
9	Discussions, limitations and further research	91
	Abstracts	95
	Abstract (English).....	95
	Abstract (Deutsch).....	96
	Bibliography	98
	Appendix	110
	Thesis mindmap.....	110
	Payment process	111
	Interview Questionnaire	112
	Curriculum Vitae	116

List of figures

Figure 1: How does Bitcoin work	20
Figure 2: Graphic chart representing all cryptocurrencies and their total trading volume	20
Figure 3: Blockchain.....	22
Figure 4: Market capitalization of main cryptocurrencies	23
Figure 5: Prototype and actual Mycelium card which is due to come in next months	25
Figure 6: Payment process	27
Figure 7: BitTag system in shop	37
Figure 8: Geographical density of businesses accepting Bitcoin.....	38
Figure 9: Worldwide geographical density of businesses accepting Bitcoin	38
Figure 10: TRA and TPB	41
Figure 11: Technology acceptance model	42
Figure 12: Technology acceptance model 2.....	43
Figure 13: UTAUT Model	44
Figure 14: User distribution	46
Figure 14: Guidelines for theory-oriented research	55
Figure 16: Revisited model: Use of cryptocurrency	87

List of tables

Table 1: Comparison Bitcoin vs. Litecoin	34
Table 2: Number of businesses accepting Bitcoin	37
Table 2: Own representation of main differences between research objectives	53
Table 3: Interview respondents	59

Abbreviation register

ACB- Austrian Central Bank

AT- Austria

BTC- Bitcoin

CJuE- Court of Justice of European Union

e.g. - for example

ECB- European Central Bank

EU- European Union

FED- Federal Reserve Bank

FMA- Financial Market Authority

GREXIT- Greek Exit from European Union

i.e . - that is

IDT- Innovation diffusion theory

IT- Information technology

IPO- Initial public offering

NBS- National Bank of Slovakia

NFC- Near field communication

NYSDFS- New York State Department of Financial Service

SVK- Slovakia

TAM- Technology acceptance model

TPB- Theory of planned behavior

TRA- Theory of reasoned action

US- United States

UTAUT- Unified theory of acceptance and use of technology

VAT- Value added tax

VC- Venture Capital

VAT- Value added tax

1 Introduction

In the end of year 2013, at time when Bitcoin bubble surged, a lot of people started to be attracted to alternative cryptocurrencies namely Bitcoin. Everybody wanted to jump in and cash in on its rising exchange rate.

Later on in 2014, the biggest Bitcoin exchange Mt. Gox suspended all trading and in February 2014 filed for bankruptcy. Company announced that around \$480 million in Bitcoins were missing. (Dougherty, Huang 2014) These events could discourage one from interest in alternative currencies, but on contrary this downfall pushed others into observation of cryptocurrencies even more. (Bitcoin is just one of more than 600 cryptocurrencies nowadays)

“What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party.” (Nakamoto 2008, p.1, Father of Bitcoin)

Nowadays, the most known cryptocurrency Bitcoin was invented by Satoshi Nakamoto in 2008. By the year 2013 when Bitcoin reached its peak at exchange rate 1 BTC = US\$1,313 (Lee, C. 2013), this cryptocurrency has attracted a massive attention. However since then, there is not sufficient literature covering all issues about this trend and whole adoption process stays unclear. Moreover, in the meantime the exchange rate descended to US\$221.6 (date 9.2.2015) and factors speaking against acceptance of cryptocurrencies aroused again. This is the reason why this thesis is going to provide a general overview of all cryptocurrencies with their stakeholders. Moreover, it will focus on factors affecting widespread acceptance in international business.

In the meantime Bitcoin has become a standard for cryptocurrencies. It has the biggest market capitalization and its price fluctuation affects also market prices of other alt coins¹. As the features of cryptocurrencies are very similar, Bitcoin will be used as main example, research object in this thesis.

¹ Alt coin = alternative cryptocurrencies derived from Bitcoin

1.1 Aim of thesis

The main goal of this master's thesis is to describe and explain main aspects of cryptocurrencies, transaction process, as well as to provide interesting future outlooks for all cryptocurrencies in regards to international business. The main emphasis will be put on Slovak and Austrian market. Outcomes and comments from qualitative interviews with experts from Slovakia and Austria will be compared with findings from academic literature and acceptance models.

1.2 Research questions

In order to predict future development of these revolutionary currencies, emphasis will be put on following research questions:

The main research question: **What are the main obstacles hampering acceptance of cryptocurrencies in international business?**

Sub-research questions:

- What are basic characteristics of stakeholders and what are their needs regarding cryptocurrencies?
- What is the added value for payee and payers in respect to international and domestic business?
- What are the solutions for overcoming negative aspects that are hampering widespread acceptance?
- Which conditions need to be fulfilled in respect to acceptance models in order to achieve widespread adoption?
- Should merchants accept cryptocurrencies as a form of payment?
- Which country specific factors can influence adoption of cryptocurrencies in business; is there a difference between Slovak and Austrian market?

1.3 Thesis composition

This thesis will be divided into 2 main parts:

First part will focus on theoretical facts about cryptocurrencies such as historical development, different stakeholders, transaction process and utility that are cryptocurrencies

providing to their users. Furthermore, this part will explain and describe currency and information technology acceptance models based on academic literature. Country specific data (e.g. no. of businesses, bank's willingness to accept cryptocurrencies, domestic regulations), describing possible differences between Slovak and German speaking markets, will be addressed as well.

Second part of this master's thesis will be dealing with empirical research. Firstly, the main research goal will be explained, followed by methodology that will be applied during exploratory interviews with experts. The last part will evaluate all outcomes resulting from conducted interviews and compare them with previously explained acceptance models and state conditions under which cryptocurrencies will be able to achieve widespread adoption. Finally revisited model, describing drivers towards use of cryptocurrencies will be sketched.

2 Cryptocurrency fundamentals

2.1 Definition of money

Before clarifying the term cryptocurrency, the term money needs to be explained. Money is a part of humankind already for centuries. It has evolved over ages, but until today money can be characterized as any record which is accepted as a form of payment in exchange for any good or service. (Smithin, J. 2002)

The main research question in this thesis, is focusing on cryptocurrencies and is trying to find answer, if they will become in some time equivalent to incumbent money. We will use functions of money to explain what cryptocurrencies are, and assess their extent how they fulfill them.

Main functions of money are:

- medium of exchange
- common measure of value/unit of account
- store of value (Jevons, W. S. 1885, p.6)

Medium of exchange

One of the oldest forms of trade was barter. However, inconveniences such as improbability of coincidence between person wanting and person possetting, complexity of exchanges and a need to divide items in trade, led to emergence of money. Thus, the main function of money is medium of exchange. (Jevons, W. S. 1885, p.6) Having money makes every person able to buy any item without the need to possess demanded item.

Common measure of value

As people used to exchange money for goods or services, after time they get accustomed to value of item in form of money. Thus, money becomes common standard measuring relative worth of goods and services.

Store of value

Money has to be able to retain its value over time. That means that person possessing certain amount of money at certain timeframe, will be able to buy for this amount also similar

amount of commodity at future date.

Any item fulfilling these descriptions can be considered as money. (Jevons, W. S. 1885, p.6 ff.)

2.1.1 Functions of money in respect to cryptocurrencies

In order to clarify what cryptocurrencies are, we will describe them according above stated functions.

Firstly, the cryptocurrencies are solving problem of “coincidence of wants” and therefore are solving the main issue of barter. When speaking about currencies as a medium of exchange, another characteristics have to be evaluated as well. These are perishability, substitutability and divisibility. Cryptocurrencies exist purely in digital form, thus they are non-perishable. Another aspect is substitutability, so one unit of cryptocurrency can be perceived as equivalent to its every other. If person acquired certain amount of money, this determines also the value that person gains. The factor divisibility is fulfilled as well, as cryptocurrencies can be denominated also in smaller units. Moreover, Court of Justice of the European Union perceives cryptocurrencies as standard currencies that are not subject to VAT Tax. (CJuE 2015)

Lastly, the condition of divisibility is also fulfilled since also smaller units of Bitcoins, or cryptocurrencies in general, can be traded. To conclude, cryptocurrencies fulfill the function of money as **medium of exchange**.

Second function of money, **common measure of value**, cannot be fulfilled sufficiently. The high volatility is the main obstacle hampering this condition. Because of this reason, users cannot perceive its value over longer time period. Because of volatile exchange rate, it is hard to predict how much of good one will it be able to obtain in perceivable time frame.

Last condition, **store of value** is also controversial, because of cryptocurrency’s price fluctuation. However, because of digital nature of cryptocurrencies, they can store its value over time and they do not perish. Probability of counterfeit is also almost zero because of cryptography used. To conclude, the last condition cannot be fully satisfied nowadays.

As seen in this short analysis, cryptocurrencies do not fully satisfy all traditional functions of money. However Krawisz (2015) argues, that if there will not be volatility in exchange rate,

there will not be also any community dealing with cryptocurrencies. Possible high speculative profits gained a lot of attraction from public audience. If this would not happen, no one will ever speak about cryptocurrencies as future money. He does not see these days, any other possibility for new currency to come alive on the market (without taking into account when currency is established by government). Krawisz (2015) furthermore concludes that "Bitcoin has the right properties for the world's money, and the more the world comes to terms with this, the more stable it will become."

2.2 Definition of cryptocurrencies

Previous chapter characterized cryptocurrencies from perspective of money functions. In spite of that all functions were not met, these days, there are many factors speaking in favor of cryptocurrencies.

Firstly, the technological development helped to decrease the processing cost for electronic transactions. This trend comes hand in hand with widespread increase of smartphone usage, making for everyone really easy to carry his or her electronic wallet (called also e-wallet) as own account in a pocket. Current trends are showing that when there is no trust in incumbent currency, people tend to stick to alternative currencies. Recent possible Greek exit from European Union, caused by its huge debt, clearly confirmed this development. (Kelly 2015) Bitcoin surged by at that times as much as 7%. These are exactly the reasons why also public audience should be informed about what cryptocurrencies are, and how they can improve our daily life.

Cryptocurrencies can be characterized as a subset of digital and alternative currencies. The first cryptocurrency Bitcoin was invented in 2009. Nowadays Bitcoin is the most know form of cryptocurrency, but since 2009 a lot of so called "alt-coins"² have emerged. As a form of money they act as a medium of exchange, but they rely solely on cryptography. In spite of young age of Bitcoin, the idea of digital currency is not new. Early in 1982, Chaum (1983) published his blueprint of electronic money as an automatic way to pay for goods and services. Other authors define cryptocurrency as follows:

"Cryptocurrencies are digital alternatives to traditional government-issued paper

² Different types of currencies relaying on cryptography. Sometimes just copies of Bitcoin.

monies.”(Omri 2013, p.3)

Omri (2013) is highlighting one of the most important features of cryptocurrencies and characterizes them as a subset of virtual money: *“Virtual currencies are online payment systems that may function as real currencies but are not issued or backed by central governments.”*

“From the point of view of market actors, Bitcoin can be interpreted as a decentralized clearing mechanism, based on a virtual unit. “ (Surda 2015, p.7)

2.2.1 Development

The first cryptocurrency, which gained public interest, was Bitcoin. However, not everybody knows that the history of cryptocurrencies is reaching in the early 1980s. This attempt is connected with inventor of many cryptographic protocols David Chaum. In 1982 he was credited as inventor of digital cash for his paper which was revealed in 1982. (1981, p.84 ff.) The original idea was that everybody can obtain digital cash, which can be afterwards spent untraceably. Later on, with his second famous paper, he introduced digital cash and also blind signatures. (Chaum 1983)

In the late 1980s, petrol station robberies were really common. This fact pushed owners of these stations towards idea of inventing a new-fangled smartcard which could not be stolen. These smartcards can be perceived as a first attempt of electronic cash. Further inventions went towards possibility to pay directly from bank accounts. This lately became known as POS or point-of-sale technology. All of these previously stated inventions were firstly released in Netherlands.

Later on the focus moved towards US, mainly because of the rich IPO of Netscape which produced a lot of VC interest and also first regulatory attempts on digital cash in Europe. A lot of startups were suddenly active in this field. The only known startup which became a world-known in payment sector was, and still is PayPal. PayPal allowed users person to person web transactions what gained firstly a huge success in eBay community. Currently, PayPal is a huge player in electronic payment business.

In 2000, Caribbean offshore company E-gold earned publicity because it allowed all of its owners to exchange gold for e-money and vice versa. This attracted a lot of internet traders who needed to send money internationally. Unfortunately, after terrorist attacks US

government started to perceive all offshore money companies using cryptography as possible tools for terroristic funding and raided all its US subsidiaries. Despite of negative perception of cryptocurrencies, US stayed to be their homeland. This is mainly because of their libertarian perception and positive start-up mood. (Griffith 2014)

In Europe the entry barriers for cryptocurrencies stayed still quite high. This is bringing us to 2008 when the first worldwide known and decentralized cryptocurrency emerged. Satoshi Nakamoto came with idea of peer-to-peer currency that can be transferred between parties without the need of supervising financial institution. Simply said, funds should be transferred straight away between parties cutting all middlemen. Until these days, the identity of Satoshi was not revealed. Speculations are saying that the name could be actually a collective pseudonym. In August 2008 the domain bitcoing.org is anonymously registered and later in January, the first transaction takes place.

In October 2009 New Liberty Standard published a Bitcoin exchange rate at US\$1 = 1,309.03 BTC. (Bitcoinwiki 2015) The quotation was established using equation which included cost of electricity needed to run computer mining Bitcoins. The record was set on November 17th 2013 at 1 BTC= US\$1216.73 on the Mt. Gox exchange. (Bitcointicker 2015)

Since 2008 more alternative currencies have emerged, but none is so known and used as Bitcoin. This is also the reason why Bitcoin is perceived as main representative of cryptocurrencies in this thesis.

2.2.2 Cryptocurrency as a unit

In academic and also professional literature, there are several terms used for cryptocurrencies. Terms such as virtual currency, digital currency or virtual money are the most common. Moreover, as Bitcoin has won worldwide recognition, it is naturally used as an equivalent. In this thesis all of this terms will be used as equivalent to cryptocurrency. When speaking about certain specific features of cryptocurrencies, Bitcoin will be used as a main representative.

Cryptocurrency is a type/subset of digital currencies and medium of exchange that is decentralized, meaning that there is no authority that will oversee its behavior and transaction process. Exchange rate is created by demand and supply. Supply is sophisticated preprogrammed preventing it from devaluation.

As already stated, the first world-recognized cryptocurrency is Bitcoin. Its father defines it as

a “*peer to peer version of electronic cash allowing online payments to be sent directly from one party to another without going through a financial institution.*” (Nakamoto, Satoshi. 2008, p.1) Main idea behind cryptocurrencies is to bypass financial institution, in order to make transactions cheaper and possible for everyone in the world. When there will not be any central institution processing payments, processing time would be much faster (nowadays just couple seconds in case of BTC). Cryptocurrencies are in general quoted in their own denotation. Bitcoin uses BTC, Ripple XRP and Litecoin LTC. In world of cryptocurrencies the whole system is maintained by community members called miners. These parties ensure that all transactions are added to ledger in certain time stamping order and can be reviewed by everyone. Private character of all payments is ensured by cryptography. This allows users to interact anonymously with each other.

2.2.3 Cryptocurrency as a technology

In this section the main emphasis will be put on the architecture hidden behind cryptocurrencies. The word cryptocurrency is already explaining itself what type of medium of exchange it is. Crypto stands for method used while payments are processed. Cryptography is used to secure and allow transactions being processed. Cryptocurrencies are usually decentralized and have public ledger. It means that everyone can overview all transactions being processed through the network. All transactions are pooled in chunks called blocks. Afterwards these blocks are ordered according timestamp, creating public ledger called blockchain. This description is just a brief start. We will dig little bit deeper.

The main idea behind cryptocurrency is cutting the middlemen. As Nakomoto (2008a) in his abstract states “A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution, saving transaction cost and avoiding double spending.” The underlying system for most current cryptocurrencies was created by inventor of Bitcoin: Satoshi Nakamoto, Because of this fact, we will use Bitcoin architecture as a role model for explanation of fundamentals behind cryptocurrencies. A standard transaction is performed as follows.

Transfer

As previously stated, the main idea is avoiding double spending and the need of trusted central authority (mostly banks). Party 1(payer) and receiving party 2 (payee) want to interact

with each other. Both parties have e-wallets installed in their devices. Wallets are files that allow access to multiple Bitcoin addresses which consist of letters and numbers. Community is reinforced to create for each new transaction a new address to improve security.

Payment

When party 2 wants to receive payment from party 1, party 2 creates address where payment should be sent to. Party 1 submits the payment (e.g. through Bitcoin client). This client signs the transaction request with private key of party 1. This transaction request can be now verified by everyone in network. (because public keys are available for everyone and allow to verify that the payment is coming really from party 1)

Verification

All of these transaction requests are added to chain of blocks; therefore called blockchain. As blockchain can be reviewed by all members, double-spending is not possible as all members agreed on first-come first-serve system. Time scheduling of transactions is provided by time stamping server. Every transaction request includes also timestamp of previous one, forming a chain. Currently there are 2 most used timestamping schemes which are used by cryptocurrencies: proof-of-work (used e.g. by Bitcoin) and proof-of-stake.

Afterwards the verification process takes place. All transactions in blockchain are verified by so called miners. These miners are solving cryptographic problems, whereas the first miner who comes to solution is rewarded in form of partial sum of BTC. In turn new BTC is generated and transaction is confirmed. Funds have been now transferred to receiver's e-wallet.

In year 2009 the reward for successful solution was 50 BTC. Currently it accounts for 25 BTC, but it is cut by half every four years (Bitcoinwiki 2015a,b). This helps to keep inflation rate under radar. The number of total Bitcoin to ever be produced was also set to 21 000 000, securing the currency from inflation risks. More detailed flow chart describing the transaction process can be found in appendix.

How Does Bitcoin Work?

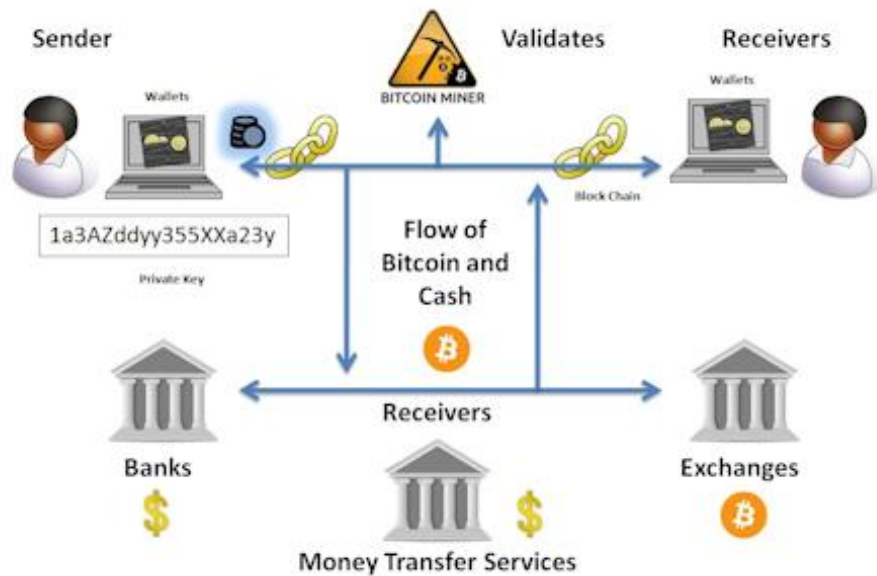


Figure 1: How does Bitcoin work (Bitcoinsnitch 2015)

2.3 The most used cryptocurrencies and their features

In this chapter, we will take a closer look on specific cryptocurrencies based on market capitalization. The most know cryptocurrency nowadays is without any doubts Bitcoin, followed by Litecoin and Ripple.³ As the Bitcoin was the first one that gained public audience, the rest of cryptocurrencies are called altcoins. Altcoins are cryptocurrencies which are in general very similar to Bitcoin with just minor differences. The most differences reside in verification process. (proof-of-work algorithm or proof of stake) This chapter addresses only Altcoins. Deeper description of Bitcoin and its features can be found in chapter 3 and 4.

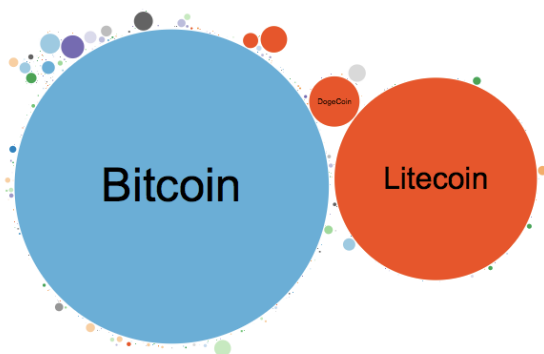


Figure 2: Graphic chart representing all cryptocurrencies and their total trading volume (Cryptocoincharts 2016)

³ BTC market cap on 02.12.2015 \$ 5,352,580,123

2.3.1 Litecoin

Litecoin ranks between cryptocurrencies as second, based on current market capitalization \$146,080,558. For the general user, there is not huge difference in comparison to Bitcoin. However, Litecoin's blockchain is capable to handle more transactions in comparison to Bitcoin. This results in faster confirmation times. Moreover as there are more units to be produced (84 Millions), reward for mining is still 50 LTC. Because of this fact, Litecoin stays to be very popular between miners. (Litecoin.org)

2.3.2 Ripple

Ripple is currently the third cryptocurrency based on market capitalization⁴. Ripple's technology, alike Bitcoin's, focuses on building a network which does not require central institution. The aim is to allow instant transaction verification and settlement system. Ripple is not just currency, but it is a whole solution which enables cross-currency settlement. The main focus is foreign exchange and direct bank-to-bank settlement with no central operator. (Ripple 2015) Interesting article about reasons, why international banks are abandoning cross-border payments, was recently published on Ripple's blog. They state reasons such as rising AML fees (anti-money laundering) imposed by bank regulators. Governments are more concerned about cross-border transactions because of international hunt for terrorist funding. This is forcing international bank houses to shut down their remittance companies abroad.⁵ Ripple could be one answer to this regulations, as there is not any central authority and consensus ledger. Vice president of FED, St.Louis David Andolfatto, addressed Ripple as follows. *"Ripple is a currency-agnostic protocol. Ripple is the winner. It processes anything. It's quite possible this ruling benefits payment processors, rather than virtual currencies."* (Cawrey 2014) To sum it up, Ripple represents a promising cross-border payment protocol with its own currency.

2.3.3 Blockchain

It is important to understand the difference between Bitcoin as a unit and its architecture. Blockchain is not other cryptocurrency on the market. It is an architecture that makes cryptocurrencies, what they are.

⁴ \$ 179,332,405 as of 6.12.2015

⁵ Barclays closed the accounts of over 140 British remittance companies. HSBC has left the remittance sector entirely. (Tran 2013)

Bitcoin architecture (based on blockchain) ensures the transactions. Hence the protocol is open source, it can be implemented also in other fields. Blockchain technology is in general used by all cryptocurrencies. Currently, there are rumors and doubts about future of Bitcoin. These are arguing about Bitcoin drawbacks, but on the other hand, are praising the advantages of blockchain. Hence the blockchain builds the basis for cryptocurrencies, we will dig a little bit deeper into this.

Bitcoin Wiki (2016) defines blockchain as a “*transaction database shared by all nodes participating in a system based on the Bitcoin protocol.*” Blockchain fulfills the function of public ledger, where all transactions are recorded and can be viewed by everyone in network. In the figure 3. below, chain of blocks containing transactions are depicted. Black blocks represent the longest and valid blockchain. Green block is the first block generated. Grey blocks are irrelevant, because they are not in the longest chain and they will be excluded. Every block contains a hash of the previous block, whereby this mechanism makes double-spending of Bitcoins almost impossible. (Bitcoinwiki 2016)

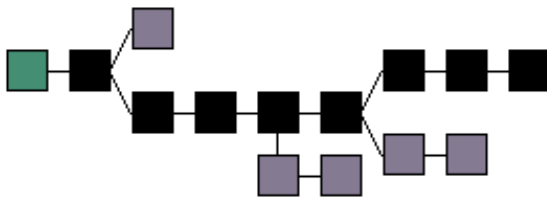


Figure 3: Blockchain (Bitcoinwiki 2016)

2.3.3.1 Alternative use of blockchain

Blockchain technology is used also outside of Bitcoin world. In general, it is used to achieve consensus on some topic and allows to have an evidence of all events occurred over time. Blockchain is currently finding its place also between big banking houses. Wall-street rumors are speaking about the use of blockchain technology for internal data exchange. (Stafford 2015) Goldman Sachs was heard wanting to launch its own virtual currency called SETLcoin which will make stock and bond deals faster and more efficient. (Wirtschaftsblatt 2015) Moreover blockchain technology can be used as a proof of original ownership, authenticity and even more. Implementations are foreseen also in e-government sector.

2.3.4 Exchange rate

Not just blockchain technology, but also development of exchange rate is really similar among cryptocurrencies. Chart below depicts the exchange rate of the first three cryptocurrencies based on market capitalization towards to US dollar. Coinmarketcap registers currently 677(state 6.12.2015) cryptocurrencies with total market capitalization of \$6,493,393,884, whereby Bitcoin's market cap \$5,927,198,949 makes 91% of total market cap. Exchange rate is also a biggest flaw that are cryptocurrencies blamed for. Its fluctuation was in the past years influenced by many events. Possible Greek exit from Eurozone; articles from BTC engineers, who meant that BTC project is failure; bankruptcy of some exchanges; Microsoft and Amazon which started to accept payments in BTC and many other factors. Hence, we can see that the exchange rate is very sensible and still offers a big potential for financial speculators. Nevertheless, the figure below shows almost linear behavior of all major cryptocurrencies.



Figure 4: Market capitalization of main cryptocurrencies (Coinmarketcap 06.12.2015)

2.4 E-Wallets

Cryptocurrencies are working similar as incumbent fiat currencies. Once they are obtained, earned or exchanged, they have to be securely stored. Since Bitcoin market cap has surged, different cryptocurrency storing options arose. In general e-wallets are used to store private keys which are needed to access funds. Thus the working is not equivalent to physical wallets. Once person has access to private key, he or she can sign Bitcoin transaction, i.e. sending money from this wallet. CoinDesk, the world's leader covering news about cryptocurrencies,

states 5 basic types of wallets: desktop, mobile, paper, web, hardware. We will aggregate this distinction into online and offline wallets.

2.4.1 Online wallets

Desktop wallets are wallets that are connected to specific hardware. For instance, once you download Bitcoin client, some of these clients enable also storage of cryptocurrencies. However, this will not have any added value when we want to use them on the streets.

In these situations are **mobile** wallets really handy. Mobile wallets are storing private keys in form of app running in mobile phones. Once the app is installed, either receiver's bitcoin address can be entered or phone can take an advantage of NFC technology and payment can be accomplished wirelessly "on tap". However, as storage capacity of mobile phones is limited and the whole blockchain consists of more than 30 GBs of data, mobile wallets use only simplified payment verification process. They download just a part of blockchain and rely on information from trusted nodes in networks. In case of mobile wallets, the need for regular back-ups is more than recommended, because there is any authority which will act as a mediator that could refund the lost funds. If the phone, where the app is installed, gets stolen, funds are not lost, but the access to wallet is not possible anymore. (in case that no back-up was carried out) Simply said "*with great freedom comes great responsibility.*" (Coindesk 2015)

Under the term online wallets are often aggregated web-based solutions which enable access to wallet from anywhere. The main drawback of these solutions is that "access to private keys is put over to third person, so the whole idea of decentralization vanishes." (Coindesk 2015) This was also a comment from interviewee Matej Michalko on this topic.

2.4.2 Offline wallets

Offline wallets, also called hardware wallets, are the most secured forms for storage of cryptographic currencies. Because of their expensive development process they are currently limited in number. Coindesk (2015) names couple of examples such as Trezor, Ledger USB wallet or Keepkey. For purposes of empirical part of this master thesis, representatives of Mycelium Company were interviewed. Main focus of this company is development of an offline wallet. They called it Mycelium card which acts as independent card that can perform transaction without any need of bank. With huge success Mycelium introduced also its USB stick, called Entropy. Entropy is a device in form of USB stick that uses hardware based

entropy to generate printable Bitcoin paper wallets. (Mycelium 2016) Currently it is sold out on Amazon. When Entropy USB stick is put into printer, it automatically prints out your Bitcoin address and private key, which is necessary to sign the transactions. Mycelium is currently launching also its new product called Mycelium card, which acts as distributed ledger and can also execute transactions. Fiat money can be afterwards transferred into Mycelium card. Based on blockchain technology each transaction within Mycelium infrastructure will be stored and verified by other members. This saves a lot of funds which are currently needed to maintain classic bank ledgers.

To sum it up, there are already couple hardware-offline wallets. These are devices developed mainly to hold private keys electronically and simplifying payment process. From all of the solutions, hardware offline wallets represent the safest way for storage of cryptocurrencies.



Figure 5: Prototype and actual Mycelium card which is due to come in next months (BitcoinX 2015)

3 Characteristics of cryptocurrencies

In this chapter we will take a closer look on basic characteristics of cryptocurrencies, using Bitcoin as a role model. Exactly these are the factors, why cryptocurrencies received so much publicity and have potential to become the “The Next Big Thing”.

3.1 Positive factors

3.1.1 Adjustable supply

Firstly, we have to understand why money supply is so important. Every transaction is accomplished by money transfer. The main reason why central banks are increasing money supply are its coexisting factors. Money supply rises through lowering interest rates, what leads to investment, giving more money to consumers. This makes them feel wealthier and thus, their consumption rises. As interest rates are low, businesses invest more and by that produce more vacancies. (Schwartz 2008)

In centralized economy, there is a central bank authority which issues a new money at some rate. This rate supposes to match the growth of the amounts of goods in circulation. This coherence aims to stabilize the prices of goods and services. In US FED is nowadays boosting money supply by quantitative easing. FED is simply buying government securities, which increase the money in circulation. This makes commercial banks to lend more money to consumers. (Investopedia 2015)

In decentralized systems such as Bitcoin, miners in the network create the amount of Bitcoins in circulation. Every time when one payment is sent, new Bitcoins are created as reward for these miners. This reward is halved every four years. This leads to maximum of 21 million Bitcoins that will exist. Just to point out, this decreasing algorithm is following the rate at which commodities such as gold are mined. Based on assumptions about mining power, the last BTC will be mined in year 2140. This should prevent currency from inflation risks and thus preserve the value of Bitcoin overtime.

3.1.2 Decentralization

As already many times stated, Bitcoin environment does not rely on any bank authority and it is working as autonomous system that relies on its members. This ensures that no human mistake can embezzle funds, and no more classic bank ledgers are needed. On one hand, this saves transaction costs, on the other, it adds transparency into system. Decentralization also

adds a safety to the whole system. The situation from 2013 (Traynor et. al 2013), when Central European Bank seized money from Central Bank of Cyprus, would not be possible in case of cryptocurrencies. Therefore cryptocurrency's infrastructure (relying on blockchain) secures money from residents also it in these extreme cases.

3.1.3 Mobile payments

Setting up a bank account requires time. Especially in case of business accounts. In case of Bitcoin, you can open your equivalent to traditional account by downloading an e-wallet and loading it with new Bitcoins. This all happens just in couple of seconds. No fees, no bureaucracy and everything transparent. Merchants and businesses can accept Bitcoins using their smartphones or tablets. They just type requested amount that they want to receive for product and QR code with their address is created on cellphone screen. The payer now uses his or her phone, scans the QR code and confirms the payment. So easy looks the whole payment process from consumer's and merchant's point of view, when you do not need understand the whole technical logic behind it.



Figure 6: Payment process (Source: Abqjournal.com)

3.1.4 Fast international transactions

This advantage is within European borders relative not important, as our SEPA system and mutual Euro currency is working relatively fine. This is not the case in developing countries and other regions for example such as Africa, Latin America or South Asia. In countries, where banking system is not fully developed and people do not have access to bank accounts, Bitcoin infrastructure comes for free. Imagine taking trip to different countries. Each visit means exchange fees, withdrawal fees etc. This could all be solved with e-wallets and

cryptocurrencies in general. Moreover, when businesses want to transfer money e.g. from EU to US, the transactions fees occur and the processing time could make up to 7 days. Not even speaking about limits in terms of amounts that can be transferred overseas.

SEPA transfer usually takes up to 2 days in average in comparison to Bitcoin, when funds are transferred within seconds. Clearing of transaction can take up to 10 minutes. This is the time needed for verification by miners. Even the clearing time can be diminished by paying fees to miners in form of reward. Moreover, there are no limitations in terms of amount of funds, which can be sent or received. Here we can see pure advantage for international businesses.

3.1.5 Anonymity

Bitcoin technology supports strong anonymity. For each new transaction a new Bitcoin address is generated. Bitcoin address consists of random numbers, so it is almost impossible to tie it to specific person. Moreover, all transactions are secured with private keys, so just the person owning this key can sign the transactions.

On one hand, anonymity can be perceived positively, as every one of us wants to keep its savings and transactions securely hidden from others. On the other, what PayPal is for E-Bay, Bitcoin used to be for Silk Road⁶. Bitcoin earned a negative perception among population mainly because of this factor. However as Matej Michalko in interview stated, “nobody is blaming money (fiat paper money) which was used to buy a gun, when suicide happens... why should we then blame Bitcoin when some gun was bought?” Meaning that, there is not any difference between Bitcoins and paper money. Everyone can use them to buy something illegal, so why should we perceive just Bitcoins negatively?

Nowadays, when merchant wants to receive credit card payments, PCI Security standards⁷ have to be met. This causes also additional costs for businesses. With Bitcoins, no personal data are stored, hence PCI standards do not need to be even considered.

3.1.6 Low to zero fees

Nowadays, there are just minor, or even no fees when sending a payment in cryptocurrency. This depends on wallet that is used. Currently the transactions are free of charge as miners,

⁶ Online black market, best known for selling illegal products such as guns and drugs

⁷ PCI Standart: Payment Card Industry Data Security Standard needed to fulfill when merchant is dealing with sensitive data while processing credit card transactions

who verify transactions, are getting reward in form of new Bitcoins.

In comparison to 2-5% standard credit card fees, when business accepts Bitcoins the fees are either zero or just minimal. These depends on system which is used. For example Coinbase is offering solution which exchanges Bitcoins instantly to fiat currency, once Bitcoins are received. With this system, businesses do not face to problem with Bitcoin's volatility. (Coinbase 2016) Moreover, with this solution there are zero transaction fees for first million dollars received through this system. Payout are initiated daily which consequently enhances liquidity of businesses. However, businesses can make verification process even faster than previously stated usual 10 minutes, when reward for miner is offered(in form of transaction fee). Fees are unrelated to the amount which was sent, making transactions of bigger amounts even more efficient.

3.1.7 No chargebacks

Once Bitcoins are sent, there is no way how to cancel the transaction. When business accepts Bitcoins or in general cryptocurrencies, risk of chargeback equals to zero. "The total cost of chargebacks is between \$10-20 billion annually in the United States alone." (Coinofsale 2016) So the acceptance of cryptocurrency can save a lot of money for each business, mainly in overseas markets.

3.1.8 Publicity

Simple sticker "Bitcoin Accepted Here" can increase the brand awareness or even gain more attention among people. Some interviewees also confirmed that they sometimes decided to shop at places, where Bitcoins were accepted, only because these reason. Bitcoin is still considered to be innovative and pretty new, so it can be a great tool how to attract new customers. There are a lot of press releases, when new merchants starts to accept Bitcoins, so why not to use this free advertisement and enhance business awareness.

3.2 Negative factors

When it comes to negative factors, Bitcoin has its own, different disadvantages in contrast to other incumbent currencies. In this chapter, we will take a look on some of them and try to explain them from business point of view.

3.2.1 Security breaches

Bitcoin was unfortunately also connected to frauds. The most known Bitcoin exchange market Mt. Gox went bankrupt back in 2014, whereas the security breach resulted in loss up to 744 000 BTCs. (Keng 2014) Currently this represents 299 Mil. Euro. (date Jan 8th 2016) We cannot blame just Mt. Gox, although it was the biggest bankrupt in Bitcoin history that shook with its price. Also other companies such as Mybitcoin and Bitcoinica lost their funds in 2012. But this all was caused by decentralization of the whole system. As there is not any central authority which can dictate conditions which has to be fulfilled to become a Bitcoin-exchange, we cannot await also any insurance, as in case of normal banking houses. Therefore it is recommended to keep own funds secured in e-wallets and not on account from third-party exchanges.

3.2.2 Volatility

Probably the main drawback for businesses is the volatility of exchange rate. This odd is the most frequently discussed when it comes to reading some articles about Bitcoin in public press. But as all fiat currencies during their formative years, also this behavior is not entirely unexpected. Sure, the crazy ride from \$1163 in November 2013 to \$167 in January 2015 is not entirely normal, but all what makes the price for Bitcoin is supply and demand. This is similar to all incumbent currencies.

As already stated, supply will stop at 21 million of BTC and it is driven by willingness of consumers to use Bitcoin for its transactions. Every transaction produces new Bitcoins in form of reward for miners. More important in price driving is demand. XAPO (2016), a producer of e-wallets and first Bitcoin debit card, states that for each currency there has to be stable demand for making purchases denominated in their currency. They argue that the majority of Bitcoins is owned just because of speculative intentions and not for real purchases.

To sum up, until then when there will not be any significant adoption among businesses and consumers, we cannot count on Bitcoin as stable currency. Maybe once, when the majority of consumers will be at least knowledgeable about cryptocurrencies, Bitcoin will sustain stable price over long-term.

3.2.3 Tax havens

Omri (2013) sees possibly cryptocurrencies as a “weapon of choice for tax-evaders”. He states 2 processes confirming his thoughts.

Firstly, he states that cryptocurrencies are not anymore just a niche currency (for example as other virtual currencies that are used just within specific online gaming environment), but they gained increasing popularity among consumers, using Bitcoin as the most recognized currency. Moreover, in August 2013, Bitcoin earned status of form of private money in Germany. (Cinch 2013) Similar process was followed in US.

Secondly, he points out, that governments around the world shifted their focus from investigating off-shore tax-haven jurisdiction and rather are starting digging in books of financial intermediaries. These financial intermediaries are forced to deliver personal data about their account holders in order to undercover possible tax evasions.

In fact, Omri identifies two basic characteristics of tax havens which are fulfilled by cryptocurrencies:

- earnings are not subject to taxation
- payer's anonymity is assured

He stresses out also the fact that the cryptocurrencies are independent from any financial institution and therefore current efforts, when control agencies focus on bank intermediaries, could fail.

To sum up, the more cryptocurrencies will be used, the more possibility for tax evasion will occur. Bigger market and wider acceptance of cryptocurrencies makes from them a great tool for tax evasion and therefore policy makers should start to be aware of this possible issue.

3.2.4 Rising transaction fees

One of the most advantages of cryptocurrencies are their low transaction fees. In case of Bitcoin, transaction fees are zero or marginal.

Despite of fact, that in general there is no transaction fee, in future it is predicted that with rising amount of cryptomoney in circulation, one will have to pay extra fee in order to get the

transaction processed faster. Nowadays, miner, who verifies the transaction and includes it into new block, receives an incentive in form of new Bitcoins. As supply of Bitcoins is limited, once all Bitcoins are mined, miners will require some kind of reward in form of Bitcoins. This will represent a new transaction fee.

Kaşkaloğlu (2014) argues that zero fees are financially unsustainable in the long term. He argues that these fees are not just incentives for miners to verify the transactions, but they are also persuading them to participate in the network. When there will not be enough miners in network, theoretically one, possessing the most computer power, could modify blockchain and in that way he could perform a double spending attack.⁸ Acceptance of unconfirmed transactions by merchants could be compared to acceptance of paper bills. Hence, the merchants could not be 100% sure, that they are not accepting counterfeits.

To conclude transaction fees are not just incentives for miners, but also a form of protection against double-spending attacks.

3.2.5 Government scrutiny (Slovak and Austrian regulations)

Governmental opinion on Bitcoin and cryptocurrencies varies from country to country. In some countries is its use explicitly banned or at least restricted. From businesses point of view, this represents a huge hurdle and it hurts also its wider acceptance. For purposes of this thesis, emphasis will be put just on Slovak and Austrian market.

Slovak regulation

National Bank of Slovakia (NBS) follows the opinion of European Central Bank (ECB) and advises public, that neither ECB nor NBS regulates the market with virtual currencies. Furthermore, NBS states that Bitcoin does not have a legal attributes of national currency (e.g. there are no regulations regarding to any area or any protection by country) and therefore is not controlled by National Bank of Slovakia. There are no comments or advisory on virtual currencies in general; only Bitcoin was stated as an example for all cryptocurrencies. NBS advices that use of virtual currencies is at each own risk and any losses caused by its use or exchange are not protected. (Pauerová 2013) Finally, NBS does not rule out that cryptocurrencies will be regulated in foreseeable future because of their rising popularity and acceptance. (Nadaský et al. 2015)

⁸ Spending money more than once. Merchants that accepts unconfirmed transactions would be ripped off.

Austrian regulation

Similarly to Slovakia, Austrian regulatory authorities do not regulate transaction with cryptocurrencies. As of April 2015, there was just one business in Austria offering exchange of paper fiat money into Bitcoin. FMA (Financial Mark Authority) confirmed that there is no need of bank license in Austria when operating ATMs for Bitcoins. (Futurezone 2015)

Austrian Central Bank (ACB) (2015) released almost same comment on Bitcoin as NBS, perceiving Bitcoins as niche phenomenon. ACB advises consumers to use it at their own risk and categories them as speculative investments.

In October 2015 Court of Justice of the European Union (2015) ruled that Bitcoin transactions will be exempt from value added tax. With this decision Bitcoin earned same status as governmental currencies and Johannes Grill, president of Bitcoin Austria, awaits rising adoption through this verdict. Before this verdict, the regulation in European countries varied a lot. For example Germany and Austria saw no reason to exempt transaction from VAT until now.

As Austrian and also Slovak jurisdiction are governed by CJuE, it is awaited that these two will also follow this decision. This could facilitate adoption process by businesses on all European markets.

3.2.6 Processing time

The main difference between the most known cryptocurrencies Bitcoin and Litecoin lies in their processing time. Maximum confirmation time for transaction in case of Litecoin decreases from 10 minutes to 2.5 minutes.

This has following implications:

- Litecoin's algorithm allows to process higher volume of transactions than Bitcoin
- Faster block generation leads to larger blockchain, and therefore more hard drive capacity is needed
- Faster block chain generation protects Litecoin against double spending attacks
- Merchants requiring transaction confirmation would only need to wait 2.5 minutes to be 100% sure, that they will get their money

	BTC	Litecoin
Coin Limit	21 Million	84 Million
Algorithm	SHA-256	Scrypt
Mean block time	10 minutes	2.5 minutes
Difficulty retarget	2016 block	2016 blocks
Block reward details	Halved every 210,000 blocks.	Halved every 840,000 blocks
Initial reward	50 BTC	50 LTC
Current block reward	25 BTC	50 LTC
Created by	Satoshi Nakamoto	Charles Lee
Creation date	January 3rd, 2009	October 7th, 2011
Market cap	\$10,467,596,650.78	\$540,274,528.26

Table 1: Comparison Bitcoin vs. Litecoin (Source Coindesk 2016)

Based on these advantages, one could assess that Litecoin is future of cryptocurrencies. More coins to be mined, faster processing time, still affordable price. On the other hand, there is still a long way for Litecoin to get ahead of Bitcoin. Bitcoin has a larger supportive community and therefore also stronger network effect. Nowadays, the acceptance of Bitcoin cannot be compared to acceptance of any other cryptocurrency.

3.2.7 Low acceptance in comparison to incumbent currencies

Prof. Roberts from Stanford University (2011) blames Bitcoin for its low acceptance among merchants and therefore does not recommend to depend on solely this cryptocurrency. This accusation is just partially true, because as stated in chapter 3.1.8, acceptance of niche currency can alternatively boost business awareness, and this can subsequently attract more customers. Moreover, currently there are a lot of services which exchange almost in real-time received payment in Bitcoin into fiat currency and hence, can protect businesses from this risks. This makes from each Bitcoin payment, basically, no difference to classic payments in fiat currency.

4 Cryptocurrency stakeholders

Investopedia (2015) defines a stakeholder as a person or organization “that has an interest in an enterprise or project”. In terms of currencies, stakeholder is every person that interacts with money and performs transactions. In this chapter, different stakeholders and their characteristics will be introduced.

4.1 Consumer

Typical payer is an initiator of payment. Imagine the situation, person comes to coffee shop and wants to buy a cup of coffee. He pulls out smartphone, scans the QR code and enters the amount that has to be sent for one cup of coffee.

The biggest advantages for consumers are:

- zero to minimal transaction cost
- anonymity of payment
- no exchange needed
- instant payment (confirmation within seconds, but this differs from one to other cryptocurrency)
- mobile payments without any need to carry physical money

4.1.1 Statistics

One of the most important features of cryptocurrencies is their anonymity. Because of this reason, it is very difficult to guess the number of potential users neither in Austria nor in Slovakia. However, the first European ATM which allows purchase of Bitcoins for fiat money was installed in Slovakian capital, Bratislava. (Wong 2014) Despite this primacy, Januska⁹ himself claims, that there was not much media coverage on this topic done on international level. Until now, this are only two ATMs in Slovakia, which allows you to buy Bitcoins. (Januska is owner of the first ATM in Slovakia)

In comparison to Slovakia, there are currently 4 ATMs in Austria. The first one was brought by Coinfinity to Graz, the other 3 can be found in Vienna.

⁹ ATM operator and owner

4.2 Business

In chapter 3.1 the most advantages of cryptocurrencies such as their non-inflationary character, decentralization, i.e. no middlemen needed, fast international and mobile payments, anonymity, low to zero fees, irreversibility of payments and publicity were listed.

Bitcoin Austria (2015), which is officially acting as an advisor for business in Austria, states following advantages for business:

- bigger customer audience
- no counterfeits
- no cash robbery possible
- no chargebacks
- low transaction fees
 - 0% fee when no payment service used
 - when middlemen used, usually less than 1% fee (middlemen often used for instant conversion into incumbent currencies to avoid exchange rate flaws)

Transaction fees at glance

- payment received by credit card: fee 1-2%
- payment sent within SEPA area: no charge
- payment sent outside SEPA: 10-35 EUR (depends on amount, but min. 10 EUR) (Taba 2016)
- payments in Bitcoin, zero or almost zero fees
- no maximum limit for payments in Bitcoin
- some banks set maximum limits for international transactions in traditional currencies
- no limits for cryptocurrency transactions

Bitcoin Austria (2016) recommends following approaches how to accept Bitcoins:

- **Bitcoin wallet in tablet or smartphone.** You can type in amount in euro, and wallet will provide the conversion of requested amount into Bitcoins. Afterwards a new Bitcoin address is generated and QR code with this address is showed on the screen. Customer scans this code and sends the payment with her or his smartphone or tablet.

- **Payment provider.** (e.g. Bitpay) This provider instantly exchange received Bitcoins into domestic currency and this amount is credited to business account. In comparison to classic long settlement time for SEPA (Euro) or USA (ACH) transaction which makes usually one week, there is daily Bitcoin settlement. Company Coinfinity provides consultancy for businesses in Austria.
- **Market exchange pricing facilities¹⁰.** Company BitTag recently announced their product which is in fact similar to classic price tag, but it displays the price in incumbent currency and also in cryptocurrency. Once the price of cryptocurrency fluctuates, the price tag changes. With this system, merchant never loses any penny, despite cryptocurrency exchange rate flaws.



Figure 7 : BitTag system in shop

4.2.1 Statistics

In comparison to difficult estimation of users for each country, the number of businesses accepting Bitcoin, can be determined relatively easy. For this purposes website Coinmap.org was used. As we can see in figure 8, the most businesses accepting Bitcoins can be found in both capital cities, Bratislava and Vienna, followed by cities Kosice and Salzburg.

Number of businesses accepting Bitcoins	
Slovakia	63
Austria	87

Table 2: Number of businesses accepting BTC (Coinmap 13.01.2016)

¹⁰ Enabling live displaying of prices in different currencies at current exchange rate, e.g. BitTag platform

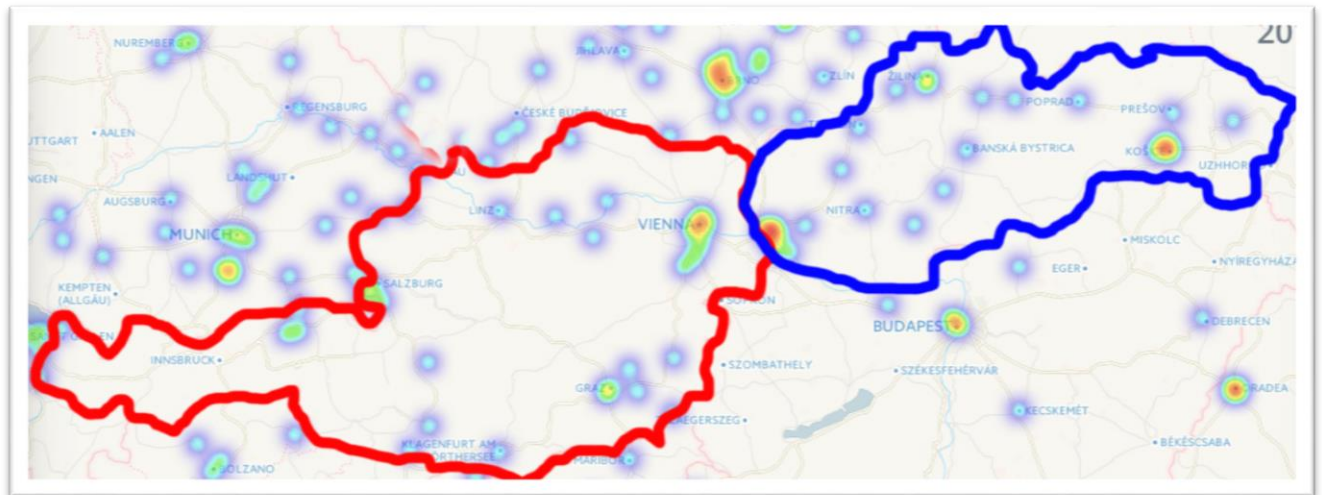


Figure 8: Geographical density of businesses accepting Bitcoin (Slovakia vs. Austria)

From worldwide point of view, we can see that the highest density spreads throughout Europe and USA. We can find also some businesses in southeastern America, Australia, South Africa and East Asia.

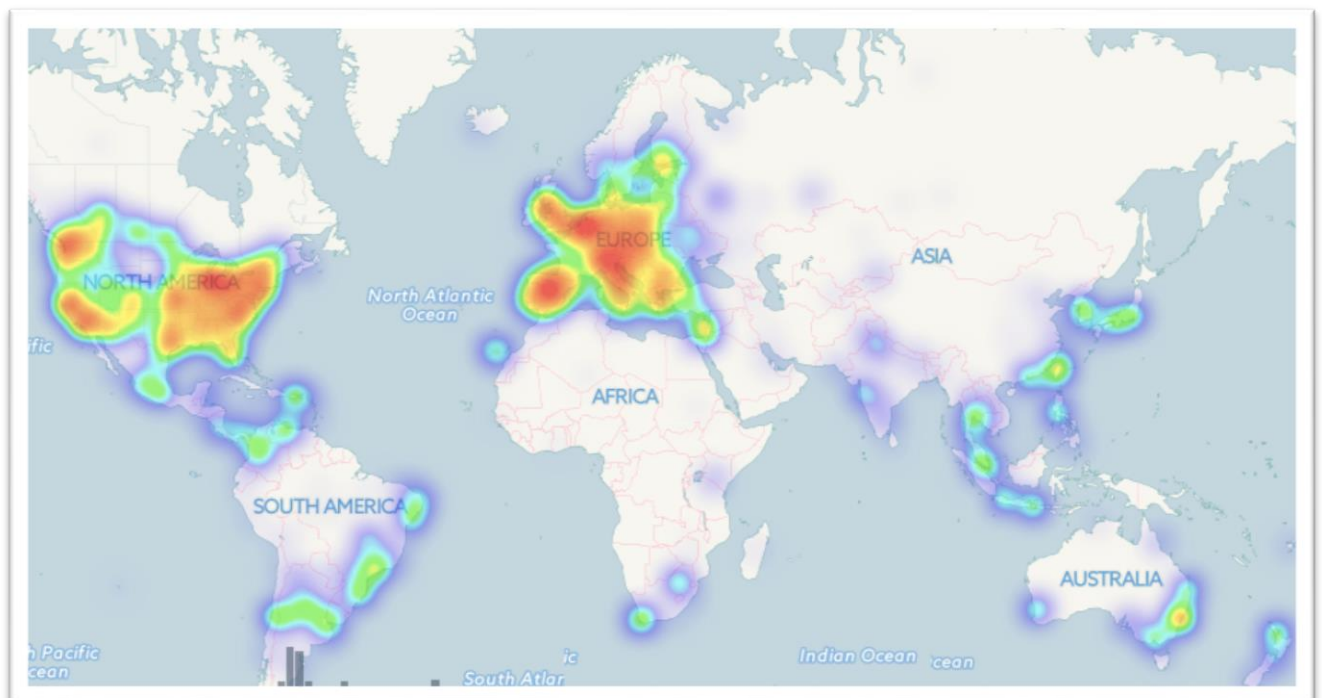


Figure 9: Worldwide geographical density of businesses accepting Bitcoin

4.3 Banks

In Slovakia, there is not any bank that will accept any cryptocurrency. Moreover, one of the investing banks in Slovakia, J&T Bank, perceives them rather negatively.

In Austria is the situation exactly the same. However, there is a bright star in Germany. The first and currently the only bank that allow Bitcoin conversion in Europe is German Fidor bank. Thus EUR/BTC trades are completed within seconds.

As we can see, there is not much willingness from banks to deal with cryptocurrencies. This is mainly because of fact that transaction fees and in general fiat money are their daily bread and butter. Thus, it is not surprise that they do not want to give up their profits.

Another possible advantage for banks could be the use of blockchain technology. This was already discussed in detail in the second chapter.

4.4 Exchanges

Nowadays, as banks hesitate to enable direct purchases of cryptocurrencies, there are a lot of exchanges providing this system instead of them. Here can users exchange their fiat money for cryptocurrencies and afterwards proceed with other financial operations. In this case, investors should be aware of fact that their funds are not secured by any government, and therefore countries do now provide any kind of guarantee. The biggest cryptocurrency exchanges are OKCoin, BTCC and Bitfinex. (Cryptocharts 2015)

5 IT and currency acceptance models

This chapter will provide an overview of basic IT and currency acceptance models. They will serve basis for interview questions for the next part of this thesis. These models focus on psychological, social and subjective norms.

Literature review revealed 6 models regarding acceptance of information technology and 3 currency acceptance models. Based on these models, basic characteristics for acceptance of cryptocurrencies will be derived and compared with results from qualitative semi-structured interviews in order to answer previously stated research questions. Interview questions will be structured, taking into account facts stated in these models in combination with characteristics of cryptocurrencies from theoretical part of this thesis. Moreover, interview questionnaire will be pretested to avoid possible flaws. Outcomes between all markets will be compared and differences eventually discussed.

5.1 Technology acceptance models

5.1.1 TRA: Theory of reasoned action (Figure A)

This model was developed by Martin Fishbein and Icek Ajzen in late 1980s and it is widely used as starting point for many authors in process of developing acceptance models for new technologies.

It focuses on the prediction of intentions that precede behavior. There are two main beliefs affecting behavior:

- Person's attitude (behavioral beliefs)
- Subjective norms (normative beliefs)

Behavioral belief is person's individual underlying influence to perform a particular task, whereas subjective norm as normative belief influences individual attitude toward performing this task. (Madden et al. 1992. p 4.)

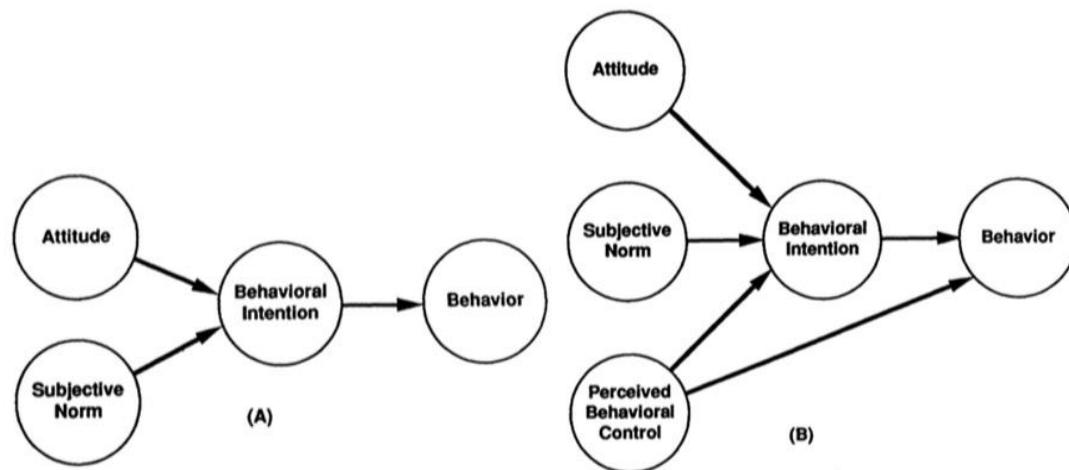


Figure 10: TRA and TPB (Madden et al. 1992. P. 4)

5.1.2 Theory of planned behavior (Figure B)

TRA was further revisited by Schiffer and Ajzen (1985) and spanned into TPB with addition of one factor, which is perceived behavioral control. Original theory (TRA) suggests that if one evaluate the proposed action as positive (person's attitude) and others evaluate it positive as well (subjective norm), one will have higher intention to perform behavior in this manner.

TPB argues that sometimes this event does not occur because of specific circumstances, which were added into model as perceived behavioral control. This has direct effect on behavior and indirect effect on behavior through intentions. To sum up all variables, the stronger the behavioral and normative beliefs combined with perceived behavioral control are, the greater is the motivation to perform certain behavior. (Madden et al. 1992, p.5)

5.1.3 Technology acceptance model (TAM)

Fred Davis together with Richard Bagozzi presented their model in 1985 (Davis Jr, F. D. 1986.) and since then it has become one of basic models when it comes to person's acceptance towards new technologies, explaining about 40% of a variance in use intentions and behavior. It is an extension of Ajzen's and Fishbein's theory of reasoned action (TRA). TAM shows that overall attitude toward using new technology is a main determinant, whether this technology is used or not. (Venkatesh, V et al. 2000, p. 186 ff.)

According to this model attitude towards use is influenced by 2 other variables:

- perceived ease of use
- perceived usefulness for user

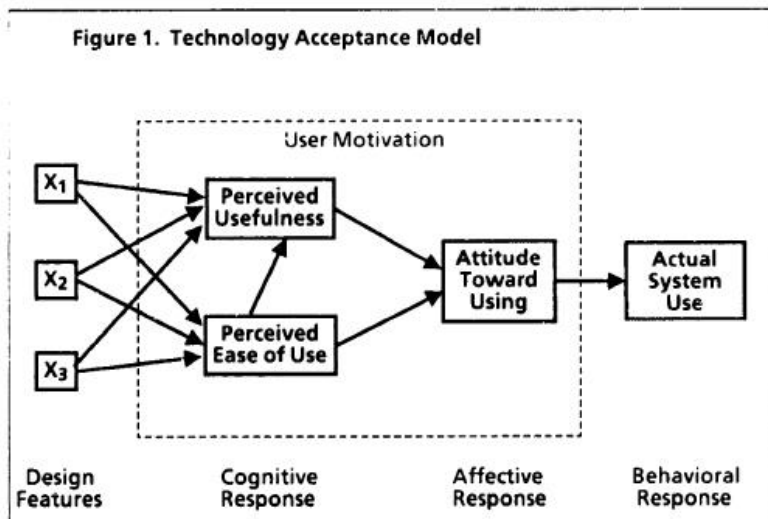


Figure 11: Technology acceptance model (Davis Jr, F. D. 1986, p.24)

As the figure above presents, there is a causal effect on perceived usefulness by perceived ease of use. Figure sketches also design features x1-x3, but these are not of interest, as they were found not having direct influence on affective and behavioral response.

Perceived usefulness is defined by authors as "the degree to which a person believes that using a particular system would enhance his or her job performance". (Davis Jr, F. D. 1986)

Perceived ease-of-use is characterized as "the degree to which a person believes that using a particular system would be free from effort". (Davis Jr, F. D. 1986) The direct impact of perceived ease of use on perceived usefulness results in greater productivity/usefulness considering that the job agenda is performed by this technology.

"the easier the system is to use, the more useful it can be." (Venkatesh, et al. 2000, p.187)

TAM was subsequently enlarged by consequent studies, namely by TAM 2 and Unified theory of acceptance and use of technology (UTAUT)

5.1.4 TAM 2

Previously stated Technology Acceptance Model was further investigated by Davis and

Venkatesh (2000). Their extended study found that there are also another factors that affect user acceptance.

These new drivers can be divided into 2 categories:

1. Social influence processes (subjective norm, voluntariness and image)
2. Cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use)

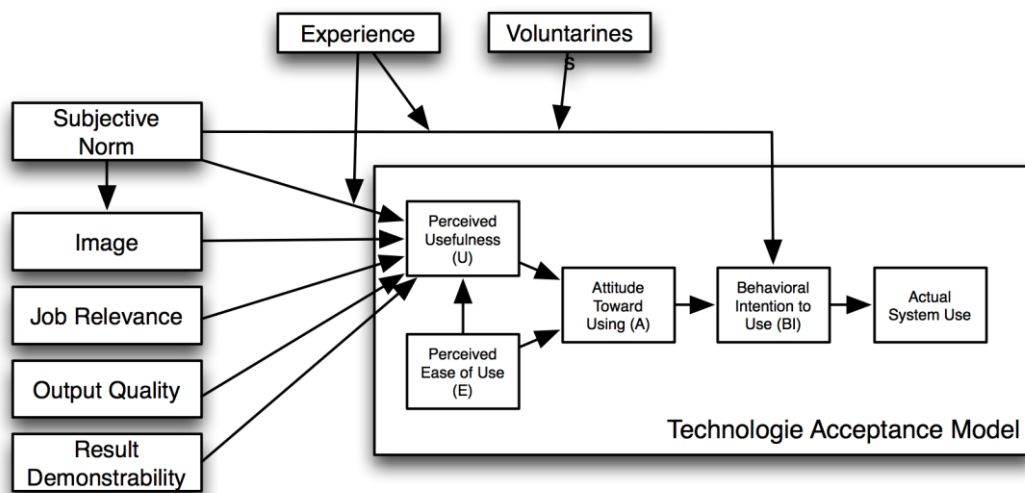


Figure 12: Technology acceptance model 2 (Davis and Venkatesh 2000, p. 188)

These two drivers were found explaining up to 60% of the variance of perceived usefulness, which is one of 2 main determinants for using intentions toward new technologies.

Subjective norm comes from TRA model, defined as person's perception that the most people, who are important to him, think he should/should not perform the behavior in question. This means that one will prefer use of new technology even if he is not favorable toward it, in case that there is a strong referent motivating him to actually use it.

Voluntariness was used as a moderating variable, mainly because of Hartwick's and Barki's study (Barki et al. 1994) who found this variable significant just in mandatory research environment.

5.1.5 UTAUT: Unified theory of acceptance and use of technology

This model was constructed based on longitudinal studies within 4 organizations and is a compilation of all previously stated models. “It was found to outperform the eight individual models, including the TAM, TAM 2, TRA, TPB, IDT, motivational model, social cognitive theory and model of pc utilization.” (Venkatesh, et al. 2003, p. 447)

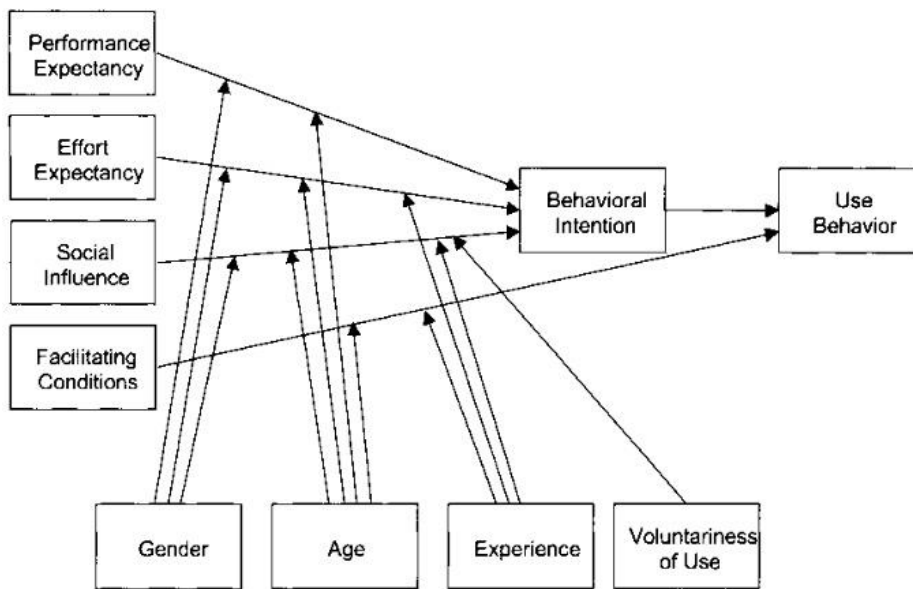


Figure 13: UTAUT Model (Venkatesh, et al. 2003, p. 447)

This model formulates 4 main determinants towards user technology acceptance:

- Performance expectancy (belief that technology will improve job performance)
- Effort expectancy (degree of ease associated with use of the system) (Venkatesh, et al. 2003, p. 450)
- Social influence (influence of important referent claiming to use the system)
- Facilitating conditions (belief of existence of system support infrastructure)

Moreover, there were found also key moderating variables which have influence on the relationship between main determinants and behavioral intention.

- Gender
- Age
- Experience
- Voluntariness of Use

5.1.6 IDT: Innovation Diffusion Theory

This theory provides a conceptual framework for innovation acceptance which was tested at individual and also on organizational level. First concept appeared in book of Everett Rogers (Rogers, E. M. 2010) and since then has been improved by other researchers.

Rogers sketched five characteristics of innovations that influence their acceptance:

- relative advantage (degree of enhancement toward current technology)
- compatibility (consistency with social norms)
- complexity (degree of ease, the lower the higher diffusion)
- trialability (possibility to try new technology before implementation)
- observability (extend to which the output performed by new technology is visible)

Further analysis by Tornatzky and Klein (1982) showed that the greatest impact on adoption had: compatibility, relative advantage and in opposite/negative manner complexity.

The most known enhancement of the original IDT Model was constructed by Moore and Benbasat (1996) which focuses on development of construct, dealing with user perception of IT Innovations. This extension added factors such as: voluntariness of use, image, relative advantage, compatibility, ease of use, trialability, result demonstrability and visibility. (Dillon 2001)

IDT also looks at individual level of users. Rogers (2010) divides users according their adaptation speed into (innovators, early adapters, early majority, late majority and laggards). Using normal distribution it was found that laggards and late adopters account in general for 50% of the population in comparison to 16% consisting of early adopters and innovators. Each member of these groups disposes of different characteristics and therefore each organizational should keep in mind this distribution in population when deciding about implementation of new technology. (Brancheau, J. C. et al. 1990)

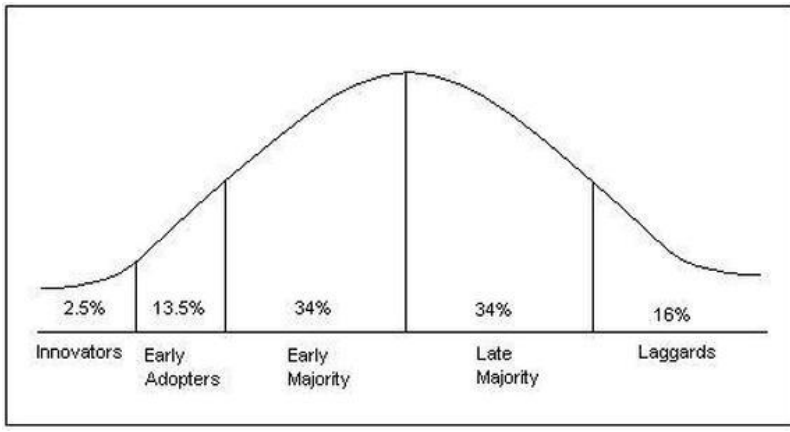


Figure 14: User distribution (Rogers, E. M. 2010)

5.2 Currency acceptance models

In this chapter currency acceptance models will be sketched. The main four authors known in this field are Greenway, Down, Luther and Kocherlakota. Their thoughts and comments will be used in the following empirical part.

5.2.1 Greenway's and Down's currency acceptance model

Greenway and Down argue that current economic models lack on factors such as **network effects and switching costs**, when it comes to making decision about currency acceptance predictions. Network effects are derived from value which certain currency posits when is accepted by users. The more users accept this currency, the stronger network effects occurs. (Dowd, Greenaway. 1993. p. 24)

They based their model on studies by Farrell and Saloner (1994). Implications from this model shed light on decision making process when users are choosing between different currencies.

They suggest that there has to be **very poor performance** (e.g. hyperinflation) of currency in order to force users to substitute it. Model also depicts, that in case of currency acceptance, economies of standardization exists, hence the more people use particular currency, the higher **switching costs** occur and subsequently the lower the transactions costs are. Moreover, it is easier for agents to understand the actual value of currency (price they quote).

5.2.2 Extension of Greenway's and Down's model by Luther

Previous model was used by Luther (2013) to test adoption process of cryptocurrencies,

namely Bitcoin. He concluded that “cryptocurrencies like Bitcoin are unlikely to generate widespread acceptance in the absence of either significant monetary instability or government support.” Luther (2013, p. 34) states 4 basic reasons why Bitcoin is unable to gain widespread acceptance:

- 1. Size of network** is too small and this impacts low utility in case of switching.
- 2. Switching costs** are high, but on the other hand Luther adds that the addition of ‘Tap and Go’ machines could make this factor surmountable. Into this category falls also the effort to recalculate the price in mind of users, which can be accomplished because of rising use of mobile technology.
- 3. Rooted historical knowledge** of agents predicting that others will continue to transact with incumbent currency. (Fear to become a first mover)
- 4. Nature of currencies** in general. User chooses naturally the currency to which more users incline.

According his study, there are necessary two conditions which have to be fulfilled in order to gain widespread acceptance:

1. Governmental support

History showed that when new currency has governmental support (e.g. fixed exchange rate is set, taxes are paid in it) it would rather become settled currency.

2. Hyperinflation

As the perceived value of currency sinks, associated benefits with its use are minimized and thus, based on previously stated models, user will switch to another currency.

Last but not at least, Luther suggests that the number of early adopters is almost exhausted and thus the cost of coordination could rise.

“Hence, in the absence of significant monetary instability or government support cryptocurrencies will find it difficult to gather widespread acceptance.”(Luther 2013, p. 34)

5.2.3 Money as memory model by Kocherlakota and Wallace

Money and memory are according to authors analytically equivalent. (Kocherlakota, Narayana R. 1998a.) They state that “if humans lack a perfect record-keeping device (e.g. memory), using money might be socially beneficial.” (Kocherlakota, Narayana R.2002 p. 58ff) So based on currency, one could determine if he or she disposes of enough funds to pay for service or product. Luther and Olson (2013) add that in case of cryptocurrencies such as Bitcoin, this public “record keeping feature” is proof of work that can be monitored by everyone. Kocherlakota et al. (2002) further conclude that by technological development and rising cost of money storage, alternative currencies could be adopted. In this case, costs are represented by effort that has to be invested in order to validate payee if she/he does have sufficient funds, and costs incurred by money storage.

In conclusion, these are the factors that cryptocurrency should posit, in order to achieve widespread acceptance according Kocherlakota and Wallace.

6 Empirical framework

In this chapter, research methodology will be explained more in detail. Based on Saunders et al. (2009, p.10) research process is characterized as multi-stage run including topic formulation, literature review, research design, data collection and description of results.

Similarly Rubin and Babbie (2010, p.41) concluded that there is an agreement in research field, how to pursue when conducting academic research. They recommend to begin with formulation of issue and with recognition of its difficulty. Afterwards it is supposed to create and test possible strategies for solving these issues. Finally, the chosen approach will be implemented and results summarized. To stay on the right path, this thesis will employ research process presented in Sanders et al. (2009) as series of linked stages, organized in linear manner.

In theoretical part of this master's thesis emphasis was put mostly on academic articles found on relevant scientific search engines such as: Google Scholar, Microsoft Academic Search, Bielefeld Academic Search Engine and Science Direct Search Engine. All of these sources are providing relevant and valid academic literature. Access was established through VPN network of University of Vienna.

Furthermore, different online sources were used in order to map actual situation that sometimes cannot be covered by academic literature and kept up to date. Statistical data, describing Austrian and Slovak market in respect to acceptance of cryptocurrencies by businesses and users, were obtained through local associations dealing with cryptocurrencies. (Bitcoin Austria Verein, Coinmap)

6.1 Thesis structure

First part of this master's thesis covers theoretical background based on academic literature. Moreover, IT adoption models in combination with currency acceptance models were analyzed and mutual factors speaking either for or against adoption were defined.

Second part will be devoted to empirical study, namely to qualitative semi-structured interviews with different stakeholders. Interviews are designed based on findings from theoretical part. Afterwards results from empirical study are compared with mutual factors influencing adoption process of IT and cryptocurrencies. Finally, future outlooks for cryptocurrencies in respect to research questions are derived. (for more see thesis mindmap in Appendix)

6.2 Research purpose

Clarifying research purpose is helping to answer question “what is going to be researched”, “why is that” and “what are possible implications of this study”. (Saunders et al. 2009)

The main purpose of this master’s thesis is to map actual situation in respect to cryptocurrencies in Slovakia and Austria. Emphasis is put on adoption perceived from consumer and business perspective. This thesis is looking for overlaps and differences between theory and practice. To address the question “why”; since the boom of Bitcoin in the end of year 2013, there was not given a clear answer, if the cryptocurrencies have any future. Moreover, this topic has not been discussed in Slovak region as often as it was in German speaking area. Implications of this thesis can provide new insights, on one hand for end-users, and on the other for merchants that could achieve a competitive advantage through their acceptance. Moreover, they could facilitate their international operations.

The most discussed research purposes in literature are threefold: descriptive, exploratory and explanatory. (Saunders et al. 2009, p. 138)

Exploratory study is usually conducted to get an overview about research phenomena. This is in general during the first stages of the research. (Saunders et al. 2009, p. 140; Blaikie 2010, p. 70.) In this master’s thesis this point is accomplished by literature review, which summarizes all necessary facts, in order to state research questions and build basis for interviews.

Explanatory study focuses on causal relationships and strives for interpretations of variables that are of main interest. Precursor, as in our case, is the main descriptive research question, which acts as a basis for deeper explanation of phenomenon. “The emphasis here is on studying a situation or a problem in order to explain the relationships between variables.” (Saunders et al. 2009, p. 140)

Finally, descriptive studies are conducted once there is enough knowledge about research phenomenon and this process should lead to deeper examination. Robson (2002, p.59) characterizes its goal as “to portray an accurate profile of persons, events or situations”. Saunders et al. (2009, p. 140) add that descriptive studies, conducted as a business research, act often as precursor for explanatory studies. They should be aimed to provide more than just a description. Awaited are conclusions and synthesis of ideas. Combination of these types of researches is called as “descripto-explanatory” research.

When choosing the best research type for this thesis, the best fit was found in combination of descriptive and explanatory studies. This decision was determined mainly by character of research questions, starting with main descriptive question and continuing with more explanatory sub-research questions.

Firstly, literature overview delivers essential and basic knowledge about phenomenon. Qualitative interviews acts as an extension to descriptive study. Furthermore, explanatory study connects all variables in question and finally, possible outlooks for this topic will be outlined.

6.3 Research approach

All stated research questions represent fundamentals for empirical analysis that is conducted based on qualitative semi- structured in-depth interviews. (Zikmund et al. 2012) As this topic is very young, quantitative approach would not provide: firstly, sufficient respondents with adequate knowledge, secondly predictions for future development, and finally the validity of results will not be sufficient. As Raap et al. (Raap et al. 2009) stated, in-depth interview with expert is an appropriate qualitative approach to find out possible outlooks and future development for problem of interest. Interviews were conducted in person, per Skype and once per e-mail because of work overload of one respondent. For transcription and evaluation purposes all interviews were recorded, either by voice recorder, or in case of Skype interview Amolto program was used.

This type of research is characterized as “research designed to help organizational decision making, focusing on understanding the nature of phenomena and their meaning rather than their incidence”. (Association for Qualitative Research)

6.4 Research strategy

Saunders et al. (2009, p 141) distinguish 7 different research strategies.

- Experiment
- Survey
- Case study
- Action research
- Grounded theory
- Ethnography
- Archival research

Yin (2003, p. 110 ff.) adds that these can be used independently if it is descriptive, exploratory or explanatory research. As previously stated descripto-explanatory purpose of study, determined by research questions, influences also decision of research strategy. This thesis is trying to compare and predict future of cryptocurrencies between 2 different markets. Therefore as suitable research strategy was chosen comparative business case study that will investigate also insights from merchant's point of view. Wood (1991) states that "The case study strategy will be of particular interest to you if you wish to gain a rich understanding of the context of the research and the processes being enacted." Moreover case study is often used in explanatory research which also corresponds with our decision. (Saunders et al. 2009, p. 146)

In terms of data collection technique, it is recommended to use triangulation, thus different data collection techniques or different data sources. This will be accomplished by interviewing stakeholders from different fields such as payers, payees and cryptocurrency experts, in order to cover this topic from as many perspectives as possible.

Yin (2003, p. 13–14) characterizes case study as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between object of study and context are not clearly evident." Furthermore, he states that major difference between survey and case study is the number of instances that are inquired. Data collection process for survey consists of numerous instances, whereby case study takes into account about one or small number of instances.

This thesis will proceed with type of comparative case studies, whereas the respondent's experiences from their practice will be of main interest.

6.5 Research objective

The next step, once the research topic was chosen, is decision about research objective. At this point it has to be chosen from either theory-oriented or practice-oriented objective.

Theory-oriented research strives to extend theory. The target group is usually academic community. Practice-oriented research focuses on real-life environment and focus on business community. Following table summarizes main differences. (Dul and Hak 2008, p. 31.)

Practice-oriented research	Theory-oriented research
• Changes evaluated based on performance in organization • Existence of theory is not relevant • Systematic correct and successful when results of interventions occur in a way as supposed in specific organization	• Objective is contributing to theory development • Theory is proven once series of independent tests could have practical value; can be viewed as projections once theory is applied • Research success is not perceived in connection to specific organization

Table 2: Own representation of main differences between research objectives based on Dul and Hak (2008) p.31

At the beginning of each research, design literature recommends to conduct an orientation, which will guide researcher either to practice-, or theory-oriented research. Orientation begins with core literature review, identification of proposition that could be enhanced and with discussion with experts. All these previous steps have driven object of this thesis towards to theory-oriented research. Dul (2008, p.32) characterizes the general objective in theory-oriented research as contribution to the development of theory regarding the topic of interest. Thus, this thesis will test findings from theoretical models (IT and currency acceptance models) and compare them with opinions from respondents active in Slovak and Austrian cryptocurrency fields.

The first step, when deciding about theory-oriented research, is to characterize theory. Dul (2008, p. 61) defines it as “set of propositions about an object of study. Propositions consist of concepts and specifications of relations between concepts.” These relations can be afterwards seen as future outlooks about object of study under certain conditions. These outlooks or predictions are valid just within domain (field where predictions are possible to generalize).

To sum it up, theory consists of 4 parts:

- Object of study: in this thesis- cryptocurrencies
- Concepts (when measured called variable): in this thesis- factors influencing adoption process of cryptocurrencies
- Propositions are characterized as causal relationship between variables- concepts
- Domain of theory is simply boundary for which previously stated propositions can be generalized and are valid. In case of this thesis, domain consists of Slovak and Austrian market.

Theory oriented research should lead to development of theory. This process consists of exploration, theory-building research and theory-testing research. Following list depicts these activities in sense of this thesis.

1. Exploration: Collection and analysis of relevant data: literature review, model analysis and in-depth interviews.
2. Theory-building research: Formulation of propositions.
3. Theory-testing research: Once propositions were drawn, these will be tested in empirical process. (Dul and Hak 2008, p.38.)

Exploration is not characterized as research itself; it is rather preliminary phase of gathering insights and information from various sources that should represent basis for theory oriented research. This step aims to grasp empirical know-how in order to state propositions. Finally, theory-testing research combines and tests propositions.

In case of this thesis, preliminary theory exploration reviewed IT and currency acceptance models. Propositions mentioned in these models are compared and used to test them in domain of this thesis. As next step exploration of practice follows. Once the propositions revealed by practice are available, theory-testing research will proceed. On contrary, if they are not available theory-building research will follow. Exact procedure will be guided based on following flow chart by Dul.

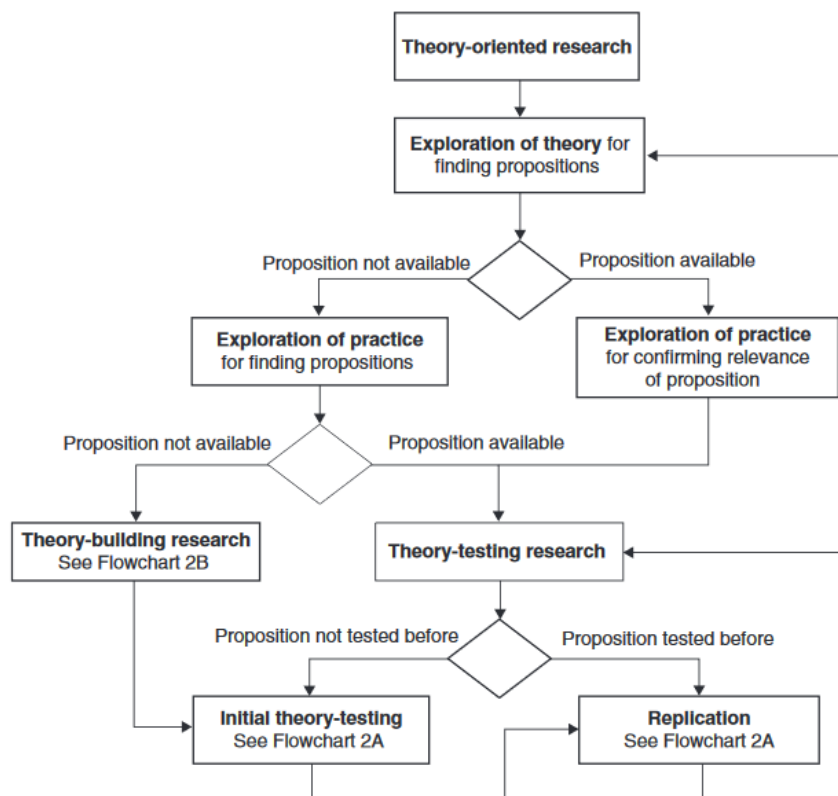


Figure 15: Guidelines for theory-oriented research by Dul and Hak p. 40

6.6 Validity and reliability

In order to fulfill all requirements for academic work, validity and reliability will be discussed as well.

External validity is characterized as a degree to which the research results can be generalized in population, thus in all settings and not only in those within sample. (Saunders et al. 2009, p. 158) In case of case studies, it is often claimed that they lack generalizability mainly because of their small sample sizes. Saunders therefore recommends shifting the main task of research and focusing on explanation of “what is going on in the particular research settings.” (Saunders et al. 2009, p. 158) Moreover, Dul (2008, p. 46) connects lack of generalizability with propositions and not with case study itself. He concludes that this lack occurs in most one-time case studies and can be eliminated just with replication (follow-up studies). This represents also a motivation for further research. Because of these reasons, as far as results will not be claimed as generalizable for whole population, this thesis meets the external validity requirements.

Internal validity refers to ability of research to measure what was actually intended to

measure. (Saunders et al. 2009, p. 372) To ensure internal validity, it is proposed to test if collected results from interviews are consistent with results accessible from different sources.

Reliability is defined as consistency of research. In other words, if the interviews will produce same results also at different times and under different conditions. To overcome this issue, it is suggested to compare data collected with additional data from a variety of sources. (Dul 2008, p.46 ff)

6.7 Research questions and propositions

One of the most important stages in research process is the statement of research questions. Preliminary literature analysis reviewed different IT and currency acceptance models. Aim of this master's thesis is naturally to answer research questions and find out, if stated proposition can be confirmed or rejected. Propositions from previous studies, dealing with currency and IT adoption topics, were used in this formulation as well.

In order to predict future development of cryptocurrencies, emphasis is put on following research questions:

The main research question: **What are the main obstacles hampering acceptance of cryptocurrencies in international business?**

Sub research questions:

- What are basic characteristics of stakeholders?
- What are needs regarding cryptocurrencies? (from stakeholder's point of view)
- What is the added value for payee and payers in respect to international and domestic business?
- What are the solutions for overcoming negative aspects that are hampering widespread acceptance?
- Which conditions need to be still fulfilled, in respect to acceptance models, in order to achieve widespread adoption?
- Should merchants accept cryptocurrencies as a form of payment?
- Which country specific factors can influence adoption of cryptocurrencies in businesses; is there a difference between Slovak and Austrian market?
- Is Bitcoin going to be "The Next Big Thing"?

Previously stated research questions are depicting the main target of this master's thesis. Guided interviews will be structured taking into account propositions found in scientific literature. Finally, diffusion between theoretical propositions and answers from interviews will enable to predict conditions under which cryptocurrencies might be adopted.

Propositions based on theoretical model:

P1: Perceived usefulness is one of factors speaking for intention to use cryptocurrency. (based on TAM)

P2: Positive subjective norm/social influence towards cryptocurrencies boosts adoption process. (based on TRA)

P2: Ease of use moderates willingness to use cryptocurrencies. (based on TAM 2)

P3: Facilitating conditions (belief of existence of system support infrastructure, e.g. governmental support) can accelerate diffusion of cryptocurrencies. (based on TAM 2)

P4: High expected cost of storing traditional currencies leads to higher demand for cryptocurrencies (Luther, Olson 2013, p13)

P5: Security concerns are the main obstacle hampering diffusion of cryptocurrencies.

P6: Crash/failure of incumbent currencies will enforce adoption of alternative cryptocurrencies. (based on Greenway's and Down's model extended by Luther)

6.8 Sample and data collection processes

As previously stated, this thesis is focusing mainly on European market with particular interest in Austrian and Slovak region. Because of this fact, experts from these countries will be chosen as relevant sample. Academic literature does not particularly specify sample size for exploratory research.

“But in general the old rule seems to hold that you keep asking as long as you are getting different answers, and that is a reminder that with our little samples we can't establish frequencies but we should be able to find the range of responses. “ (Baker et al. 2012)

Based on this statement the upper limit was kept open and just the lowest limit to candidates was set.

6.8.1 Austria

In Austria Bitcoin Association¹¹ is responsible for adoption process of cryptocurrencies, namely Bitcoin. Experts from this organization were addressed to state their thoughts about possible predictions for cryptocurrencies. Moreover, there is also an expert center for cryptographic currencies located in the creative quarter of Lend in Graz, named Coinfinity¹².

6.8.2 Slovakia

Similar approach was followed also in case of Slovakia. However, as there is not any specific organization dealing with cryptocurrencies, such as Bitcoin Association in Austria, the contacts were adhered based on principle word of mouth.

6.8.3 Respondent's profiles

1. Matej Michalko

Matej Michalko is a co-founder of startup called Decent, which focuses on creation of decentralized network owned by its users and allowing media sharing, Decent platform rests upon blockchain technology and uses advanced cryptography. Before the foundation of Decent, he organized many crypto events in Slovakia, China, Belgium and UK. He used to work for Coinsulting Company, which focused on business consultancy. He lives in Slovakia, but spends his time also in China, because of its current business.

2. Alexander Vasylchenko

Alexander Vasylchenko is currently CTO at Mycelium company based in San Francisco, but having offices in Europe, America and Asia. They focus on improving the costs of economic value transfer while using the power of blockchain technology. He is based in Vienna, working on Mycelium products, which consist of Mycelium wallet and Bitcoincard. Their Mycelium Entropy offline paper wallet gained worldwide recognition and was sold also through Amazon.

3. Andreas Petersson

Andreas Petersson started as software developer, but later on realized the power of Bitcoin and co-founded Bitcoin Austria non-profit organization, which is supporting and spreading

¹¹ <http://bitcoin-austria.at/>

¹² <https://coinfinity.co/about-en/>

the word of cryptocurrencies and mainly Bitcoin in Austria. At the same time, he works for previously stated Mycelium company and focuses on Mycelium Wallet development. He is currently based in Vienna.

4. Peter Surda

Peter Surda is Bitcoin economist and he also wrote his master's thesis about Bitcoin at Economic University of Vienna. He also handed in comments on BitLicence¹³ at NYDFS. (New York State Department of Financial Services) He specializes in economic research of cryptocurrencies, with emphasis on the economic theory. His passion started 3 years ago and currently he publishes papers, writes reviews, teaches lectures and provides consulting in this field. He writes his own blog economicsofbitcoin.com and is based in Vienna.

5. Matej Boda

Matej Boda is a big Bitcoin enthusiast and together with Matej Michalko also a co-founder of Decent company. "He is an experienced miner who enjoys building mining rigs and advising about mining process." (CeBe 2014) He believes in future of cryptocurrencies, but has doubts about Bitcoin's future.

6. Juraj Bednar

Juraj Bednár is a Slovak programmer, entrepreneur, hacker and new technology enthusiast. He wrote his first code at the age of 6. Later on, he continued as a system administrator at several companies, acted as an independent consultant and contributed to magazines. Currently he is a founder of companies Digmia s.r.o. and Citadelo. They provide high-level system administration services. The second stated business focuses on security needs of big companies. They provide hacking on demand, while trying to fix bugs in several applications.

Respondent	Occupation	Country
Matej Michalko	Decent GmbH	Slovakia/worldwide
Alexander Vasylenko	Mycelium GmbH	Austria
Adreas Petersson	Bitcoin Austria	Austria
Peter Surda	Bitcoin economist	Austria
Matej Boda	Decent GmbH	Slovakia/worldwide
Juraj Bednar	Digmia, Citadelo	Slovakia

Table 3: Interview respondents

¹³ Regulations regarding the use of virtual money in NY area

7 Study findings

This chapter provides overview of findings from interviews which were conducted from November 2015 until February 2016. This master's thesis sheds spotlight on Slovak and Austrian market, hence interviews took place in this 2 countries. Most of interviews were conducted in person, one was conducted through Skype and one per email. Overall 6 interviews were conducted with 3 stakeholders from Slovakia and 3 from Austria. Interviews lasted in average for an hour. Interviews that were conducted through Skype and in person were recorded and afterwards transcribed. Furthermore, statements were allocated into categories and after that analyzed.

The emphasis was put on main research question. *“What are the main obstacles hampering acceptance of cryptocurrencies in international business?”*

Interview questions were constructed based on factors that were discussed in previous chapters. Participants were asked to state their comments regarding positive and negative aspects of cryptocurrencies, their general perception, international relevance of cryptocurrencies, academic IT and currency acceptance models and future of cryptocurrencies.

Following chapters summarize the most important and interesting points and are trying to predict future of cryptocurrencies in respect to international business.

7.1 General perception of cryptocurrencies

This question was raised because it is difficult to characterize cryptocurrencies just with one term. National Bank of Slovakia classifies them as virtual currencies, others as digital money, German court called them *"reine Währung"*, Surda states that in Russia they are even called financial surrogates (note: cryptocurrencies are currently banned in Russia).

Interviewees agreed on digital aspect of this currency. Surda sees them as *a tool for enforcement of property rights*. Michalko considers them as *a subset of online money that uses cryptography*. Andreas Pettersson and Alexander Vasylenko agreed that they are *tool for value exchange*. Furthermore Pettersson, Bednar and Boda are underlining *also decentralized factor of cryptocurrencies and perceive them as a novel way to reach public consensus*.

To sum up, we can classify cryptocurrency as a decentralized, autonomous subset of online

money, which uses cryptography in order to reach public consensus without need of clearing middlemen.

7.2 Advantages from business point of view

In this chapter literature findings will be compared with expert's comments, in order to clarify the most important advantages that are brought by cryptocurrencies. This chapter will address one of the sub-research questions.

What is the added value for payee and payers in respect to international and domestic business?

Literature revealed 7 basic advantages of cryptocurrencies using Bitcoin as a role model: **adjustable supply, decentralization, mobile payments, anonymity, low fees, no chargebacks and possible increase in public awareness.**

Adjustable supply was perceived as positive in general. *“Seeing in small, it is good that the amount of BTC is limited.” (Michalko)*

Alexander Vasylenko praises the **anonymity** of cryptocurrencies. He continues that some services should be without any possibility to track funds that were used to pay for them. Good example is paying for speeding tickets. In Austria this payment should be anonymous, but in fact it is not. When the guilty party has to transfer money from his account, it is not even possible to pay in cash at police station. Nowadays a lot of companies are trading information. When person uses credit card, his/her insurance company could figure out e.g. how many times person ate fast-food and then they could raise insurance fee. When it is paid in cash, person's privacy is still guarded. This **privacy in digital world** are providing cryptocurrencies.

Other advantages stated by respondents can be found in following chapters. All of the advantages found in academic literature were confirmed except one. **No chargebacks** as an advantage have not been stated. Reason resides mainly in geographical focus of respondents, as in Europe chargebacks do not play any role, as payments cannot be in general undone. This advantage could be hence confirmed just in case of overseas markets.

7.2.1 Transactions and efficiency derived from decentralization

From business point of view, Michalko points out the advantage of **transaction clearing in real time** and **daily settlement**. **Low fees and fast mobile payments** were stated also among

other positive factors. Michalko, who used to be active also in cryptocurrency consulting for couple of merchants and banks, claims that acceptance of cryptocurrencies can lower transaction costs by less than 1%, whereby credit card fees can go up to 3% for each transaction. Matej Boda named these most important advantages of Bitcoin: *“Fast, cheap payments, independency from bank and limited number of coins in case of BTC.”*

All respondents mentioned also **decentralization** as the main advantage. Matej Michalko states that *“The most important advantage is that cryptocurrencies cut the middle men and therefore can make processes faster and a lot of efficient.”* Juraj Bednar adds **decentralization** and **democratization** as the most advantageous factors. Cryptocurrencies give people back **control of money** from state authorities that tend to mismanage cryptocurrencies.

Peter Surda argues that when a system is centralized, it becomes very expensive. Therefore decentralized system of cryptocurrencies is very efficient. We need to trust all points in network in centralized system. Moreover, in order to establish this trust, money and control parties are needed.

7.2.2 Advantages for e-Government

Other field, where cryptocurrency and its technology could help, is e-government. In this field cryptocurrencies benefit from its core blockchain architecture which could serve as public ledger for all transactions processed in network.

Alexander Vasylenko glorifies the technological advancement and adds that BTC can bring enormous **efficiency** on how companies and governments can process and store information. All registration of public information could move towards blockchain technology. Blockchain allows to **manage informational databases** almost for free and instantly. Furthermore, he perceives possibility for tax lowering in public sector, because of funds saved by its efficiency.

Andreas Petersson adds to this topic similar statement. *“Cryptocurrencies are one tool that can make public institutions more transparent and efficient.”*

7.2.3 Use cases for cryptocurrencies

This part will answer following research question:

Should merchants accept cryptocurrencies as a form of payment?

Respondents stated several use cases for cryptocurrencies that can be interesting for certain business models. Surda recommends using cryptocurrencies for **fast repeating transactions**. As an example he states paying for video streams. For each minute customer will be repeatedly charged. Vasylchenko agrees and predicts its use in automatic **machine to machine transactions** and situations when payments are accomplished without registration.

Petersson recommends looking for use cases in fields, where the acceptance of cryptocurrency already proved to be feasible. He states Lieferservice.at (**online food delivery platform**) as a good example. Acceptance of cryptocurrencies makes the whole process faster and more anonymous, as you **do not need to register** anywhere. Petersson highlighted example with products requiring **anonymity**. The use of cryptocurrencies is feasible e.g. when you want to buy cigars in Cuba and let it shipped to Germany, where they are totally legal. Unfortunately you cannot pay for them with usual credit card. **Gambling industry** revealed the advantages of anonymous payments as well. Surda recalls one example when company-doing business in **adult sector** could not pay for online advertisement with credit card, because they got blocked by advert provider. So they paid with Bitcoins and made use of anonymous transactions.

All participants recommend implementing cryptocurrencies in **online shopping industry, mostly in businesses with digital products**.

Petersson recalls the PR factor again. *“When there is online shopping, for example for digital product, there is a possibility that BTC will reach a larger audience. Nowadays there are a lot of goods that are sold very well with BTC.”*

Matej Boda states again the efficiency. *“Cryptocurrency works best with digital content. You can avoid paying high fees to publisher.”* His company uses blockchain technology to distribute digital content to customers through peer 2 peer network. So the author does not depend on **publisher** and therefore can receive adequate incentive for his work. Boda states criticism on the use of cryptocurrencies in brick and mortar shops and perceives BTC more as a live payment tool. The reason is the long verification process when no verification party is involved. (Approximately 10 min until the block is mined)

Surda thinks that influence on overall sales, after acceptance of cryptocurrencies, will be rather small. He does not forecast any massive cryptocurrency relevance in near future for

average brick and mortar shop.

“Acceptance of cryptocurrencies is not interesting for every business. You have to look for use cases.” (Petersson 2015)

7.2.4 PR

Juraj Bednar and Matej Michalko recommend for all merchants to accept cryptocurrencies. *“It is a good marketing at least.”* This confirms the findings from literature that claimed to use cryptocurrencies in order to gain more public awareness. Vasylchenko adds that acceptance of cryptocurrencies is like *“fetish”*. Business could stand out and **differentiate** itself from competition.

7.3 International relevance

In this chapter we will take a closer look on 2 main markets, Slovakia and Austria. However, as cryptocurrencies are worldwide currency, international perspective cannot be skipped.

Matej Michalko states on topic with **remittances**: *“Transferring money through SWIFT system takes around 3 days and it costs around 30 Eur. With cryptocurrencies, namely BTC, you can get transaction confirmed in 10 minute and in 2 hours safely credited to any account worldwide, while paying almost nothing. Clear benefit is therefore also the **transaction time**. It’s like sending an e-mail.”* Here we see another exact advantage for international businesses and also individuals working and getting salary abroad, and afterwards sending their money back to their family living still in homeland. Same opinion was shared among all participants. Schiller (2015) found out that these payments, totaled \$440 billion in 2015, which is more than overall foreign aid sent to developing countries. When nowadays Mexicans working in US want to send \$100 to their family in Mexico through Western union, the transaction fee of \$11 needs to be paid. These fees will become minimal with blockchain technology and cryptocurrencies. Hence, families often living in poor conditions, will be able to get more as they are getting right now.

Petterson sees also another potential for cryptocurrencies in **developing countries**. *“If producer in Africa does not have established identity, it is hard for him to accept money from overseas.”* If this producer will create his own e-wallet, running on smartphone, he would not need to go to bank or get a new ID in order to open an account. The whole process could be accomplished just with purchase of smartphone.

Juraj Bednar shared his idea. *“Also, there are countries that are disconnected from international banking system and using cryptocurrencies could facilitate trade with these countries. Notably, China, Japan or Iran make it really difficult.”*

Peter Surda addresses cryptocurrencies in more general way as follows: *“Cryptocurrencies are advantageous everywhere, where property right enforcement lacks or is expensive and e.g. where POS terminals do not work the best.”* This confirms also Schiller (2016) in his article. He states couple of countries, which struggle to maintain accurate records of land and business ownership. He criticizes people, who should administer them and adds one example, when officials in Honduras seized beachfront properties and bought election votes. Cryptocurrencies using blockchain could uncover any discrepancies and check if data has been modified.

Not just in developing countries, but also in our regions, cryptocurrencies are hiding another positive factor and that is their **value transfer** possibility.

Due to regulations, making international transfers is becoming more and more difficult. There are many compliance issues, banks need invoices, contracts and a lot of details regarding larger transactions. With Bitcoin, it is just entering address, typing password and hitting a button “send”. This year the regulations are even stricter and sending even €20000 to a different country usually requires a call from the bank. This slows down business. After solving the volatility problem (with hedging against major currencies), this could radically facilitate international business. (Bednar)

To sum up, clear benefits in international context are fast, cheap and no-limit transactions, remittances and possibility to do business in countries where banking sector is not developed yet.

7.3.1 Differences between countries

This part will put emphasis on following research question:

Which country specific factors can influence adoption of cryptocurrencies in business; is there a difference between Slovak and Austrian market?

All respondents came to conclusion that **there are not any big differences between Slovak and Austrian cryptocurrency market**. Surda perceives difference in capital gain tax.

Cryptocurrencies are subject of **taxation** in Austria when they are sold within one year. He sees also more fostering institution and companies dealing with cryptocurrencies in Austria than in Slovakia. (Bitcoin Verein, Mycelium, Coinfinity etc.) Peter Surda was doing also consulting for Austrian government and according his latest information, Austrian government has decided to invest into **support of start-ups** that are dealing with this problematic. Here resides the difference between the markets and also a reason why more businesses are emerging in Austria than in Slovakia. Matej Michalko adds that both countries are **similarly conservative**, but happening in these countries cannot be compared with markets like UK, USA or China. Vasylchenko states **that European market is much more developed than Asian and even US market**. He perceives actually Slovak market bigger than Austrian and does not see any legal differences. On the other hand, Boda perceives Austrian market as bigger and adds that a lot of international crypto businesses are coming to close Czech Republic.

From **worldwide perspective** there are a lot of online shops that accept cryptocurrencies. Surda picks **Germany, US, GB, Switzerland and Netherlands** as the best examples.

Best cities to spent Bitcoins nowadays are London and Berlin in Europe adds Michalko. These 2 capitals are perceiving acceptance of cryptocurrency rather as a step against government and are trying to express their anarchistic attitude. On the other hand, there are many venture capitalists in **Silicon Valley** running their start-ups based on cryptocurrencies or their architectures. **Chinese** investors understand it mainly as an investment. Michalko blames them even for the exchange rate peak in 2013. During these times they started to invest into BTC. He adds that the most of the trade with BTC takes place also in China. In US they rather invest in start-ups that are using BTC or its technology in some forms.

Boda also states that in China they likely invest into companies running exchanges and wallets. They want to just cash the profit. They do not look at usability. Most of Chinese companies are trading companies. In Europe and in America there is desire to find application for payment processor and record storage.

Vasylchenko also complains about US banking system and oligopoly. He adds that their costly and **robust system** is the reason why even more people are inclining towards cryptocurrencies in US.

Regulations

Other country specific factors are different regulations. In Europe the law is more or less similar, mainly because it is given by ECB. Petersson is **criticizing US regulation** in couple states and argues, that running a business and accepting BTCs could bring you more hurdles than advantages in US.

Juraj Bednar adds *"Country-specific regulations could be a problem (notably in Russia)"*

Surda also confirms that selling e.g. Bitcoins is forbidden in Russia. In Austria a lot of crypto businesses freely decided reporting the transactions, even it is not explicitly needed. They want to be protected against possible allegations about money laundering etc. But in general to receive payments, there are any extra steps needed. You just have to implement it right from technological point of view. (Surda)

To conclude in terms of regulations, there are not differences between Slovak and Austrian market. Differences occur among Europe, US and Russia mostly. In US the regulation differs from state to state. Petersson does not think as necessary to have e-money law tied to cryptocurrency. Surda confirms and adds that since regulators have started to look into cryptocurrencies in US, many start-ups decided to move their headquarters to other states. This example confirms that free market policy is feasible also for this kind of businesses.

"Little regulation is one of the main advantage. Destroying it, represents threat to both cryptocurrencies and business in general." (Juraj Bednar 2015)

7.4 Disadvantages

In this part the emphasis will be put on negative aspects of cryptocurrencies. Following research question will be addressed:

What are the solutions for overcoming negative aspects that are hampering widespread acceptance?

With help of this question, negative aspects and possible solutions for overcoming them will be addressed. Literature revealed these basic negative aspects or features of cryptocurrencies: **security flaws, volatility, tax evasions, rising transaction fees, government scrutiny, processing time, low acceptance.**

7.4.1 Bad PR

With previously stated positive effect on public awareness contrasts statement from Matej Boda: *“People are still kind of afraid about cryptocurrencies, BTC. It has still bad reputation in some people’s minds.”* Michalko continues in similar manner, but tries to explain bad direction of news that paint cryptocurrencies in dark colors. *“No one blames e.g. money for financial crisis. The main reason was its inappropriate use. No one also blames cash that is used to buy a rifle, when a murder happened. Why should we blame then BTC for thefts and connection with Silk road.”* Michalko and Surda also came across businesses that do not want to implement cryptocurrencies mainly because of their **bad reputation**. This could be solely overcome by right education and explanation to all potential users.

7.4.2 Rising costs and architecture of Bitcoin

Respondents agreed that cost of transactions will rise with increase of cryptocurrency amount on the market. On the other hand, they do not perceive it very negatively, as this will not be any time soon.

“I do not perceive possibility of rising cost as a problem. Businesses do not need to care. There are people who have to deal with it.” (Surda 2015)

As Bitcoin was used as a role model for all cryptocurrencies, mostly its negative aspects were recalled by experts. Michalko states criticism on BTC as follows: *“Bitcoin has nowadays a lot of flaws. It was a good pioneer, proof of concept, but **BTC cannot handle all worldwide transactions**. It will not be able to process it.”*

BTC can handle just 7 transactions per minute in comparison to VISA which process about 2000 or even more. *“Moreover **the confirmation time** should be less than 10 min.”* Bitcoin simply was not designed to handle **so many transactions** as it handles now.

Matej Boda shares his ideas and he states further drawback, the **scalability** of BTC. It involves again the amount the transactions and furthermore also the hard drive capacity needed to have full blockchain stored. *“You cannot have it fully store in your smartphone. When you want to use your smartphone, you have to use some third party client. Here it loses the most important advantage which is decentralization. Moreover, you have to trust this authority which is in general not protected against any flaws, robberies etc.”* This could lead to further loss of funds for people who do not understand the whole process. This use of third parties harms also a whole concept of decentralization, adds Michalko.

In same manner can be understand also a comment from Andreas Petersson: *“There is **increased number of crooks** compared to another industries. This is the biggest problem right now.”* This also gives politicians excuses when they slow down the e-government and similar reforms.

Vasylchenko perceives **problem in ways how to get BTC**. For general public it is still very difficult to get BTCs. However this is slightly improving by possibility to buy BTC in kiosks in Austria.

Boda adds also a problem with **possible manipulation of blockchain** and **inefficiency** in calculations by miners. *“There is a problem in BTC that couple of companies can own the majority of mining power. This makes them able to amend blockchain. Afterwards, they could control transaction process and set their transaction fees. In case of BTC, miners calculate unimportant math problems. This is total waste of electricity. Transaction cost will rise also because the maximum amount of BTC is set.”*

7.4.3 Implementation

When business already decides to accept cryptocurrencies, it is important to implement it in a correct way. Surda’s criticism relates to not only bad technical implementations, but he saw examples when **technically** was everything correct, but **user experience was very bad**. This should be taken into consideration before each launch.

Michalko recommends for merchants the use of **bit processors**. Their main advantage, in comparison with POS terminals, is the daily settlements. Business can get its money on daily basis so liquidity rises much faster. The cost for implementation for these bitpay processors is almost zero, as everyone can use smartphone or tablet.

All respondents do not recommend bookkeeping in cryptocurrencies. Petersson recommends conversion of cryptocurrencies into domestic currency. Vasylchenko adds that in his company they just mentioned BTC as transfer medium, but all was kept in domestic fiat currency. Surda even adds that there is not any software that will allow bookkeeping in some cryptocurrency. Companies cannot use BTCs in their books.

“If you want to make your bookkeeping in BTC, you have to be fanatic.” (Surda 2015)

Similarly as other respondents, he recommends to exchange BTC into any fiat currency using some kind of middlemen.

7.4.4 Volatility

As stated in theoretical part of this thesis, volatility is still a major disadvantage of cryptocurrencies. Andreas Petersson stated his fear about actual volatility of Bitcoin as follows: *“It will still take a while to become mainstream. There is still a fluctuation risk with BTC price. This is not a thing that will serious businesses want to adopt immediately.”* Bednar confirms, but on the other hand Surda admits that it is a topic, but he does not perceive it so dramatic. *“Volatility is a topic, but businesses can avoid it by using some middlemen.”* Finally, Juraj Bednar also recommends businesses to hedge against volatility. This means in other words e.g. conversion into incumbent currency right after receiving Bitcoins.

7.4.5 Security

Other aspect, which was discussed in theoretical part among disadvantages, was security of payments. On one hand anonymity of transactions is perceived positively, but on the other it brings also some security flaws together. These are the comments from experts.

Vasylchenko and Petersson actually perceive **security problems as positive**. These “scandals” are increasing mass media coverage regarding this topic, which simultaneously makes cryptocurrencies more known and therefore it could attract also new enthusiasts. All respondents agreed that it is not Bitcoin or cryptocurrencies themselves that have security issues. People are losing their money because of their **incorrect handling**. This could be e.g. use of untruthful middlemen, who store people’s funds. Why people lost their BTC when Mt. Gox crashed? Because they left them on Mt. Gox’s accounts and did not transfer it back to their individual wallets.

Experts recommend **using paper or some kind of hardware wallet** for storage of cryptocurrencies (e.g. Mycelium Entropy). Peter Surda even pays his monthly rent in BTC. He uses Cashilla as a tool handling his transactions. Thus, security problems connected with cryptocurrencies arose because of incorrect use. Users have to become more knowledgeable about ways how to store their funds.

7.5 Banking sector

To start this part, following citation sounds appropriate. *“It took Western Union 150 years to get to 500,000 agents worldwide. Abra using blockchain will have as many tellers in its first*

six months, “ Tapscotts says.

Abra is a start up which received \$12 million in venture capital funding. They use blockchain for peer 2 peer transactions, without any need of conventional institution. Person abroad wanting to send money to his family overseas finds agent and handles him cash. This agent converts cash into equivalent in BTC and sends it to other mobile device abroad. Family finds local agents and withdraws these BTC converted to cash. Each agent is able to set his own fees, with Abra cutting also a small portion. This is just one example how remittances and whole banking system could change very soon.

Nowadays, banks **control how much funds can be withdrawn** from account. This is would not be the case with cryptocurrencies, adds Michalko. Furthermore, banks could use blockchain to improve their internal processes and inter-banking communication. It saves operational cost and secures whole system.

However, Michalko expresses doubts that more banks will trade and exchange BTC such as Fidor or some banks in UK. Petersson continues in similar way, and as a reason why banks should implement blockchain technology states, that banking has not been disrupted since Second World War, and therefore cryptocurrency and their technology can bring a lot of improvements to this sector. *“There were wires used to make calls in telecommunication industry in the past and now we have Skype. Bitcoin is like Skype for banking sector. “*

Vasylchenko raised interesting point. VISA and Mastercard shareholders, even that they bread and butter are cashless transactions, confirmed that cash will never disappear. *“Cash gives people **undeniable sense of feeling of privacy**. This feeling is achieved by cryptocurrencies in digital world. “Hence the future of cryptocurrencies could be perceived positive.*

Vasylchenko, Petersson and Surda perceive tendency that rather smaller banks want to **tap a new niche market** with cryptocurrencies, in order to diversify from the others. Because of banking crisis in Europe and US, the best starting base for cryptocurrencies is exactly on these 2 continents.

“I think that there is general idea that we need more innovations in a field of money. There is a perception that banks are slow and awful and we need something better“ (Petersson 2015)

Surda adds that Bitcoin is rather meant for **end-users**, but the technology has future internally e.g bank’s back offices. They can reduce cost for IT, data auditing, reconciliation and **public ledgers**.

Final thought that is in contrast with previous statements was stated by Boda. He thinks that **BTC is not the best use of blockchain in practice**. He does not believe that that banking system can work without any guarantees. Banking is nowadays so expensive, because it takes all the risk in case of lost, robberies, frauds, hacks etc. This is not the case of cryptocurrencies.

“If you want to achieve this in cryptocurrency’s field, then you have to have some third party.”(Boda 2015)

To conclude, there are huge improvements that can cryptocurrencies and blockchain bring to banks. Starting from cost reduction, through diversification, ending up to reconciliation. One is sure. Banking system is becoming obsolete and cryptocurrency architecture is holding all good cards to improve it.

7.6 Blockchain

The most of previously stated advantages are referring to blockchain technology. This is deeply anchored in cryptocurrencies. This chapter will just briefly highlight some interesting statements regarding blockchain technology.

Matej Michalko perceives cryptocurrencies just as a minor thing in comparison to blockchain. He is comparing blockchain to “*something like WWW in nineties*”. Vasylchenko adds that blockchain is a whole new concept and attractive field for young developers. He forecasts a very bright future for it.

Blockchain is also a good technology, on which your startup, could be built. Petersson, speaking from his own experience, states that “*chances to get funding for your start-up, that uses blockchain technology, rises from 20-50 % just because of buzzword blockchain.*”

Matej Boda is the only pessimist among respondents regarding BTC. He perceives Bitcoin just as a “*good first try*”, but does not think that it will held for a long. On the other hand he praises the advantages of blockchain and sees its application in e-health, e-government systems.

To sum up, it seems that not cryptocurrencies are the best advantage embedded in this concept. They are perceived rather as tool that uses the advantage that will change the lives of others without them noticing. Blockchain brings a whole new concept to **banking system in developing countries, e-government, remittances and property rights**. Schiller (2016),

Yale Professor and Nobel Laureate, adds that blockchain can serve a role of **public ledger and can create the ID for disenfranchised people**. He sees potential also in **foreign aid**, by bypassing middlemen who represent additional cost and can be corrupted.

7.8 Analysis of academic models

In this chapter, the most suitable model for currency and technology acceptance will be determined. Firstly, respondents were provided with charts displaying all relevant aspects, embedded in each of these models. After that, they were asked to state their thoughts about each model and comment the particular factors. Lastly, they were requested to choose the best fitting model for cryptocurrencies. Factors from these models will subsequently answer following research questions.

- What are basic characteristics of stakeholders and what are their needs regarding cryptocurrencies?
- Which conditions need to be still fulfilled in respect to acceptance models in order to achieve widespread adoption?

Based on determination of main drivers for use of cryptocurrencies, together with moderating aspects, the main research question will be answered as well.

- What are the main obstacles hampering acceptance of cryptocurrencies in international business?

Moreover, positive and negative aspects influencing usage of cryptocurrencies will be outlined. Revisited model for usage of cryptocurrencies can be found in chapter 8.

7.8.1 Analysis of TRA and TPB

In this model, there are 2 important factors to depict. Behavioral belief (person's individual influence to perform particular task) and normative belief (subjective norm of public audience).

Based on respondent's answers, it is hard to determine which of these two factors is the most important. One is sure. There are not just these two factors determining the drive towards acceptance. Matej Michalko adds to this model **location and ease of use** for instance. Ease of use is one of the factors which are covered by next TAM Model.

Michalko picked **normative beliefs** as the strongest drivers. Juraj Bednar confirms it, but

similarly adds location as an important factor. He states China as the best example for normative beliefs. They perceive cryptocurrencies as an escape from currency regulations. On the other hand Vasylchenko picked personal attitude. He argues with fact that Bitcoin is currently not for ordinary people. *“Ordinary people will not make decision based on someone else’s opinion.”* In case of second factor, subjective norm, he states that we would more start-ups, to make cryptocurrencies more popular.

Petersson deflects from common factors, and chooses as the main driver for adoption **novelty** factor and **very specialized use cases**.

Boda thinks that for the adoption are both factors important. He perceives it rather as a whole process. Firstly, there is a personal attitude and then, person is going to check the information online. Thus, normative beliefs are double checked.

Surda states a good point. He mentions that Austrian population is still more conservative in comparison to other European countries. **Thus, normative beliefs** could be more important in this market. He uses example with the amount of credit card transactions in Austria, where these are still not at the level as in other European countries. *“In Austria more than average of all payments is accomplished in cash. The amount of credit card transactions is very low in comparison to EU. It is strange because credit card system is very developed here.”* He thinks that Austrians could still remember the hyperinflation from the World War I.

To conclude, it is hard to use this model as a role one. Respondent’s even added factors from other, following model and they did not agree on mutual consensus. TRA and TPB models are not the best fitting models.

7.8.2 Analysis of TAM and TAM 2

TAM model states two most important factors that drive consumers towards acceptance of new technology: **perceived usefulness and perceived ease of use**.

Ease of use was underlined also in discussions about previous model and confirmed as one the most important factors. Surda and also Vasylchenko state criticism on cryptocurrency’s ease of use. Programmers should focus on user friendliness when programming apps for cryptocurrencies. Moreover, there is not any cryptocurrency **support in book keeping** software. Boda adds interesting point to perceived ease of use. *“It depends on industry. Ease of use is for IT guys already ok. For global acceptance it should definitely improve.”* Thus, **type of end-user** also influences perceived ease of use as a factor towards acceptance.

Petterson also thinks that ease of use is for majority apps very low.

Perceived usefulness as a factor speaking towards acceptance is dependent on **geographical location of end-user**, according Surda and Bednar. In Europe the perceived usefulness is not significant driver as SEPA payments are within Euro zone for free. For international transactions the importance increases. Perceived usefulness is important factor mostly for users from developing countries (Asia, Africa etc.), or countries where banking sector is extremely costly (USA). Not just the cost efficiency is important in these terms, but also the regulations. Bednar confirms Surda's idea and adds example with regulations. For end-users who are influenced by regulations, perceived usefulness is stronger factor than to others. Vasylenko also perceives usefulness of cryptocurrencies as the strongest driver nowadays, mostly because of missing ease of use. This is likely to change in time span of 5 years, according to him. He believes that paying with cryptocurrency will be in some time as easy as nowadays paying with NFC.

To conclude, ease of use has to be improved mostly by people who are responsible for implementation. General consumer should be better advised about advantages that cryptocurrencies are offering. Non-profit organizations could represent suitable breeding ground. It was found that type of user varies the influence of perceived ease of use as driver. Furthermore, perceived usefulness is moderated by location of user, whereby it could be more significant in developing countries. TAM and its extension TAM 2 revealed important aspects that can moderate drivers towards use of cryptocurrencies. This will be added into revisited model in the following chapters.

7.8.3 Analysis of IDT

Innovation diffusion theory can be perceived such as combination of previous models. Its factors: relative advantage (perceived usefulness in TAM), compatibility (normative belief in TRA), complexity (ease of use in TAM) can be found also in previously state models. Rogers added also trialability and observability.

Juraj Bednar perceives **observability and trialability** as the most important factors. Michalko depicts **relative advantage, complexity** and trialability as the most important. General user does not care about social norms and observability, according to him. On contrary, he thinks that for future it will be necessary to **improve ease of use** and make use of cryptocurrencies unified with social norms.

Surda thinks that the most important factor is a mix of factors observability and trialability. *“From experience I know, that when I explain to others how easy it is, they will start to use them.”* Vasylichenko compares Bitcoin to bicycle. *“Bitcoin is like bicycle. Once you experience it, you will start to understand it.”* (note on trialability as factor in this model)

Bednar agrees with all of factors stated in model. Boda states that first, the most important factor is relative advantage. When person is accustomed to use some technology, there has to be very high relative advantage to switch. After this comes trialability and complexity. Complexity (degree of ease of use) is very bad in case of cryptocurrencies. You have to go through too many identification steps to get BTC. *“The normal procedure nowadays how to get BTC is to scan your ID, plus any receipt with your address. Mostly people turn off computer when they come to these steps.”*

Analysis of this model revealed another 2 important factors important for acceptance of cryptocurrencies. These are **observability**, thus extend to which the output performed by new technology is visible and **trialability**, possibility to try new technology before use.

7.8.4 Analysis of UTAUT

Unified theory of acceptance and use of technology incorporates factors covered by TAM, TAM2, TRA, TPB, IDT. It not just confirms all previous factors, but also answers one of the important research questions.

What are basic characteristics of stakeholders and what are their needs regarding cryptocurrencies?

Boda perceives **social influence** as a first important factor in this model, followed by infrastructure. Infrastructure is improved while more people are using any kind of new technology. Bednar claims that **infrastructure** is currently missing for cryptocurrencies and has to be improved, in order to get widespread acceptance.

General user

UTAUT model also includes couple of key moderating variables which have influence on behavioral intention and further, on use of new technology. These variables are age, experience, gender and voluntariness to use. Discussions about this model provided also deeper information about these moderating variables.

General cryptocurrency user can **be described as male, between 20-35, with higher education, mostly with IT or financial background.** Peter Surda describes them as **anarchists**. Michalko divides users based on geographical location. Western stakeholders (Europe, America, Australia) are in general with **upper education degree, 35 years old, understanding technology, rather liberal, partly anarchist and men.** From geographical point of view, in Europe the stakeholder focuses rather on ideology. In Asia focus shifts rather on investment.

Petersson describes Austrian and Slovak users as *“young white males, using BTCs and well educated. Moreover in Slovakia and Austria have these people computer science and some economic background.”*

Juraj Bednar perceives general user as savvy smartphone user, whose intention is currently learning something new or avoiding stupid regulation.

Boda divides cryptocurrency users also into 2 groups: *“People who are hearing BTC and are putting money on table, or the others who are libertarians, young, mostly males, with tech education.”* Boda found out that even from Bitcoin community, not everyone understands the logic behind.

General audience, masses, do not even know the technology behind cryptocurrencies. For them it is important to understand the usefulness, according to Boda. Thus, the **performance expectancy** is the most important factor that is driving acceptance. Surda claims that the most important factor are the **facilitating conditions (supporting infrastructure)**. He comes across that mostly young people without IDs cannot obtain Bitcoins. In Austria, it is better, because nowadays Bitcoins can be obtained also from kiosks. He sees problem also in education, because public audience do not know how to use cryptocurrencies.

7.8.5 Greenways's and Down's currency acceptance model

Greenway and Down added to standard economic models 2 factors. **Network effects and switching costs.** Moreover, they suggest that very poor performance of incumbent currency, such as hyperinflation can drive users to switch to cryptocurrencies. They also suggest that the more people will use cryptocurrencies, the lower transaction cost occur and the switching cost will decrease.

Surda describes the situation with cryptocurrencies slightly different in comparison to other

currencies in terms of network effect. *“I would say that network effect is strong when there is switch from one type of cryptocurrency to another. In countries, where payment system and property right enforcement are working well, network effect and switching costs are really low and not important.”* He adds that the ease of conversion process from cash into cryptocurrency could also accelerate the whole adoption process. **Poor performance** of incumbent currency was also perceived as an important decision point. Michalko even states that in his case, it was the Greek crisis that make him to look for alternative payments. Back then, he wanted to be better secured when Euro was in decline. He also underlines the direct correlation of rise in demand for Bitcoin with Grexit, and recommends people in Venezuela and similar countries, with high inflation, to look into cryptocurrencies.

Michalko states network effect as the most important factor, followed by poor performance and switching cost. Furthermore, Petersson adds that we are still far away to achieve network effect in case of cryptocurrencies. He praises also fluctuation of exchange rate and crisis in Greece and Cyprus. They are perceived in positive way, making people to look for other, better solutions to store their funds. Petersson and Vasylchenko agree with Michalko that the strongest factor is the network one. Surda stumbled upon cryptocurrencies actually just because of banking crises in Cyprus and Greece. Since then, he tries to keep just minimum money in fiat currencies.

Juraj Bednar comments on this topic: *“Fluctuation is a problem, but the solution could be hedging, not stabilizing value. Poor performance of incumbent currencies enhances the adoption of cryptocurrencies. Switching costs, network effect and poor performance are all important factors for switching.”*

Boda totally agrees with the factor poor performance of incumbent currency. He does not see incentive for people to switch from Euro to BTC, until they will not *“hit the wall”*.

Based on interviews, the most significant factor seems to be the network effect which directly influences also the switching costs. The more people use cryptocurrencies, the higher is the network effect and the lower are switching costs for them. Poor performance was also confirmed as reasonable incentive for public to switch to alternative currencies. Peek in demand for cryptocurrencies during Grexit and Cyprus crisis have already proved this in practice.

7.8.6 Extension of Greenway's model

This extension of Greenway's model deals with reasons that are speaking against adoption of Bitcoin. Luther stated these following drawbacks: **small size of network, high switching cost, rooted historical knowledge** (fear to be first mover) and **nature of currencies** (user naturally inclines to currency that is used the most).

Surda forecasts that all of Luther's factors will lose their importance over time and become minor. Once again education is mentioned as the right to tool to solve this issues.

Michalko perceives historical knowledge as the strongest driver. On the other hand, he is not so sceptic about the future of cryptocurrencies. *"It is not so far away that we had barter. Nowadays, we just believe that bank will exchange some papers for money. This will change over time."*

Petersson claims as the most negative factor the **small size of network and missing infrastructure**. Moreover, bad performance of incumbent currencies is perceived by him as farfetched.

Vasylchenko agrees on small size of network as the most negative factor and adds **high switching costs**.

Interesting point was raised by Bednar, who thinks that **governmental support will not boost up** adoption process. He perceives nature of currencies as the most important factor and compares it to network effect. Boda agrees and adds that banking adoption of cryptocurrencies could also invoke adoption by consumers through network effect. *"This could have network effect because people are trusting banks in general."*

Boda has different idea than Bednar on governmental support, as a factor for adoption. He states situation in Russia, where transaction with BTC are not allowed, and therefore also the adoption of cryptocurrencies is so low.

Based on factors revealed by Luther, historical knowledge, small size of network- missing infrastructure, high switching cost and nature of currencies(is related to network effect, because people incline to currency that is used the most) were determined as factors that are moderating the intentions towards use of cryptocurrencies in a negative way.

7.8.7 Money as memory

This model focuses rather on backend of cryptocurrencies, thus on blockchain. Authors found out that money is used as a record keeping device. In case of cryptocurrencies could be this fulfilled by blockchain. Petersson commented on this model: *“I think that it is farfetched conglomeration of terms here. I do not think that there is any connection with proof of work here.”* Bednar continued and also states criticism on this model. Rest of interviewees responded in similar manner.

To sum up, factors from this model will not be used to state any conclusions and they will be excluded from analysis.

8 Future of cryptocurrencies

In this chapter respondent's opinions regarding future of cryptocurrencies will be discussed. Furthermore, factors needed for adoption will be outlined as well. Based on findings from previous chapter, general model, including possible drivers towards intentions to use cryptocurrencies, will be presented. The focus will be put on following research question. Furthermore, the question will be extended on cryptocurrencies in general.

Is Bitcoin going to be “The Next Big Thing”?

Peter Surda forecasts a bright future for cryptocurrencies. He did not think that the main demand for BTC will slow down. He predicts that banking systems will become more open and user will get better access to it. Possible successor of Bitcoin can become Ethereum project. **Ethereum** should solve the main issues of Bitcoin such as scalability. Nowadays its own cryptocurrency, Ether, is exchanged on the markets.

Michalko perceives cryptocurrency in a positive manner too, mostly because of blockchain. He thinks that there will be several alt coins together with BTC, and they will coexist on the market. More specifically, he **doubts that BTC will persist as the main cryptocurrency**. He thinks, that **specific cryptocurrencies will be used for each specific field**. Bitcoin is simply not able to cover whole market, according to him. Furthermore, cryptocurrencies could be used as a **value transfer mechanism for international business**.

Vasylchenko still perceives Bitcoin like a “*fetish*” and is still awaiting that one cryptocurrency will establish on the market and others will continue. He agrees that BTC will not become mainstream any time soon, and similarly to Michalko, he perceives its place in **niche world**. BTC could find its place in segments with wholesale settlement systems, or in very specific markets. He thinks that cryptocurrencies will not disappear and they will **become present, without public noticing it**.

Bednar continues and states that public audience do not need to accept cryptocurrencies. They will become part of internet infrastructure and will surround us in a way that public audience will not ever notice. Similarly as the other respondents, he thinks that cryptocurrencies have potential for the future, but the **volatility issues should be fixed**. He perceives its use also in **international business**. However, he **doubts** that it will be BTC that will be used as the main cryptocurrency.

Petersson believes that in the future BTC will be recognized as a good tool for innovation and therefore will get direct funding from government. In coming years, he prognosticates the creation of cryptocurrency law that will clarify the aspects and overlaps between traditional money transmitters and cryptocurrency service providers. Petersson perceives cryptocurrencies also as a good investment right now. What is the most interesting in this field, is blockchain, according to him. He predicts that there will be more open and transparent e-government solutions in the future.

Last respondent, Matej Boda continues in a similar manner as the others. He does not think that BTC will become “The Next Big Thing”. He mentions a lot of flaws in its infrastructure and in one breath adds, that there are more technologically advanced crypto projects out right now. He forecasts **that BTC will disappear in the future**, but **blockchain architecture will persist** over time, and will be used in many fields.

To conclude and answer the research question in the beginning of this chapter, BTC seems to slowly loose its recognition as the leading cryptocurrency. Experts mentioned couple of flaws that are rather calling for its successors. In general, cryptocurrencies will have a very bright future and experts agreed that they will find its place in international business as a value transfer tool.

8.1 Revisited model for adoption

This part will outline the factors that are influencing the adoption process of cryptocurrencies. With analysis of IT and currency acceptance models, it is possible to sketch a new revisited model. As this thesis was carried out in form of empirical case studies, it has to be advised that this model represent subjective opinions of experts, who were willing to take part in this study. Because of this reason, just propositions instead of hypotheses were tested.

The Unified theory of acceptance and use of technology incorporates factors that influences the adoption process of several other models and therefore, this model was chosen as the best fitting model for explanation. Moreover, currency acceptance studies from Greenway and Down with comments from Luther revealed interesting moderating factors that have influence on this adoption process. All of these factors create basis that will outline the main obstacles hampering the worldwide acceptance of cryptocurrencies.

8.1.1 Drivers towards usage

First group of drivers (**drivers towards usage**), are elements that influence the intention to use new technology. In this case use of cryptocurrencies. Its detailed analysis can be found in chapters dealing with analysis of particular models (chapter 7.8 and further on).

Perceived ease of use was stated in models: TAM, TAM 2 and IDT (called complexity in this model). It is characterized as "the degree to which a person believes that using a particular system would be free from effort". (Davis 1986) Currently, the ease of use of cryptocurrencies is perceived as very low and has to be enhanced, in order to gain more adoption. The easier the system will be, the more acceptance will cryptocurrencies gain.

Perceived usefulness is the second driver in the revisited model. It is incorporated in TAM, TAM 2, UTAUT (called performance expectancy) and IDT (called relative advantage). It is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance". (Davis 1986) The more usefulness will cryptocurrencies bring to users, in comparison to other currencies, the more acceptance will they gain. Perceived usefulness could be e.g. lower transaction cost, faster settlement or no chargebacks in comparison to incumbent currencies.

Trialability was added to revisited model based on TAM 2 (called experience) and IDT. It is simply possibility to try new technologies before implementation. Cryptocurrencies cannot be seen on daily basis and therefore they lack trialability. Once the more people will come into contact with them, they will gain on acceptance.

Observability was chosen as one of the fitting factors, mainly because of its existence in TAM 2 (called result demonstrability) and in IDT. It can be characterized as extend to which the output performed by new technology is visible. Observability is similar factor such as trialability, but can be rather compared to experience. There have to be more use cases for cryptocurrencies in order to gain more acceptance. New start-ups, banks implementing blockchain and accepting cryptocurrencies, e-health solutions, are some of the examples.

One of the first models TRA and TPB revealed very important driver for acceptance of cryptocurrencies. These are **behavioral beliefs and social norms**. These are, in another form, stated also in TAM 2 and UTAUT (social influence). When the use of cryptocurrencies will be perceived by public audience as feasible and positive, adoption process will accelerate.

Facilitating conditions are drivers that were confirmed as appropriate for this model by all

respondents. Once they will not be appropriate infrastructure for cryptocurrencies, they will not gain more recognition. Currently, there are problems to even obtain cryptocurrencies, exchanges are not very user friendly too, and therefore this factor has to improve.

8.1.2 Moderating variables

Previous model analysis revealed some interesting moderating variables that can influence drivers towards use of cryptocurrencies and consequently their adoption process.

Based on UTAUT model, it was possible to determine, who the actual users of cryptocurrencies are, and what are they needs. Drivers towards use differ based on **gender, age and education**. It was found that mostly men, between 20-35, with higher education, incline towards use of cryptocurrencies.

Location of user also moderates the variables towards usage. For instance, perceived usefulness can be stronger driver for user that is based in developing country, where banking system is expensive or even does not exist. For European users could be perceived usefulness also lower, mostly when it comes to transactions within European Union (SEPA's are mostly for free).

Type of user was chosen also as moderating variable. Whereby in Asia people incline towards use of cryptocurrencies because of investment reasons, in Europe are users perceiving the use of cryptocurrency rather as diversion from conventional banking system. After crisis in Greece and seizure of client's assets in Cyprus, Europeans are more cautious about their funds. Moreover, user in Europe can be described as libertarian, anarchistic person who inclines towards decentralized solutions. In Asia cryptocurrency users are investors looking for short term returns. In US stakeholder's focus shifts more towards long term investment and venture capitalism.

Experience differs also among users. Users with higher IT experience have different level of perceived ease of use. Once person came into contact with some kind of technology, it is for him easier to understand the logic behind the new one. Therefore this factor was added as moderating variable. It comes from TAM 2 and UTAUT model.

PR and media coverage were added based on discussions with experts. They shared the idea that, if there would not be so massive media coverage on Bitcoin, it would never gain so high recognition. This moderates also the perceived usefulness and ease of use and other factors from this group. Once media are able to explain the advantages of cryptocurrencies, public

intention towards usage of cryptocurrencies will rise. On the other hand, once they will depict them in negative light, it could jeopardize the use.

8.1.3 Negative factors

There are also some negative factors that could slow down the whole process of adoption.

Firstly, there is **rooted historical knowledge**. Simply said, it is the fear to become first mover, to be the first one who is going to use the technology. Respondents stated that more use cases have to come up, in order to persuade people to use cryptocurrencies more.

Luther also states **high switching costs** as a problem why cryptocurrencies will not adapt. Interviews revealed that it rather comes from **nature of cryptocurrencies**. **Nature of cryptocurrencies** creates network effect which causes high switching cost. For better explanation. Nature of cryptocurrencies means that people naturally incline to currency which is the most used. This causes so called network effect. When merchants are using Euro, users will stick to Euro in order to be able to pay for goods. This goes further and more people jump in. As a number of users rises, switching costs are rising as well.

Another negative aspect, confirmed by experts, is **small size of network**. If there will not be more merchants allowing payments in cryptocurrencies, adoption of cryptocurrencies can slow down.

Respondents also perceive a problem in **usability**. Apps and supportive software is often very difficult and not very user friendly. This has to be also changed, in order to gain more acceptance.

To sum up, points raised in Greenway's and Down's model, broaden with Luther's comments, proved to be right and have to be taken into consideration in this model.

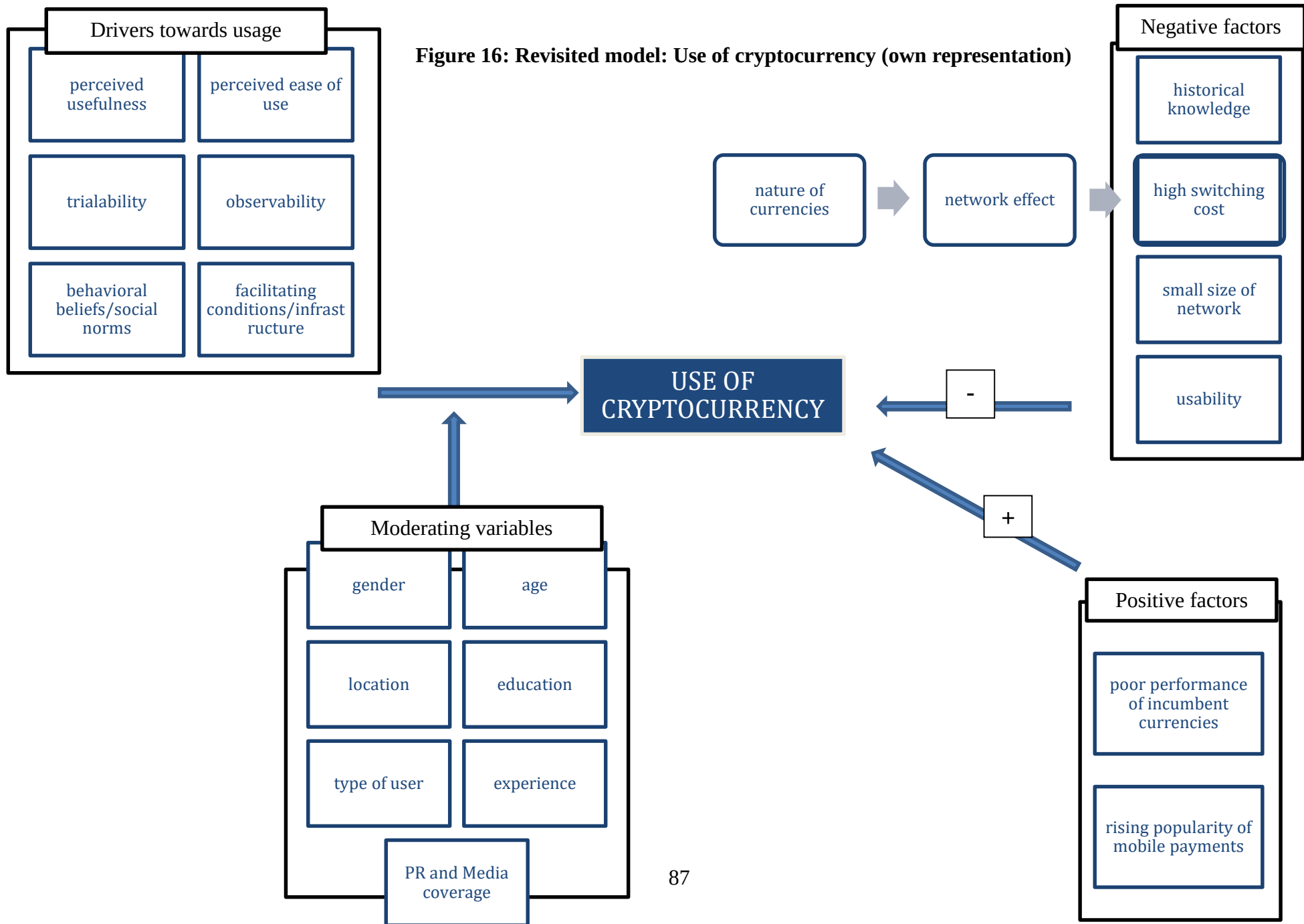
8.1.4 Positive factors

Luther also stated 2 conditions, under which Bitcoin could gain worldwide recognition. These are governmental support and hyperinflation. In the first case, it is questionable if governmental support is needed. As interviews revealed, a lot of cryptocurrencies users are libertarians with anarchistic lifestyle. They are rather deflecting from government. On the other hand, in countries where cryptocurrencies are banned, such as Russia, it could be very difficult for cryptocurrencies to gain recognition. As statements from respondents did not exactly answered this point, this condition will not be added to revisited model.

Another factor, that is supportive in use of cryptocurrencies, is the **poor performance of incumbent currencies**. This was confirmed by all experts, but also already in practice. When there were rumors about possible Greek exit from Eurozone, or crisis in Cyprus, the demand for cryptocurrencies rose substantially.

Based on interviews, **rising popularity of mobile payments** have also positive impact on use of cryptocurrencies.

Factors from model Money as Memory were not taken into consideration, as this model was not positively received by experts.



8.2 Testing propositions

To complete empirical part of this master's thesis, propositions stated in theoretical part will be examined. For this purpose the findings, from semi-structured interviews, will be used. Propositions are based on findings in academic models and should act as a supplement towards revisited model for usage of cryptocurrencies.

P1: Perceived usefulness is one of factors speaking for intention to use cryptocurrency. (based on TAM)

This proposition proved to be right and was included into revisited model. All respondents agreed on this factor. More can be found in previous chapter 8.1.1 and 7.8.2. It has to be noted, that there are also moderators that can influence the strength of this driver. (e.g. location of user, type of user etc.)

P2: Positive subjective norm/social influence towards cryptocurrencies boosts adoption process. (based on TRA)

This proposition was also confirmed and included in revisited model. The strength of social influence depends on several moderating variables. This social norm aspect varies across countries. Surda states that in Austria, where the general public is still very conservative, this plays a very important role. Similarly in China. On contrary, there are locations in Germany, e.g. in Berlin, which perceive the use of cryptocurrency as their life attitude. These users inline to cryptocurrencies mainly because of its decentralized aspects, and for them the social norms acts in opposite direction. More can be found in chapter 7.8.1.

P3: Ease of use moderates willingness to use cryptocurrencies. (based on TAM 2)

Ease of use, or as stated in revisited models perceived ease of use, was found as one of the main drivers. Ease of use was found also as a main obstacle that hampers adoption of cryptocurrencies. All respondents state that the use of cryptocurrencies is not sufficiently explained to public. Moreover, even the programmers do not make the life for people easier, when they roll out not user-friendly applications. More about perceived ease of use can be found in chapter 7.8.2 and 8.1.1.

P4: Facilitating conditions (belief of existence of system support infrastructure, e.g. governmental support) can accelerate diffusion of cryptocurrencies. (based on TAM 2)

This proposition could be confirmed just partially. Facilitating conditions revealed to be perceived as supportive aspect. Currently, when there are not many merchants accepting cryptocurrencies and there is even problem to obtain them for someone, this represents severe aspect that is slowing down the adoption process. On the other hand, governmental support was not confirmed as supportive mechanism. In countries such as Russia, where use of cryptocurrencies is banned, it is supportive factor for sure. In countries, where users want to decline from constitutional system (Germany, Benelux countries etc.), this does not represent a factor that can accelerate diffusion. Thus these proposition can be confirmed just partially. More can be found in chapter 7.8.6.

P5: High expected cost of storing traditional currencies leads to higher demand for cryptocurrencies (Luther, Olson 2013, p13)

This proposition could not be confirmed. None of the respondents confirmed this proposition. Because of this reason, this factor has not been included into revisited model.

P6: Security concerns are main obstacle hampering diffusion of cryptocurrencies.

Security concerns were discussed couple times across all of the interviews. The majority of respondents agreed that security concerns are not created by cryptocurrencies themselves. The main problem, why security flaws occur, are incorrect ways of use cryptocurrencies or incorrect tools for cryptocurrency storage. Cryptocurrency itself is a very secure way of payment. They can be perceived even more secure than incumbent currencies because of cryptography used. Security flaws occur when consumers use not-trusted nodes to store their funds. Each consumer should transfer its funds into its wallet after each transaction. (more in chapter 2.4) Respondents even perceived security flaws, when a lot of Bitcoins were stolen, as positive in particular way. Each flaw increases public awareness and media coverage. This makes a good PR. As a rule of thumb says: Also negative PR is way of PR. To sum up, security concerns were not found as main obstacle hampering diffusion of cryptocurrencies. People should just learn from their mistakes. The key is better education about cryptocurrencies. Based on these findings security concerns weren't confirmed as main obstacle hampering diffusion.

P7: Crash/failure of incumbent currencies will enforce adoption of alternative cryptocurrencies. (based on Greenway's and Down's model extended by Luther)

This proposition was found as correct. Failure of traditional currencies can lead to switch towards cryptocurrency. Respondents even stated that they switched because of unfavorable performance of Euro and problems with possible Greek exit from Eurozone and banking crisis in Cyprus. Rising demand for cryptocurrencies, in times when traditional ones are declining, is confirming this statement as well.

9 Discussions, limitations and further research

The main aim of this master's thesis was to describe and explain features of cryptocurrencies, as well as to provide future outlooks for cryptocurrencies in regards to international business. Moreover, the emphasis was put on factors that could support and hamper their worldwide adoption.

The first, theoretical part covered aspects such as cryptocurrency fundamentals starting with their development, going through their technological background, and ending with description of main IT and currency acceptance models. The most used cryptocurrencies and their features were explained as well. As cryptocurrencies are very young topic, academic literature with online sources was used to explain their most important positive and negative characteristics. This thesis includes also characteristics of Slovak and Austrian market compared with worldwide situation. Basic statistics of each market were included as well.

From business perspective, there were found several advantages in comparison to traditional currencies. Decentralization (independency from traditional banking systems), low to zero transactions costs, fast international transactions, mobile payments, anonymity, no chargebacks, possibility to increase public awareness are some of these. Implementation of cryptocurrencies is mostly feasible in online shopping industry. The best use cases are products including digital content, services where anonymity of payer has to be guaranteed, or cases when registration process is obsolete.

Second part of this thesis was dealing with empirical research. Firstly, the empirical framework, including sample and data collection process, was described. Respondent's profiles for better orientation were attached as well. Empirical part of this master's thesis was carried out in form of semi structured-qualitative interviews with respondents from Slovakia and Austria. All of the respondents are still in direct contact with cryptocurrencies. Interviewed were 3 experts currently active in Austria, and same number of experts from Slovakia. Interview questions were constructed based on findings from theoretical part.

Based on research findings, formulated propositions and research questions could be answered. Overall 4 propositions were confirmed, 2 just partially and remaining 2 were not confirmed. It was found out that perceived usefulness is one of the factors speaking for

intention to use cryptocurrency. The more are cryptocurrencies perceived as improving job performance for users, the more used they will be. Similarly, it was found that positive subjective norm (called in couple models also social influence) can boost the use of cryptocurrencies. It has to be noted, that there are also factors, that moderate the strength of these, previously stated, drivers. For example in conservative countries such as Austria and Slovakia, these social norms are playing very important role. On the other hand, in US the influence of social norm is rather marginal, as users tend to use cryptocurrencies more as a statement of their life attitude. Next, ease of use was found as factor influences the intention to use cryptocurrencies. All respondents confirmed, that nowadays there is a lack of user friendly apps for cryptocurrencies. In general, the whole process with payment and obtaining of cryptocurrencies is very difficult. Facilitating conditions, such as existence of supportive infrastructure for use of cryptocurrencies, were revealed as positive drivers towards use of cryptocurrencies. On the other hand, governmental support was not jointly confirmed. As cryptocurrencies are decentralized, support from government could hurt them and they could use their competitive advantage against incumbent, centralized currencies. High expected cost of storing traditional currencies was found as not leading towards higher demand for cryptocurrencies. Security concerns were not stated as main obstacle hampering acceptance. Respondents agreed that it is inappropriate choice for storage and managing payments, what is causing security flaws. The key is to educate consumers how to handle cryptocurrencies. Lastly, failure of incumbent currencies was found as factor that could accelerate the adoption process of cryptocurrencies. This proposition was confirmed already in practice, in times when Greece was dealing about exit from Eurozone and banking crisis in Cyprus.

The last part of this thesis discussed the factors found in academic models. Respondents were asked to state their opinions on these particular factors. Afterwards, the revisited model was built, in order to map the whole perspective with all drivers towards usage, moderating variables and also positive and negative factors influencing the use of cryptocurrencies. Perceived usefulness, perceived ease of use, trialability, observability, social norms and facilitating conditions/infrastructure were confirmed as drivers leading towards use of cryptocurrencies. However, this behavior is moderated by gender, age, location, education, type of user, experience and PR and media coverage. Based on nature of currencies (people incline to the most used currency), network effect is created and this further causes higher switching costs. These are, among historical knowledge, difficult usability and small size of

network, some of the negative factors that can hurt the adoption of cryptocurrencies. On the other hand, it was confirmed that performance of incumbent currencies could accelerate the diffusion and therefore was included in this model as well. Rising popularity of mobile payments is also supporting the adoption of cryptocurrencies, as each user can use smartphone as e-wallet.

This master's thesis focused also on Slovak and Austrian market. Based on interviews with stakeholders, it was found that these 2 markets are very similar, but still very small in comparison to other cryptocurrency markets such as Germany, US or China. Users in these markets (AT and SVK) are similarly conservative, thus are afraid to become first mover. Regulatory basis is same, as both countries are members of European Union. Both national banks follow the opinion of European Central Bank (ECB) and are advising public, that neither ECB nor NBS and ACB regulates the market with virtual currencies. There are definitely more businesses focusing on cryptocurrencies and its architecture-blockchain in Austria than in Slovakia. Surda stated, that this is probably because of direct governmental funding in Austria. In Austria it is easier to obtain Bitcoins for younger generation without IDs. Bitcoin can be bought here also in kiosks/newsstands.

To answer the main research questions, negative factors from revisited models can be used as main characteristic of factors that are slowing down the adoption process of cryptocurrencies. Historical knowledge (fear to be first mover) is one of them. People need to learn new technologies and education is the key to improve it. There is a lot of work to be done. Experts perceive it as a role for non-profit organizations that will focus on spreading of positive word of mouth. There are currently efforts from Austrian government, which offers a funding for start-ups that focus on new technologies, namely cryptocurrencies and blockchain.

Next, the small size of network is also one of the problems. If there will not be more merchants accepting cryptocurrencies, they will not become worldwide accepted.

Furthermore, there is also problem with high switching costs. Not just in form of direct costs, but indirect as well. Indirect costs occur when it is difficult for user to obtain cryptocurrencies. (for example you need to go through long and difficult verification process). Experts also confirmed, that there is currently problem with usability of software that is

connected to cryptocurrencies. Book keeping is not possible in cryptocurrencies, and therefore merchants need to exchange payments received in cryptocurrencies. Furthermore, developers have to make apps and whole software more user friendly in order to attract also general user, not just IT freaks. Thus, the infrastructure has improve.

To ensure internal validity, multiple sources were used in order to make sure that same results would be obtained also in case of replicative study. Online sources and academic models from theoretical part were combined with empirical research. Based on this, internal validity was met. In cases of qualitative researches, external validity can possess a possible problem. This is mainly caused by limited number of respondents. As in this case, this thesis is limited also by length, thus more could not be done. Therefore, it has to be noted, that all findings have to be interpreted with caution. Outcomes should not be generalized to whole worldwide market, because only participants from Austria and Slovakia were used.

Further research could examine situation in different markets. Analysis of moderating variables, such as location of user could bring new insights into this topic. It would be interesting to see, how cryptocurrencies are perceived in developing countries, where perceived usefulness is definitely higher than in Europe.

However, the aim of this master's thesis was to provide deeper insights with focus on Austrian and Slovak market. So in spite of lack of external validity, these results can be used as a starting point for future research. Moreover, cryptocurrencies seem to have bright future, thus they can be a great investment possibility and value transfer tool for international businesses. Bitcoin is perceived as a good pioneer, but as all respondents stated, it is likely to be substituted with cryptocurrency that will fix its flaws. Cryptocurrencies and its blockchain architecture are likely to become "The Next Big Thing". Dices were rolled, now it is in businesses hands to make the most of it.

Abstracts

Abstract (English)

Nowadays, a lot of tech-oriented people are discussing what could be “The Next Big Thing”. Like Facebook amended the term mass media and became very important in marketing field, cryptocurrencies are innovation that could find its place in international business.

This study focuses on cryptocurrencies, more specific on their aspects relating to international business. In the first part of this master’s thesis, several advantages for businesses were depicted. Disadvantages that could hurt the worldwide adoption were addressed as well. Literature review revealed several IT and currency acceptance models. Based on these models and comments from Luther, factors driving towards use of cryptocurrencies were found.

As a fitting research method were chosen comparative case studies that included qualitative interviews with experts. Mainly expert’s experiences were used to state comments on actual situation, advantages, disadvantages and factors stated in models. Based on these interviews, revisited model was sketched and propositions were tested. Only propositions were chosen, because the low number of interviewees does not allow us to draw any specific causal relationships.

It was found that cryptocurrencies have good aspirations to become an important tool for value transfer. Not only that, also their background architecture-blockchain seems to gain on adoption even more. This technology could make a lot of processes and businesses much more efficient. Experts agreed, that currently the number 1 cryptocurrency Bitcoin, will be substituted by technological more advanced currency in the future. Even more important is the technology hidden behind cryptocurrencies, namely blockchain.

Moreover, Slovak and Austrian markets were discussed as well. There were not found any dramatic differences between markets. In these both countries social norms/behavioral beliefs were found as very important driver that influences the use of cryptocurrencies. Beyond social norms, there are also factors like perceived ease of use, perceived usefulness, trialability, observability and facilitating conditions that are speaking towards use of cryptocurrencies.

Results of this thesis confirmed a role of cryptocurrencies in international business. It is just matter of time, when cryptocurrencies will become used in daily life.

Abstract (Deutsch)

Derzeit wird in technisch-orientierten Kreisen häufig über das “The Next Big Thing” diskutiert. Wie Facebook die Massenmedien verändert hat und sehr wichtig fürs Marketingfeld geworden ist, können auch die Kryptowährungen ihre Stelle im internationalen Handel finden.

Diese Masterarbeit konzentriert sich auf die Kryptowährungen und ihre Eigenschaften im Zusammenhang mit internationalem Business. Im ersten Teil dieser Masterarbeit wurden mehrere Vorteile für Unternehmen dargestellt. Die Hindernisse, die der weiteren Verbreitung schaden, können in diesem Teil auch gefunden werden. Die Literaturrecherche ergab mehrere IT,- und Währungsakzeptanzmodellen. Je nach den Faktoren aus diesen Modellen und Kommentaren vom Luther, wurden die Treiber, die für die Verwendung von Kryptowährungen sprechen, geschildert.

Diese Arbeit ist in Form einer vergleichenden Fallstudie mit qualitativen Expertenbefragungen ausgearbeitet. Diese Forschungsstrategie ermöglichte die aktuelle Situation, Vorteile, Nachteile und Treiber aus den Akzeptanzmodellen, anhand von Praxis-Erfahrungen, zu beschreiben. Basierend auf diesen Befragungen, ein überarbeitetes Akzeptanzmodell wurde dargestellt und die Propositionen getestet. Die geringe Anzahl der Befragten erlaubt keine konkreten Kausalbeziehungen zu ziehen. Daher wurden nur die Propositionen getestet.

Die Ergebnisse haben gezeigt, dass die Kryptowährungen sehr gute Chance haben, ein wichtiges Instrument für Wertübertragung zu werden. Nicht nur die Kryptowährungen, sondern auch die grundlegende Architektur, sprich Blockchain, scheint auf Akzeptanz zu gewinnen. Die Experten waren sich bzgl. der Zukunft einig. Die derzeit Nummer 1 Kryptowährung Bitcoin, wird durch technologisch fortgeschrittene Währungen in kommenden Jahren ersetzt.

Des Weiteren wurde auch der slowakische und österreichische Markt untersucht. Es wurden keine markanten Unterschiede zwischen diesen beiden Ländern festgestellt. In beiden Ländern spielen die sozialen Normen eine wichtige Rolle. (im Zusammenhang mit Akzeptanz von neuen Währungen und Technologien) Außer von sozialen Normen, gibt es auch andere Treiber wie wahrgenommene Handhabung, wahrgenommene Nützlichkeit, Möglichkeit des Ausprobierens, Beobachtbarkeit und die unterstützenden Bedingungen bzw. die Architektur,

die für Verwendung der Kryptowährungen sprechen.

Die Ergebnisse dieser Masterarbeit haben die wichtige Rolle von Kryptowährungen im internationalen Handel bestätigt. Es ist nur Frage der Zeit, bis die Kryptowährungen auch in täglichem Leben verwendet werden.

Bibliography

Interview references

Michalko, M. (2015) Future of cryptocurrencies, analysis of their advantages, disadvantages and acceptance models. Interview with Matej Michalko Co-Founder of Decent, Skype Interview, Bratislava-Slovakia, 19. November 2015, Interview Length: approx. 51 min, Interviewer: Jozef Negli.

Boda, M. (2016) Future of cryptocurrencies, analysis of their advantages, disadvantages and acceptance models. Interview with Matej Boda Co-Founder of Decent, Skype Interview, Bratislava-Slovakia, 18. January 2016, Interview Length: approx. 47 min, Interviewer: Jozef Negli.

Surda, P. (2015) Future of cryptocurrencies, analysis of their advantages, disadvantages and acceptance models. Interview with Peter Surda cryptocurrency speaker, lecturer and businessman, Skype Interview, Bratislava-Slovakia, 29. November 2015, Interview Length: approx. 1:35 hr, Interviewer: Jozef Negli.

Vasylchenko, M. (2015) Future of cryptocurrencies, analysis of their advantages, disadvantages and acceptance models. Interview with Alexander Vasylchenko CTO of Mycelium/Grid Singularity since 2016, Skype Interview, Bratislava-Slovakia, 28. November 2015, Interview Length: approx. 45 min, Interviewer: Jozef Negli.

Petersson, A. (2015) Future of cryptocurrencies, analysis of their advantages, disadvantages and acceptance models. Interview with Andreas Petersson Co-Founder GPS Spot and Bitcoin Austria, Skype Interview, Bratislava-Slovakia, 28. November 2015, Interview Length: approx. 45 min, Interviewer: Jozef Negli.

Bednar, M. (2016) Future of cryptocurrencies, analysis of their advantages, disadvantages and acceptance models. Interview with Juraj Bednar Founder of Digmia and Citadelo, E-mail Interview, Bratislava-Slovakia, 20. January 2016, Interview Length: approx. 14 pages, Interviewer: Jozef Negli.

Other references

ABQJournal.(2015). Payment process. www.Abqjournal.com/324935/news/betting-that-bitcoin-will-take-off.html (Access on January 18th 2016).

Affeldt, T. (2014). Selbstregulierende Währungen am Beispiel Bitcoins.ISO 690.

Association for Qualitative Research (2015). Glossary of Terms, <http://aqr.org.au> (Access on May 22th 2015).

Baker, S. E., & Edwards, R. (2012). How many qualitative interviews is enough.

Barber, S., Boyen, X., Shi, E., & Uzun, E. (2012). Bitter to better—how to make bitcoin a better currency. In Financial cryptography and data security (pp. 399-414). Springer Berlin Heidelberg.

Barki, H., & Hartwick, J. (1994). Measuring user participation, user involvement, and user attitude. *Mis Quarterly*, 59-82.

Becker, J., Breuker, D., Heide, T., Holler, J., Rauer, H. P., & Böhme, R. (2012). Geld stinkt, Bitcoin auch-Eine Ökobilanz der BitcoinBlock Chain. In GI-Jahrestagung (pp. 39-50).

Bitcoin Austria. (2015). Vorteile. <https://bitcoin-austria.at/de/business> (Access on January 20th 2016).

Bitcoin official page.(2016) Open peer 2 peer money. <https://bitcoin.org/en/> (Access on November 13th 2015).

Bitcoinnewsfeed. (2014). New York Reveals BitLicense Framework for Bitcoin Businesses. <http://bitnewsfeed.com/news-item/new-york-reveals-bitlicense-framework-bitcoin-businesses/> (Access on January 2nd 2016).

Bitcoinnewsfeed. (2015) Bitcoin 's 'Rough Start to the Year' to Get Worse?. <http://bitnewsfeed.com/bitcoin-s-rough-start-year-get-worse/> (Access on January 2nd 2016).

Bitcoinsnitch (2015). How does Bitcoin work?. <http://www.bitcoinsnitch.com/how-bitcoin-works-and-how-you-can-join-the-fun/> (Access on April 16th 2015).

Bitcointicker. Live BTC Exchange. <http://bitcointicker.co> (Access April 16th 2015)

Bitcoinwiki (2015a). How it works. <https://bitcoin.org/en/how-it-works> (Access on October 28th 2015).

Bitcoinwiki (2015b). Mining reward. <https://en.bitcoin.it/wiki/Mining#Reward> (Access on October 28th 2015).

Bitcoinwiki (2016). Blockchain. https://en.bitcoin.it/wiki/Block_chain (Access on January 7th 2016).

Bitcoinwiki. (2015). History. <https://en.bitcoin.it/wiki/Category:History> (Access on April 15th 2015).

BitcoinX. (2015). Mycelium is close to launching its bitcoin hardware wallet <http://bitcoinx.io/news/articles/mycelium-is-close-to-launching-its-bitcoin-hardware-wallet/> (Access January 12th 2016).

Brancheau, J. C., & Wetherbe, J. C. (1990). The adoption of spreadsheet software: testing innovation diffusion theory in the context of end-user computing. *Information systems research*, 1(2), 115-143.

Brezo, F., & G Bringas, P. (2012, October). Issues and risks associated with cryptocurrencies such as Bitcoin. In *SOTICS 2012, The Second International Conference on Social Eco-Informatics* (pp. 20-26).

Cassey, Michael, Paul Vogna.(2015) *Cryptocurrency: Wie virtuelles Geld unsere Gesellschaft verändert*. Ullstein eBooks.

Cawrey, D. (2014). Federal Bank VP: Bitcoin Threat Means Banks Must 'Adapt or Die' <http://www.coindesk.com/federal-bank-vp-bitcoin-threat-means-banks-must-adapt-die/>

(Access on December 5th 2015).

CCN.LA. (2016). Cryptocurrency news. <https://www.cryptocoinsnews.com/> (Access on February 14th 2016).

CeBe. (2014). <http://cebexpo.net/matej-boda/> (Access on March 21th 2016).

CJuE. (2015). The exchange of traditional currencies for units of the ‘bitcoin’ virtual currency is exempt from VAT (2015) <http://curia.europa.eu/jcms/upload/docs/application/pdf/2015-10/cp150128en.pdf> (Access on November 15th 2015).

Clinch, M.(2013). Bitcoin Recognized by Germany as ‘Private Money’, CNBC. <http://www.cnn.com/id/100971898> (Access on January 19th, 2016).

Coinbase. (2016). Merchants. <https://www.coinbase.com/merchants> (Access on January 18th 2016).

Coindesk. (2015). How to store your Bitcoins. <http://www.coindesk.com/information/how-to-store-your-bitcoins/> (Access on October 25th 2015).

Coindesk. (2016). Comparison BTC and Litecoin. <http://www.coindesk.com/information/comparing-litecoin-bitcoin/> (Access on January 20th 2016).

Coinmarketcap (2015). Crypto-Currency Market Capitalizations. <http://coinmarketcap.com/currencies/ripple/#charts> (Access on December 6th 2015).

Coinofsale. (2016). 6 reasons to start accepting Bitcoins in your store. <https://coinofsale.com/whyAcceptBitcoin> (Access on January 19th 2016).

CoinWarz: Cryptocurrency Mining vs. Bitcoin Mining. <http://www.coinwarz.com/cryptocurrency> (Access on December 2nd 2015).

Conmarketcap.com. (2015-2016) Market Capitalization for Cryptocurrencies. <http://coinmarketcap.com> (Access on December 2nd 2015).

Cryptocoincharts (2015). Chart. <http://www.cryptocoincharts.info/coins/graphicalComparison> (Access on January 9th 2016).

Cryptocoincharts. (2016) Bitcoin exchanges. <https://www.cryptocoincharts.info/markets/info> (Access on November 14th 2015).

Cryptocharts. (2015). <http://www.cryptocoincharts.info/markets/info> (Access on January 21th 2016).

Davis Jr, F. D. (1986). A technology acceptance model for empirically testing new end-user information systems: Theory and results (Doctoral dissertation, Massachusetts Institute of Technology).

Derstandard.at. (2014). "Einige Tausend Bitcoin-Nutzer in Österreich" <http://derstandard.at/1392687953180/Einige-Tausend-Bitcoin-Nutzer-in-Oesterreich> (Access on January 18th 2016).

Dillon, A. (2001). User acceptance of information technology. Encyclopedia of human factors and ergonomics.

Dillon, A., & Morris, M. G. (1996). User acceptance of new information technology: theories and models. Annual review of information science and technology.

Dingledine, R., & Golle, P. (Eds.). (2009). Financial Cryptography and Data Security (Vol. 5628). Springer Science & Business Media.

Dostov, V., & Shust, P. (2014). Cryptocurrencies: an unconventional challenge to the AML/CFT regulators?. Journal of Financial Crime, 21(3), 249-263.

Dougherty, C & Hueng, G (2014). Mt. Gox Seeks Bankruptcy After \$480 Million Bitcoin

Loss, Bloomberg News, <http://www.bloomberg.com/news/articles/2014-02-28/mt-gox-exchange-files-for-bankruptcy> (Access on January 1st 2016).

Dowd, K., & Greenaway, D. (1993). Currency competition, network externalities and switching costs: Towards an alternative view of optimum currency areas. *The Economic Journal*, 103(420), 1180-1189.

Dul, J.; Hak, T. (2008). *Case Study Methodology in Business Research*. BH – Butterworth – Heinemann, 1. Edition, Oxford, UK.

Durden, T. (2013). Visualizing how a bitcoin transaction works. <http://www.zerohedge.com/news/2013-05-12/visualizing-how-bitcoin-transaction-works> (Access on January 30th, 2016).

Farrell, Joseph, and Garth Saloner. 1986. "Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation." *American Economic Review* 76(5): 940–55.

Futurezone. (2015). Österreich: Bitcoin-Handel ohne Banklizenz erlaubt <http://futurezone.at/digital-life/oesterreich-bitcoin-handel-ohne-banklizenz-erlaubt/122.661.222> (Access on January 27th, 2016).

Griffith, K. (2014). A Quick History of Cryptocurrencies BBTC — Before Bitcoin. Bitcoinmagazine. <https://bitcoinmagazine.com/articles/quick-history-cryptocurrencies-bbtc-bitcoin-1397682630> (Access on August 6th 2015).

Houy, N. (2014). It Will Cost You Nothing to Kill a Proof-of-Stake Crypto-Currency. Available at SSRN 2393940.

Chaum, D. (1983, January). Blind signatures for untraceable payments. In *Advances in cryptology* (pp. 199-203). Springer US.

Chaum, D. L. (1981). Untraceable electronic mail, return addresses, and digital pseudonyms. *Communications of the ACM*, 24(2), 84-90.

Investopedia. (2015). Stakeholder. <http://www.investopedia.com/terms/s/stakeholder.asp> (Access on January 20th 2016).

Investopedia.(2015). Quantitative Easing. <http://www.investopedia.com/terms/q/quantitative-easing.asp> (Access on January 16th 2016).

Jevons, W. S. (1885). Money and the Mechanism of Exchange (Vol. 17).

Kannenberg, A. (2014). Kryptogeld-Regulierung in Deutschland: "Bitcoins fair behandeln". <http://www.heise.de/newsticker/meldung/Kryptogeld-Regulierung-in-Deutschland-Bitcoins-fair-behandeln-2403752.html> (Access on March 16th 2016).

Kaskaloglu, K. (2014). Near Zero Bitcoin Transaction Fees Cannot Last Forever. In The International Conference on Digital Security and Forensics (DigitalSec2014) (pp. 91-99). The Society of Digital Information and Wireless Communication.

Kelly, J. (2015) Bitcoin surges as Grexit worries mount, posts best run in 18 months, Reuters, <http://www.reuters.com/article/us-eurozone-greece-bitcoin-idUSKBN0OW2DS20150616> (Access on August 2nd 2015).

Keng, C. (2014). Bitcoin's Mt. Gox Goes Offline, Loses \$409M -- Recovery Steps and Taking Your Tax Losses. Forbes. <http://www.forbes.com/sites/cameronkeng/2014/02/25/bitcoins-mt-gox-shuts-down-loses-409200000-dollars-recovery-steps-and-taking-your-tax-losses/> (Access January 8th 2016).

Kocherlakota, N. R. (1998a). Money is memory. *journal of economic theory*, 81(2), 232-251.

Kocherlakota, N. R. (2002). Money: what's the question and why should we care about the answer?. *The American Economic Review*, 92(2), 58-61.

Koller, C., & Seidel, M. (2014). Geld war gestern: wie Bitcoin, Regionalgeld, Zeitbanken und Sharing Economy unser Leben verändern werden. FinanzBuch Verlag.

Krawisz, D. (2015). Bitcoin as a Store of Value, Unit of Account, and Medium of Exchange, Satoshi Nakamoto Institute <http://nakamotoinstitute.org/mempool/bitcoin-as-a-store-of-value-unit-of-account-and-medium-of-exchange/#selection-63.123-63.133> (Access on March 15th 2015).

Lee, C. (2013) China no plans yet to legalize use of Bitcoins, ZD Net <http://www.zdnet.com/article/china-no-plans-yet-to-legalize-use-of-bitcoins/> (Access on March 3rd 2015).

Lee, Dave. (2014). "Self-updating Bitcoin price tag shown off in East London" (4 Feb.), <http://www.bbc.co.uk/news/technology-26031331> (Access on November 21th 2015).

Luther, W. J. (2013). Cryptocurrencies, network effects, and switching costs.ISO 690.

Luther, W. J., & Olson, J. (2013). Bitcoin is memory. Available at SSRN 2275730.

Luther, W. J., & White, L. H. (2014). Can bitcoin become a major currency?.

Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. *Personality and social psychology Bulletin*, 18(1), 3-9.

Marian, O. Y. (2013). Are Cryptocurrencies' SuperTax Havens?.

Mjolsnes, S. F., & Michelsen, R. (1997, January). Open transnational system for digital currency payments. In *System Sciences, 1997, Proceedings of the Thirtieth Hawaii International Conference on* (Vol. 5, pp. 198-207). IEEE.

Moon. M. (2015). A brief attempt at explaining the madness of cryptocurrency, Engadget.com.<http://www.engadget.com/2015/01/21/cryptocurrency-explainer/> (Access on March 18th 2016).

Moore, G. C., & Benbasat, I. (1996). Integrating diffusion of innovations and theory of

reasoned action models to predict utilization of information technology by end-users. In Diffusion and adoption of information technology (pp. 132-146). Springer US.

Morris, T. and Wood, S. (1991). 'Testing the survey method: continuity and change in British industrial relations', Work Employment and Society, Vol. 5, No. 2, pp. 259–82.

Mycelium. (2016). Mycelium Entropy. <https://mycelium.com/mycelium-entropy.html> (Access on March 20th 2016).

Nadaský A, Péntes. (2015). Niekoľko úvah k virtuálnej mene bitcoin" . Slovak National Bank.

Nair, M., & Cachanosky, N. (2014). Entrepreneurship and Bitcoin: Breaking the Network Effect. Working Paper.

Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. Consulted, 1(2012), 28. OENB.(2015). FAQ. <https://www.oenb.at/FAQ/sonstiges.html> (Access on February 19th, 2016).

Nakamoto, S. (2008a). Bitcoin: A peer-to-peer electronic cash system. Nakamotoinstitute <http://nakamotoinstitute.org/bitcoin/> (Access on November 19th, 2015).

Pauerová, P. (2013). Upozornenie NBS-Bitcoin. http://www.nbs.sk/sk/informacie-pre-media/tlacove-spravy/spravy-vseobecne/detail-tlacovej-spravy/_upozornenie-nbs-bitcoin (Access on January 25th, 2016).

Pavlou, P. A. (2003). Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model. International journal of electronic commerce, 7(3), 101-134.

Raap, A. E., Poost, A., Eichhorn, S. (2009). Marketingforschung: Ein praxisorientierter Leitfaden. W. Kohlhammer: Stuttgart

Ripple (2015). Technology. <https://ripple.com/technology/> (Access on December 5th 2015).

- Roberts, E. (2011). Disadvantages. Stanford University.
<http://cs.stanford.edu/people/eroberts/cs201/projects/201011/DigitalCurrencies/disadvantages/index.html> (Access on January 20th 2016).
- Rogers, E. M. (2010). Diffusion of innovations. Simon and Schuster.
- Rubin, A.; Babbie, E. (2010). Essential Research Methods for Social Work. Cengage Learning, 2. Edition, Belmont, USA.
- Saunders, M.; Lewis, P.; Thornhill, A. (2009). Research methods for business students. Pearson, 5. Edition, Harlow, England.
- Schifter, D. E., & Ajzen, I. (1985). Intention, perceived control, and weight loss: an application of the theory of planned behavior. *Journal of personality and Social Psychology*, 49(3), 843.
- Schiller. (2016). How the technology behind Bitcoin is going to change lives of bottom billion, fastcoexist.com, <http://www.fastcoexist.com/3056481/how-the-technology-behind-bitcoin-is-going-to-change-the-lives-of-the-bottom-billion> (Access on April 10th 2016).
- Schwartz, J. A. (2008). Money Supply. The concise encyclopedia of economics <http://www.econlib.org/library/Enc/MoneySupply.html> (Access on January 15th 2016).
- Smithin, J. (Ed.). (2002). What is money?. Routledge.
- Sorge, C., & Krohn-Grimberghe, A. (2013). Bitcoin—das Zahlungsmittel der Zukunft?. *Wirtschaftsdienst*, 93(10), 720-722.
- Spenkelink, H. F. (2014). The Adoption Process of Cryptocurrencies-Identifying factors that influence the adoption of cryptocurrencies from a multiple stakeholder perspective.
- Stafford, P. (2015). Blockchain initiative backed by 9 large investment banks. *Financial times*.

<http://www.ft.com/cms/s/0/f358ed6c-5ae0-11e5-9846-de406ccb37f2.html#axzz3z7PYMajP>
(Access on September 15th 2015).

Surda, P. (2012). Economics of Bitcoin Is Bitcoin an Alternative to Fiat Currencies and Gold.
TaBa.(2016). <http://www.tatrabanka.sk/sk/o-banke/dolezite-dokumenty/cennik-sluzieb.html>
(Access on January 20th 2016).

Tornatzky, L. G., & Klein, K. J. (1982). Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings. *Engineering Management, IEEE Transactions on*, (1), 28-45.

Totakura, S. H. (2014). *Crypto-currencies & Bitcoin*.

Traynor, Moulds, Elder. (2013). Cyprus bailout deal with EU closes bank and seizes large deposits. *The Guardian*. <http://www.theguardian.com/world/2013/mar/25/cyprus-bailout-deal-eu-closes-bank> (Access on January 18th 2016).

Tran, M. (2013). Remittance company awaits court ruling on Barclays account closure, *The Guardian* <http://www.theguardian.com/global-development/2013/oct/16/barclayssomalia-remittances-court-ruling> (Access on May 18th 2016).

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science*, 46(2), 186-204.

Wirtschaftsblatt (2015). Goldman-Sachs-bastelt-an-eigenem-Bitcoin.
<http://wirtschaftsblatt.at/home/boerse/international/4880600/Goldman-Sachs-bastelt-an-eigenem-Bitcoin> (Access December 5th 2015).

Wissert, S. (2014). *Bitcoin. Geld ohne Vertrauen in Dritte?*. GRIN Verlag.

Wong, J.A. (2014). Slovakia Sets Record Straight on Europe's First Bitcoin ATM.
<http://www.coindesk.com/slovakia-sets-record-straight-europes-first-bitcoin-atm/> (Access on January 20th 2016).

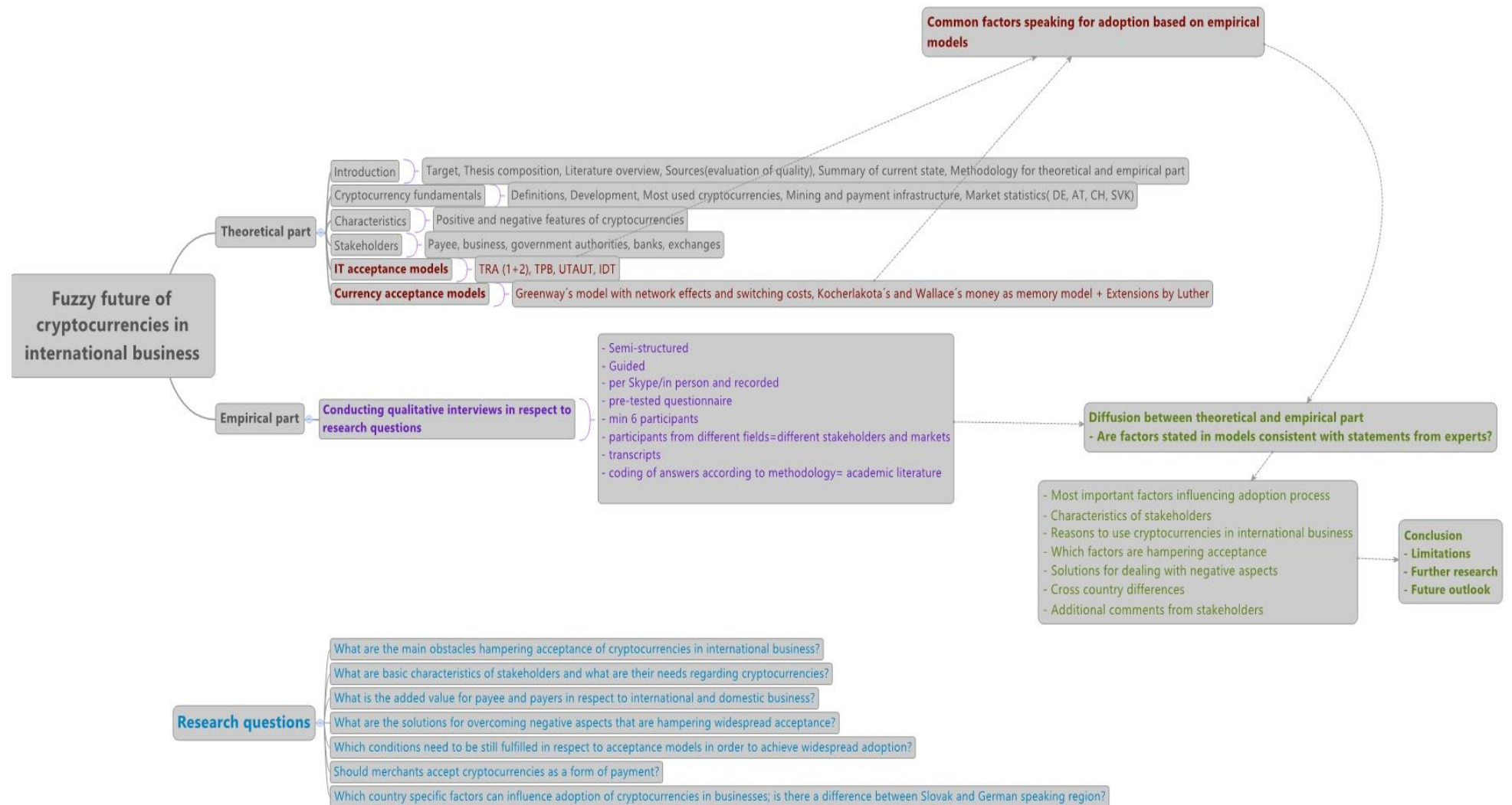
XAPO. (2016). Bitcoin price and Volatility. <https://xapo.com/resources/price/> (Access on January 10th 2016).

Yin, R.K. (2003) Case Study Research: Design and Methods (3rd edn). Beverly Hills, CA: Sage.

Zikmund, W., Babin, B., Carr, J., & Griffin, M. (2012). Business research methods. Cengage Learning.

Appendix

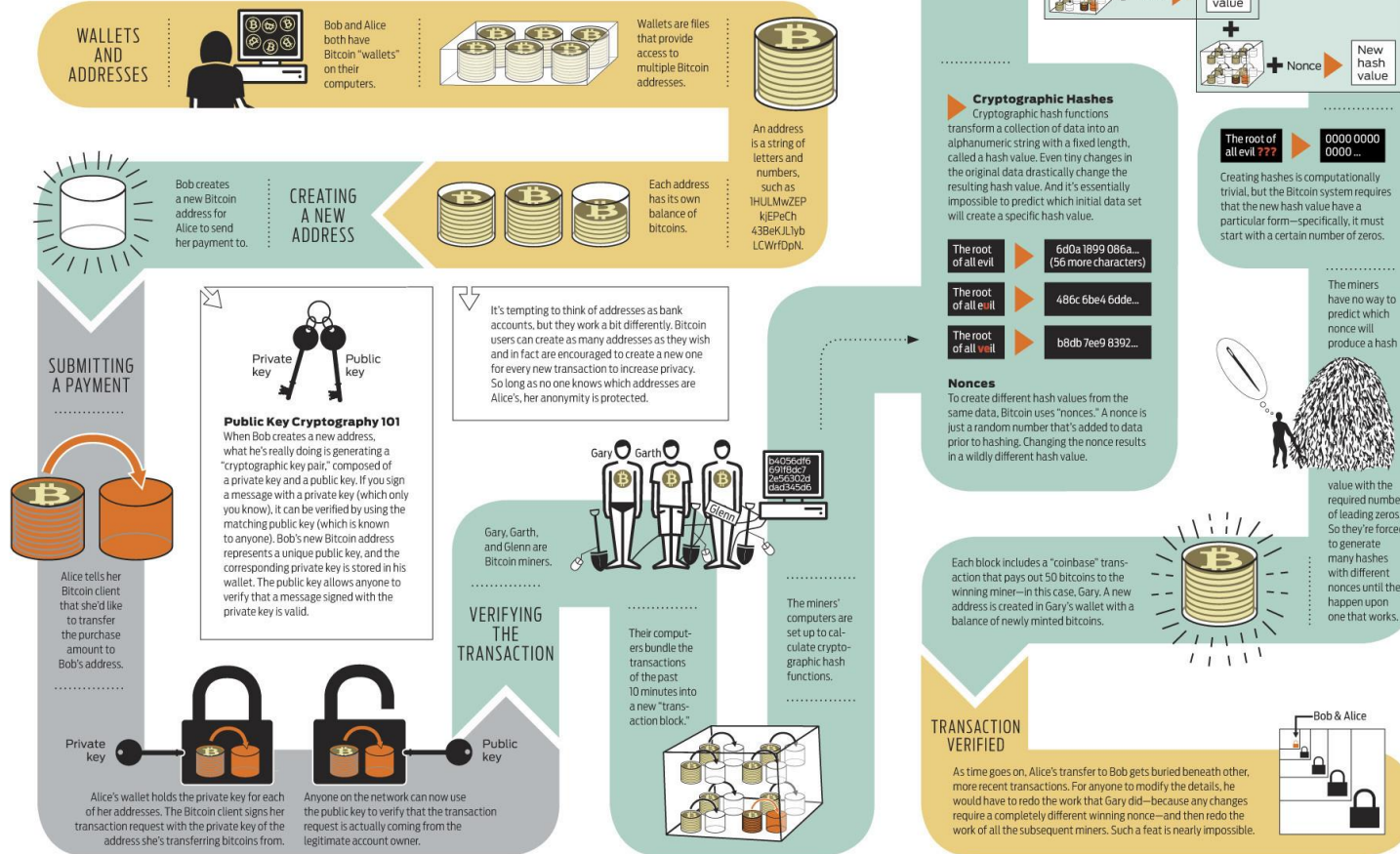
Thesis mindmap



Payment process (Durden 2013)

How a Bitcoin transaction works

Bob, an online merchant, decides to begin accepting bitcoins as payment. Alice, a buyer, has bitcoins and wants to purchase merchandise from Bob.



Interview Questionnaire

Introductory questions

What is cryptocurrency from your point of view, your perception?

Why did you become a cryptocurrency stakeholder? Is there a story behind it? What do you do in terms of cryptocurrencies?

How long are you active in this field?

Positive factors of cryptocurrencies

What are the most positive factors of cryptocurrencies according to you, what comes to your mind? Why?

From your point of view as a stakeholder, what drives you towards acceptance or use of cryptocurrencies? Depict the strongest drivers.

International context

Which of these positive factors are important for international business?

Do you use cryptocurrencies in international context, i.e. when you travel?

Do you use cryptocurrencies in your everyday life?

How do you assess the role of cryptocurrencies in international context, could they facilitate international business?

Will you recommend the use of cryptocurrency for merchants in international business, why?

Which country specific factors can influence adoption of cryptocurrencies in businesses?

Is there a difference between Slovak, Austrian and worldwide market? If yes what kind of?

Which country is the most advanced in use of cryptocurrencies?

Will you recommend implementation of cryptocurrencies for merchants from international point of view or in general? Why?

Do you see some differences, hurdles from legal point of view?

Can acceptance of cryptocurrency hurt some businesses?

Negative factors

What are the most negative factors, from your point of view?

How would you solve them?

Do you have trust in cryptocurrencies? If yes/no why?

How do you perceive security breaches- i.e. Mt. Gox scandal as a hurdle? Did you come across such a risk?(lost of funds from e-wallet)

Which tools do you use to secure your funds? Which will you recommend?

Do you think that people will deflect from cryptocurrencies because of negative factors?

Legal terms

Is there a difference in legal regulation in Slovakia and Austria?

Do you perceive cryptocurrencies as tax havens? Is it a way how to avoid taxes?

Is there a movement driving towards regulation policy, how do you perceive the future of regulation?

Banking

Do you think that banks will support, implement or accept cryptocurrencies?

Blockchain

How to you perceive idea of blockchain architecture?

Do you see possibilities for further implementation?

Questions derived from theoretical models

IT adoption models

TRA and TPB (theory of reasoned action, theory of planned behavior)

How do you assess drivers in this model? Do you agree with behavioral and normative beliefs as the strongest drivers? Which one is the strongest?

Will you add some drivers to this model?

Is the situation different in different countries (markets)? Normative vs. Behavioral beliefs

TAM-technology acceptance model

How do you perceive the easy of use and perceived usefulness of cryptocurrencies? Are there any solutions, how to endorse these factors?

How would you promote cryptocurrencies?

Comments on model?

Which factor of these will be the most reasonable to you, do you agree with them?

TAM 2

Which factor of these will be the most reasonable to you, do you agree with these factors?

UTAUT (most factors towards acceptance are similar with previous models)

Which are the strongest drivers from this model?

Can general public understand the technology behind cryptocurrencies?

How would you improve the public knowledge?

How do you perceive general cryptocurrency user? (gender, age, experience, field...)

Is there a difference from your point of view between Slovak, Sustrian and woldwide user?

What could be the intentions driving towards use of cryptocurrency?

Are conditions- infrastructure for use of cryptocurrencies sufficient?

IDT Innovation Diffusion theory

What are the factors that will persuade you to switch from incumbent currency to crypto one?

Is public audience prepared to accept cryptocurrency as a form of payment? If not/yes why? If no, what is speaking towards incumbent currencies?

This model is speaking about following drivers, which lead toward acceptance of cryptocurrencies. How do you asses them? Which are the strongest drivers?

Currency acceptance models

1 .Greenway's and Down's of currency acceptance model with network effects and switching costs

How do you assess current fluctuation in exchange rate?

Do you think that poor performance of particular incumbent currency could lead user to switch to alternative currencies? (i.e. Grexit issue)

How do you perceive switching cost?

How do you perceive transaction costs?

Which of these drivers are the strongest, in terms of adoption?

2. Extension of Greenway's and Down's model by Luther

Which factors support widespread acceptance, from these?

Will the size of network facilitate the adoption process?

Is it likely that cryptocurrency network will spread?

Which factors from this theory are the most reasonable?

3. Money as memory model by Kocherlakota and Wallace

Is blockchain sufficient tool how to monitor transactions?

Will the cryptocurrency stay decentralized also in the future?

What is speaking for and against decentralization?

Do you agree with factors in this model?

Last comments on: future of cryptocurrencies

How do you predict future of cryptocurrencies?

Do you think that there is potential for cryptocurrencies?

How do you perceive factor that the amount of Bitcoins is fixed?

Is the current amount of transactions processed at the same time (note 7) enough?

Do you think that current dispute between Bitcoin experts can hurt the currency itself?(comments on current situation, when some experts want to improve protocol)

Which conditions need to be still fulfilled in respect to acceptance models in order to achieve widespread adoption?

Do you see cryptocurrencies in future as a currency that will be used in international business?

Will BTC be used in 10 years or in future in general?

With which model do you agree the most?

(TRA and TPB, TAM, TAM 2, UTAUT, IDT, 1. Greenway, Greensways extension by Luther, Money as memory)

Thank you for your answers.

Curriculum Vitae

Personal details

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Work experience

Since 2013 LL Consulting s.r.o. , Bratislava, Slovakia, SAP Consultant, SAP XI/PI Administration, Configuration and Customizing

2009-2014 Freelance Translator, Bratislava, Slovakia

2009-2013 Streint s.r.o, Bratislava, Slovakia, Marketing account and Web-Designer

2010-2013 CCC s.r.o., Bratislava, Slovakia, Customer representative

Education

2012- 2016 University of Vienna (Master program in Economics with the focus on: International Marketing and e-Business)

June 2009 - 2012 Comenius University Bratislava, (Bachelor program with focus on Business Administration)

09/2010 - 02/2011 University Siegen, Bachelor program in Economics, Erasmus Student

Languages

Slovak Mother Tongue

German C1, DSH 3 Certificate (accomplished in 2010)

English C1

IT know-how

SAP XI/PI 7.1-7.4, SAP IS-U, ABAP (Basics), SAP CRM, UC4 Job, ProGov, IBM SPSS

Other: Wordpress, Pascal, Google Analytics, Google Adwords, Google Sites, MS Access- Relational Databases, Adobe Photoshop, MS Office

Hobbies

Sport (football, snowboard, tennis und beach volleyball), IT, friends, travelling around the world, meeting new people