DIGITÁLIS VALUTA FORRADALMA

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Összefoglalás

A bitcoin 2009-es megjelenése óta számos új kriptovaluta látott napvilágot. S habár manapság 4940 nyílt forráskódú digitális fizetőeszközt tartanak nyilván, sőt naponta jelennek meg újak, a jegybankok többsége nem fogadja el ezeket reálvalutaként. Sőt inkább annak veszélyeire és kockázataira hívják fel a figyelmet. Ugyanakkor a figyelmeztetések ellenére mégis robbanásszerűen megnőtt a kriptovaluta-tranzakciók száma.

Éppen ezért a kutatás alapvető célja, hogy vizsgálja a befektetők motivációit, valamint azt, hogy az egyes befektetők innováció diffúziója milyen mértékű. Mi indokolja ezt a nagymértékű érdeklődést és elfogadást a jelenleg még nem mindenhol hivatalos és többségében az állami szervek által nem elfogadott fizetőeszköz iránt.

Módszer: A kutatás a hazai befektetők körében vizsgálta a befektetők megtakarítási szokásait, motivációit kérdőíves megkérdezés segítségével. Fókuszba került a mintában résztvevő válaszadók innovációs elfogadásának vizsgálata is, melynek elméleti alapját a Rogers-féle modell adta.

Eredmények: A mintában megkérdezett befektetők motivációit bevételszerzési, gazdasági tényezők indokolják, de ugyanakkor erős indíttatást jelent a függetlenség is. Többségükben nyitottak az innovációkra és újításokra, ezt igazolja a klaszteranalízis is, mely szerint a megkérdezettek többsége a Rogers-féle vizsgálat alapján az innovátorok vagy korai elfogadók közé tartozik.

Kulcsszavak *kriptovaluta, bitcoin, motiváció, innovációs elfogadás, innovációs diffúzió*
JEL: *G11, G19*

DIGITAL CURRENCY REVOLUTION

Abstract

Background. Bitcoin protocol was released in 2009, which created a revolutionary virtual currency, the Bitcoin. Many cryptocurrencies have appeared in the last decade, and as a result nowadays approximately 4940 cryptocurrencies are registered, and new ones emerge almost every day. Majority of the central banks do not accept these cryptocurrencies as real currencies, rather they draw attention for their dangers and risks. At the same time, despite warnings, the number of cryptocurrency transactions has exploded.

Research aims. The aim of this research is to examine the investors' investing habits, motivations and study the acceptance of innovation. Our aims are to explore those habits and motivations, which are obstruct or incite investors' investing habits. Also, one of our aims is to study how cryptocurrency investors open for innovations and which adaption categories they can be classified into.

Methodology. During the research process, the professional bibliography of the academic basis for cryptocurrencies had been reviewed. We used the results of previous research in our study whilst we examined the investing, savings habits and motivations of the Hungarian population. Everett Rogers' theory of innovation played a vital role in our research, mostly that is what our own research was based on. During the primary research we conducted a questionnaire survey, which results were analyzed using mathematical-statistical models.

Key findings. The main motivation for cryptocurrency investors is gaining income, wealth and seeking entertainment. Their characteristics are mostly the independence and lifecycle motivation. For cryptocurrency investors, the motivation is mostly obstructed by lack of income and market information. Most of them are open for innovation and bear it inevitable. The most of them considered as innovator or late majority. They are rarely known as laggards.

Introduction

Satoshi Nakamoto created Bitcoin (BTC), the virtual currency at the beginning of 2009. There was a tremendous progress in the development of bitcoin in 2013. As a result of growing media debate, there has been a significant exchange rate explosion. In the first 10 years of bitcoin being released and available, many altcoins have been created - their amount exceeded 4940 in December 2009 -, which are based on bitcoin protocol and technology. Most states and central banks do not accept these cryptocurrencies, issued by individuals and companies as a valid currency, rather they draw attention for their dangers and risks. Like startup projects, 90% of newly issued cryptocurrencies become bankrupt. There is also a contingency that the Ponzi-schemed pilot games are released and spreading in this area. These pilot games threaten the success of bitcoin and take advantage of the investors' insufficient knowledge in this subject. However, more and more worldwide efforts are being made to create central bank dedicated to cryptocurrencies. Despite the many risks, millions of cryptocurrency transactions are initiated each, and every day, and the number of cryptocurrency investors are increasing. In most countries of the world, such as Hungary, the legal regulation of bitcoin is either completely missing or is incomplete, so many people invest in cryptocurrencies with high exchange rate volatility.

In this article we examined four research questions:

RQ1: What are the investment habits of cryptocurrency investors?
RQ2: What are the factors that inhibit and motivate cryptocurrency investors' investment habits?
RQ3: How open are cryptocurrency investors to innovation?
RQ4: Which adaptation categories can be used to classify cryptocurrency investors?

Cryptocurrency Theory

Cryptocurrencies are based on the blockchain technology, which is a key element of peer-to-peer payment networks. The blockchain is a decentralized, shared database (shared ledger) and are consistently being shared by all users. In this shared database, each block represents a data point that is time stamped and digitally signed. The blockchain contains all executed transactions that can be seen by all users, however if someone want to view the database, it requires a higher level of programming knowledge (Rubini, 2017). A block is a unit that contains unapproved data points (transactions) that are appended to an existing blockchain. These data blocks are connected by a cryptographic procedure and the new block will only be valid together with the previous block. The blocks are strictly sequential, so the longest block chain is the valid one. Each block must be approved by a minimum of 51% of the network users and then everyone needs to update the whole database (Tüzes, 2012). A blockchain is valid if it starts with a "primal block" and all transactions in it are valid. There is only one straight way from each block of the blockchain to the "primal

block". During the blocks being generated, mathematical operations convert individual data into a string called "hash" (Eszteri, 2017). Blockchain technology has many usage methods. Best known method is the first blockchain based payment network (bitcoin). The blockchain can play a decisive role in the creation of smart contracts because its protocol is based on blockchain technology. Smart contracts are capable of establishing credible transactions without the involvement of a third party. These smart contracts contain all the content that is needed for contracting (Pompianu, 2018).

Blockchain technology can be used in many places and ways, such as management, enterprise area, supply chain audits, prediction markets, protection of intellectual property rights, developing various local micro-networks, processing personal data, land registry, or even anti-money laundering (AML) and at "know your customer" (KYC) practices. Technology is also suitable for advancing in the field of digital customer identification (onboarding), securities trading, transaction management, and compliance with different regulatory requirements. (Narayanan et al. 2016). The scope of use is far from over, due of the rapid evolution of the technology. New areas appear almost every day, showing how blockchain technology can be further used and this can bring us a new and unknown economy.

Many people associate the birth of cryptocurrencies with the appearance of Bitcoin, however back in the 1980s, truck drivers used virtual money to refuel (smartcard) for security reasons in Netherlands. Rural gas stations were often robbed, and a solution was required to keep them constantly running. Money was uploaded to smartcards, marking the beginning of electronic money (Reznor 2017). DigiCash Inc. (founded in 1989), an electronic-money company, has developed unique electronic transactions and payment methods using cryptography protocols. The operation of the system was based on the use of cryptography encrypted keys, which prohibited third parties to gain access to personal data (Tapscott–Tapscott, 2016.). DigiCash systems were first supported by the American Mercantile Bank and later by the German-based Deutsche Bank. One of the companies' great products was the e-cash (electronic cash) digital payment system, which made it possible to send money over the Internet (Macintosh, 1999).

Japanese developer Satoshi Nakamoto unveiled his currency concept in 2009 based on which he created the Bitcoin (BTC) virtual currency. The coin is made up of bits only, and is not physically tangible, so it cannot be used as a coin or banknote. There is no cover behind it (gold, merchandise, etc.), "just" a source code software that allows users to access the virtual currency (Eszteri, 2012). Virtual currencies are non-material assets that are created using mathematical algorithms. Virtual currencies are typically issued and verified by the producer (not the central bank) and accepted by the users (members of the virtual system) (Bacsó, 2016). "The blockchain of Bitcoin and next-generation cryptocurrencies is a continuously written public chain, with only the last block "open" and written on, while the rest of the chain-links are forever closed, so stay unchanged. The blockchain exists and runs on many computers at a time, which store and build it" (Karvalics–Nagy, 2017: 8-9.). Cryptocurrencies contain some form of encryption (cryptography) in order to ensure secure transactions. They are characterized by decentralization, which can be linked to the application of the blockchain (distributed ledger technology) (Rothstein, 2017). Most cryptocurrencies are based on an open source system whose source code can be freely accessed, edited, or modified by anyone (Vigna–Casey, 2016). Using, editing, and developing these systems is completely free, such cryptocurrencies for example Bitcoin, Dash, Litecoin, Ethereum, Microcoin, etc. Media platforms began to provide information about Bitcoin in 2011, but for a long time only a small group of programmers and cryptographers were interested in it. Most of the information that appeared during the initial period linked the system to the Silk Road of Dark Web (Illegal Transactions of the Internet) (Ambrus, 2017). In 2013, another breakthrough happened in the development of Bitcoin,

when an exchange rate explosion in the value of the cryptocurrency took place (Kovács, 2017). The number of Bitcoins is finite. Only 21 million coins can be produced (mined), 75% of which have already been brought to the "surface" (Robledo, 2016). New coin can be generated, if "mining" users' computers are connected to the network and they find a solution for a mathematical algorithm. This requires the use of mining software. Miners receive some coins for their work, which value depends on the difficulty of mining (Norman, 2017). Creation of Bitcoin was followed by the emergence of several alternative cryptocurrencies (altcoins), which are some peer-to-peer payment networks and most of them were created by copying the bitcoin code with minimally altering. However, there are altcoins that differ in function from Bitcoin (Chuen, 2015). Following the rise and popularity of Bitcoin, many financial service providers and start-up companies have used blockchain technology and offered their services with different success. The potential of cryptocurrencies has aroused people's interest.

We must acknowledge the trust that people place in cryptocurrencies, as they invest money in a cryptocurrency because they trust in the network behind it. This trust is also decisive because cryptocurrency hype has exposed several fake cryptocurrencies which took their "victims" (eg.One-Coin, BitConnect). Confidence in cryptocurrencies has also been stirred up by the emergence of fake cryptocurrency stock exchange applications.

Investment and saving habits, motivations amongst the Hungarian population

Savings can be made by putting aside income that is not currently spent on consumption, to use it later in many expected and unexpected life situations. There may be many savings targets for individuals, such as building up emergency reserves for unexpected expenses, illness, gaining reserves for vacation, buying lower or higher value consumer goods, achieving decades-long goals (retirement, child's future, etc.). The boundaries between different savings opportunities and investments are not sharp, but there may be significant differences in the level of profit or loss achieved.

Among the factors affecting the savings and investments of Hungarian households and individuals, income, wealth, interest rates and savings targets should be highlighted. At the same time, it is important to note that there may be great differences between households and individuals in the factors that influence them. Many savings theories also adjust the size of savings to the size of their income. Income is determined by both consumption and real or financial accumulation. Lifecycle theories assume that an individual's income grows during his or her active life and then declines, so savings and investments are most likely to be made during the active period. Since the mid-2000s, credit has become increasingly popular amongst the people, with the result of households' liabilities have outstripped the growth of financial assets. Credit facilities created an opportunity to advance consumption and purchase (eg. buying a home or a car). In the past, these assets were realized by households for savings, but nowadays, target savings have declined. Financial savings can appear as investments. Interest rates and changes in the value of household wealth are mentioned in academic literature as factors influencing savings (Tatay, 2009).

State regulation also has a direct or indirect impact on the factors that influencing savings. Ability and willingness to save money effect together for savings purposes. Saving behaviour and available income influence the size of household savings (Horváthné–Széles, 2014). The savings and investments of households and individuals are influenced by external (economic, legal, social, technological, political factors and taxation) and internal (individual goals, personal attributes, age, education, marital status, financial status) environmental factors (Pálinkó–Szabó, 2007). Among the theories set up to analyze the factors influencing household savings Friedman's (1957) Permanent Income

theory and Modigliani's (1986) Life Cycle hypothesis are predominant. According to the theory of Modigliani, households try to balance their consumption expenditure over different lifecycles. The consumption and saving behaviour of different generations are different.

Saving motivations can be described through different theories, in which most of them put focus on a single saving motive, such us inheritance, motive of target saving. "Generally, there are eight main subjective motives or goals that make individuals refrain from spending their income. These eight motives can be called the motives of prudence, foresight, calculation, striving for progress, independence, enterprise, pride, and stinginess. On the other hand, we can list against them the appropriate motives for consumption for example, pleasure, myopia, generosity, miscalculation, bragging and wasting" (Keynes, 1965: 129.). In our study we used the interpretation of Keynes' motives by Tóth and Árvai (2001) and Browning and Lusardi (1996). Among the saving motives we examined the cautious, lifecycle, developmental, independence, inheritance, stingy, and business aspects motives (Tóth–Árvai, 2001). Modern categorization of saving motives can also be found in the study of Browning and Lusardi (1996), which is supplemented by Tóth and Árvai (2001) with the motive of self-motivation. Meaning of the precautionary motive is to spare for avoid poverty. Lifecycle motive refers to the phasing of future incomes and consumption line. Development motive is a form of saving that aims a continuous improvement of living standards in the future. Independence motive is a form of saving which aims the in dependence of unspecified consumption/investment decisions. The obsessive saving aptitude means aversion to spending money, this is the stinginess motive. The business aspects motive is to save money on carrying out profitable business and speculation projects. Aim of the inheritance motive is typically to gain savings for the offspring (Tóth–Árvai, 2001).

The long-term results of investing in cryptocurrencies are still cannot to be forecasted today, and there are very different conceptions about the outcome. Some believe that cryptocurrencies remain a highly risky tool of speculation, while others believe that they can function as a currency (Sebestyén, 2019). On the verge of bankruptcy, Venezuela will use petroleum-based cryptocurrency, Petro, as a unit of account and with giving workers' wages in Petro, opening a new era for cryptocurrencies (Ulmer–Buitrago 2017).

In 2016, AEGON conducted a non-representative study (n = 610 persons) on the savings motivation and savings goals of Hungarian people. 62.70% of the respondents were over the age of 55, so it was not too surprising that 35.40% of the respondents save for retirement. 32.60% of respondents identified emergency reserve as a savings target. 24.10% of them choose some kind of saving forms for investment or acquisition. Nearly 15.00% of the respondents had no savings at the time of the survey. Other savings targets appear among the answers are savings for property purchase or renovation, large amount spending in future (eg. car purchase, travel, wedding, etc.), and securing the future of children (Veresegyházi, 2016).

Savings, investments by households and individuals can be aimed at gaining income, accumulation of capital, or secure placement of capital. Before making an investment decision, it is worthwhile to set investment goals, make an investment plan and assess the associated risks (MNB, 2018.). Examining the financial investments of the Hungarian population, current account deposit, cash and government papers were the favorite form of savings in 2018. According to the data of MNB, in 2018 the gross financial wealth of the Hungarian population increased by 9.5%, while and the pension fund, stock and life insurance are becoming less and less popular forms of investment. Other forms of financial investment increased significantly in 2018, but the data does not reveal exactly what does it contain (Portfolio, 2018b).

The Hungarian academic literature as well as savings and investment statistic do not mention cryptocurrencies as an investment opportunity. According to the Hungarian National Bank (MNB),

the National Tax and Customs Administration of Hungary (NAV) and the Ministry of Finance (PM), cryptocurrencies are not considered as a legal currency, electronic money, financial or cash substitutes (Portfolio, 2018). Moreover, the MNB considers virtual payment instruments such as bitcoin [MNB n.d.] to be risky. However, in our opinion, cryptocurrencies can be a form of investment, whether or not they are considered legal currency.

It is important to note that the demand for financial literacy of the Hungarian population increased significantly during the financial and economic crisis of 2008/2009. The population access in more and more financial products and services, and this can be a risk if the individual has no basic financial knowledge or has not developed it. "This creates a gap between people's financial literacy and the level of knowledge needed to safely access the financial products on offer" (Botos et al. 2012: 292.).

Innovation theory of Everett Rogers

The diffusion theory of innovation is an effective method for understanding the acceptance of innovation by cryptocurrency investors. The method was developed by Everett M. Rogers, an American sociologist, who also developed the concept of early adapter. Rogers (1962) published his theory in his book named 'Diffusion of Innovations'. Rogers defines innovation as a practice, thought or object that people regarded as new. People who apply innovations are categorized into 5 categories such innovators, early adopters, early majority, late majority, and laggards (Rogers, 1962).

Rogers' theory defines four components of the diffusion process. These are the innovation itself, communication channels, time, and a social system. Rogers examines those dimensions and factors that influence the pace of adoption and the diffusion of the innovation (Csizmadia, 2017). The model defines individuals' acceptance of innovation in 5 steps: awareness, interest, evaluation, trial, and adoption are integral to this theory (Savery, 2005). The pace of acceptance and the adaption of innovation are determined by the characteristics of the actual innovation, which can be classified into 5 categories in terms of potential adapters, such as relative advantage, compatibility, complexity, trialability or testability and observability. Relative advantage refers to the perceived efficiencies gained by the innovation relative to current tools or procedures. Compatibility shows how innovation fits into the existing system, how fits with the values, needs, and experiences of potential users. Complexity means how difficult to learn and adapt that innovation. Testability refers to the way in which innovation can be experimentally tested. Finally, observability refers to how transparent and unambiguous the results of innovation are. The speed of innovation of adaptation is closely related to each of the examined factors. The innovation decision-making process also consists of 5 steps: knowledge, persuasion, decision, implementation, and confirmation. Knowledge is created when the individual is first exposed to an innovation and understand how it works. Persuasion is acquired when the individual is interested in the innovation and actively seeks further details about it. Decision means the expression of an individual's opinion, which may be positive or negative about the innovation. Implementation is being achieved when the individual starts using and applying the innovation. Confirmation occurs when individual finalizes his/her previous decision about using the innovation (Csizmadia, 2017).

Rogers (1962) believes that opinion-sharpers, trends and networks play a crucial role in the acceptance of innovations. Through opinion-sharpers, innovation reaches more and more people. However, important to note, that opinion-sharpers can not only accept but also reject innovations. Media play a big role in spreading innovations, because through these channels, potential users

become aware of the innovation. Timeliness also plays an important role in the spread of innovations (Csizmadia, 2017). Blockchain-based systems, products, services, and constantly evolving altcoins carry new innovations every day. Cryptocurrency investors also need to become familiar with new technologies and names, but the same time the question is how open these investors are to adapt these innovations. Above described Rogers' Diffusion Theory may be helpful to examine this question.

Material and Methods

During research of the academic literature, we did not find any viable literature, research or study that focused on the motivation or acceptance of innovation of cryptocurrency investors, however, we believe that Rogers' theory of innovation may be feasible to move us closer to understand the adaptation of innovation of the domestic investors through the four essential components of the diffusion process. Through the primary research of this study, we intended to fix this incompleteness.

The acceptance of innovation by cryptocurrency investors was examined using Rogers' theory of innovation as presented in above. Savery (2005) used the Rogers' diffusion model to examine the level of innovation of PR professionals. We thought cryptocurrency investors could be categorized as innovators, so we chose the Rogers model to examine them. Based on Rogers principles, during the examination, we used the following statements in the questionnaire:
- 10.1 I am curious, and I am the first one who tries new innovations.
- 10.2 I accept innovation and I influence others.
- 10.3 I am willing to follow others in adopting innovation.
- 10.4 I need to be convinced of the benefits of innovation created by others.
- 10.5 I have an intuition for innovations.
- 10.6 I am constantly looking for innovations.
- 10.7 My acquaintances respect my opinion on innovations.
- 10.8 I accept the innovations, but I do not influence others.
- 10.9 I admit the necessity of innovations.
- 10.10 I resist change.

The statements can be categorized into 5 groups as follows:
- Innovators: 10.1 and 10.6
- Early adapters: 10.2 and 10.7
- Early majority: 10.3 and 10.8
- Late majority: 10.4 and 10.9
- Laggards: 10.5 and 10.10

We combined the questions in the same way as Savery (2005) did, so we took the arithmetic mean of the answers of the two questions. We did several observations from the obtained data.

Our questionnaire contains 16 questions and was answered online. In order to fill in the questionnaire, we searched people who invest in cryptocurrencies in various cryptocurrency Facebook groups and forums. The questionnaire could be answered between 17 February and 21 March 2019. The questionnaire was completed by 214 people, hence n = 210 people. When we determined the focus group: eligibility criteria were that the respondents should have some form of cryptocurrency

investment. The questionnaire included demographic (personal) questions and subject-specific questions. By asking topic-specific questions, we examined three areas:

1) Investment habits of cryptocurrency investors;
2) Motivations of cryptocurrency investors;
3) Acceptance of innovation among cryptocurrency investors.

Investing habits of cryptocurrency investors was examined by 4 single- and multiple-choice questions. Questions related to how investors have cryptocurrency, what type of cryptocurrency they have, what other type of investments would they consider and what percentage of their investments are cryptocurrency investments.

When we examined the motivation of cryptocurrency investors, we looked for those factors that discourage and motivate respondents during their invests. During the examination of motivation, we compiled 4 topics. Each contained 9-7-7-5 statements, which had to be rated on a 5-point promoter score scale, where 1 = absolutely not, 5 = strongly agrees.

We used the questions and statements of the questionnaire compiled by Savery (2005) – and remodelled by us – based on Rogers' innovation theory to examine the acceptance of innovation of cryptocurrency investors. By asking three group of questions, we examined that how much investors are open to innovations. Each topic contained 10-10-7 statements, which could be rated on a 4-point promoter scorescale, according to how much the respondents are characterized by the statement (where 1 = not at all and 4 = very typical). Microsoft Excel and SPSS were used to evaluate the questionnaires.

On the one hand, we used the method of Savery (2005), combined statements, and formed 5 groups based (innovators, early adapters, early majority, late majority and laggards) on the arithmetic mean of the responses received. On the other hand, Kolmogorov-Smirnov normality test was used to examine the normal distribution and to determine further methods of analysis. We also found it important to eliminate statistical errors affecting the results of the tests. The normality test revealed that neither the original items nor the trained variables follow a normal distribution. Statistical hypothesis testing was performed for different parameters (gender, education, age). Relationships between male and female acceptance of innovation were made with the Mann-Whitney test, while education and age comparisons were made with the Kruskal-Wallis test. We examined whether the surveyed persons could be divided into relatively homogeneous groups in terms of "innovation", and whether there is a significant difference between the formed clusters in the other variables. First, we performed a hierarchical cluster analysis and then a k-focused cluster analysis.

Results

144 men and 66 women participated in the questionnaire survey. The proportion of respondents was 68.60% male and 31.40% female. The 30-40 age group was the largest group among cryptocurrency investors, but not far behind the second largest group was the 41-50 age group. It can be surprising, that respondents over the age of 51 represented 25.71% of the questioned ones. Most surveyed cryptocurrency investors can be divided into two groups on the basis of their educational qualifications: those who have secondary education (44.8%) and those who have higher education (college, university) (43.3%). The majority of those who judged their standard of living, live better, or much better, than an average Hungarian citizen, however 40% of respondents were unable to determine how they live compared to an average citizen.

Attitudes towards cryptocurrencies

Satoshi Nakamoto released the first version of the bitcoin in 2009 and 0.48% of surveyed people started inquiring about cryptocurrency investments in the year following the release of the bitcoin protocol. Bitcoin became world famous during the financial crisis in Cyprus in 2013, however, only a small percentage of Hungarian investors started to get to know it at this time. Two thirds of cryptocurrency investors have only been interested in cryptocurrency for 3 years. This is surprising, since Bitcoin exchange rate has fallen to a nominal after December 2017 and problems has become clear, such as exchange rate volatility, security (hacker target), lack of warranty and regulation, etc. Slightly more than a quarter of surveyed people started to become interested in cryptocurrencies in 2018. In the first 3 years of the cryptocurrency's presence, only a small proportion of investors were open to cryptocurrencies, they were the "early investors" or "risk-takers". The initial spread of cryptocurrencies in Hungary was discouraged by, among other things, the shadow banking system, its dubious reputation, the lack of a regulatory background, and tax issues (Kecskés–Zéman, 2018).

There are several ways to invest in cryptocurrency, including buying cryptocurrency, mining cryptocurrency, investing in a cryptocurrency investment fund or a mining company etc. A large number of cryptocurrency investors use multiple cryptocurrency investment methods at the same time. Nearly two-thirds of investors buy cryptocurrency as a form of cryptocurrency investment, one-third investing in a mining company, also one-third choosing cryptocurrency mining, while only a few investors prefer take money in a cryptocurrency investment fund. However, investors may use other cryptocurrency investment methods besides the ones we examined, such as ICO, Faucet, AvaTrade, or Forex trading. It also important to note that pyramid schemes, such as ICO-called scams, are increasingly spreading, in which perpetrators create fake (non-existent) virtual money and cheat people with the promise of high returns. According to a 2017 report by Erst& Young, the perpetrators caused a huge amount - $400 million –of damages (Tóth, 2019). In our research, we did not examined how investors purchased cryptocurrency (from exchange bills, cryptocurrency ATMs, individuals, etc.). We also did not study the computer or technology used by cryptocurrency miners to produce their coins. Most cryptocurrency investors have invested in different cryptocurrencies so far.

Half of the surveyed people chose Bitcoin from the Top 10 Cryptocurrencies of the Coinmarketcap (Cryptocurrencies by Market Capitalization) on 22 February 2019, similarly to international trends; Bitcoin is the most popular cryptocurrency among Hungarian investors. Beside Bitcoin, Ethereum and Litecoin cryptocurrencies are also very popular among cryptocurrency investors. Ethereum is both a computing platform and a cryptocurrency that includes a smart contract function (script) and it is also one of the best known and most popular altcoin among cryptocurrency investors. (Figure 1)
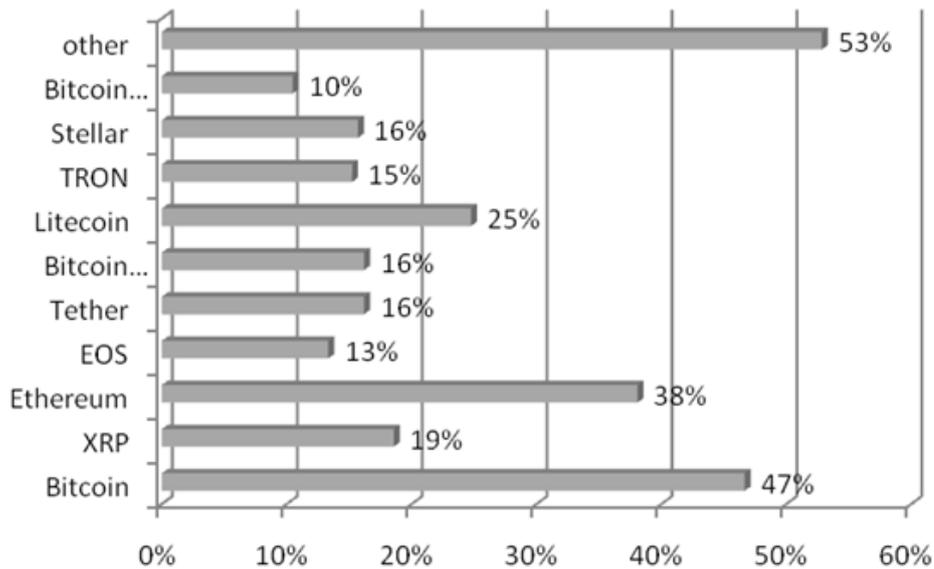
Figure 1. Cryptocurrency choice among investors (%)
Source: own construction according to the quantitative research, 2020. N=210

Different Bitcoin forks, such as Bitcoin Cash, Bitcoin SV, or Bitcoin Gold are also popular be-tween investors. At the same time, it is also noticeable that cryptocurrency investors often choose cryptocurrencies outside of the Coinmarketcap Top 10. Other indicated cryptocurrencies include Monero, NEO, IOTA, Verge, ZCash, ADA, DOGE, DGB, VeChain, Ontology, Platincoin, Decred, Holo, Cardano, Dogecoin, Dash. These cryptocurrencies can also be found in between other cryptocurrencies: Smart Trade, 4Art, ConvertVR, Nano, Omise GO, WBT, BNB, LOC, TFD, BSO, BNO. It is important to note, that among the other cryptocurrencies mentioned by the respondents, there are some that are often come into contact with the Ponzi-scheme (pyramid scheme), such as OneCoin or DasCoin. The last two "cryptocurrencies" are often identified with scandals, pyramid-like operations and business models or links to the shadow banking system.

Investment motivations of cryptocurrency investors

When presenting the criteria used to motivate cryptocurrency investments on a 1 to 5 Likert scale, it is clear that the main motivations for cryptocurrency investors are gaining wealth (4.67) and income (4.66). (Figure 2)
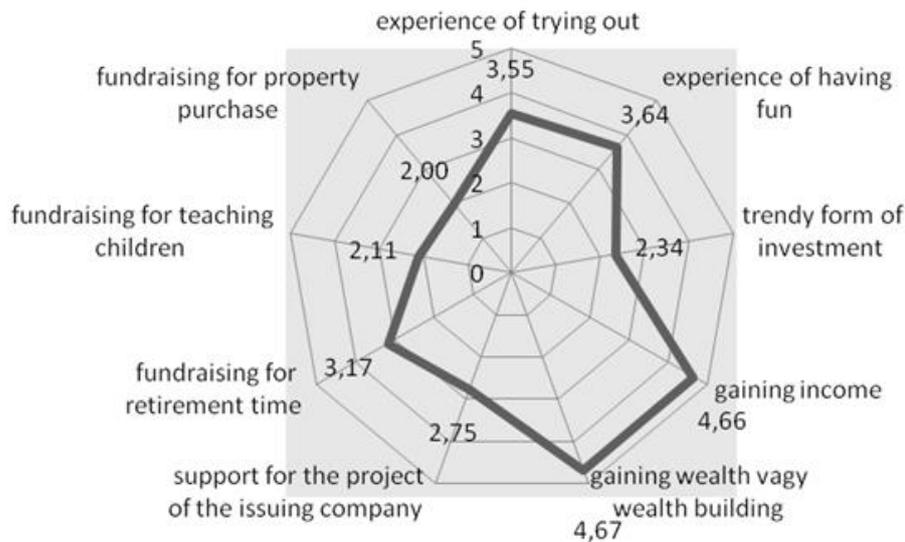
Figure 2. Investment motivations of cryptocurrency investors (Likert-scale)
Source: own construction according to the quantitative research, 2020. N=210

While we examined the income gaining motivation, we did not analyze whether investors'income stem solely from investing in cryptocurrency or, they have a full-time earning activity, and investing in cryptocurrency is considered as a passive source of income. Experience of novelty (3.55) and having fun (3.64) are moderate motivation factors. There are few cryptocurrency investors who invest in cryptocurrency solely for the sake of having fun or trying it out. The least motivating for cryptocurrency investors is fundraising for property purchase (2) and fundraising for teaching children (2.11). Horváthné and Széles, (2014) survey's results, based on 4106 household, shown that those who are in the "self-care" and "conscious self-care" clusters prefer housing (4.4), as motivation, over cryptocurrency investors. Those who are in the "Live for Today" cluster have almost the same motivation in property purchase as cryptocurrency investors. According to the AEGON survey, only 12.8 % of the savings are for property purchase (Veresegyházi, 2016). All three clusters, which created by Horváthné and Széles, (2014), rated children's futures as motivation higher than cryptocurrency investors. The results of the AEGON survey show that nearly a fifth of savers are thinking about saving for children's future. In the research of Tóth and Árvai (2001), the proportion of savings related to children and property are higher than the results obtained by the survey of AEGON and by us.

Examining the saving motives of Tóth and Árvai (2001) in Keynes interpretation, it can be stated that among the motivations of cryptocurrency investors, the independence motivation is significant based on the values obtained on the Likert-scale (4.73). Investors try to establish permanent financial independence, and most of them find this very motivating. So, we can see how important it is for cryptocurrency investors to make savings in order to ensure the independence of unspecified consumption/investment decisions. Most cryptocurrency investments aim at reaching financial independence. Lifecycle motivation is also completely typical ofmost respondents (4.25). Respondents consider it important to make provision for the time when the ratio between income and needs will change (eg.: retirement care). 86.2 % of investors can completely or mostly identify the lifecycle motivation as a savings motivation. The business aspects motivation (3.98) is also very

common among respondents. Business aspect and developmental motivation show expectations about the improvement of expected income and investment environment (Tóth–Árvai, 2001). Cautionary motivation is less typical (3.46) for cryptocurrency investors other than the above-mentioned investment and savings motivations. At the same time, it should be noted that, between 1995 and 2000, cautious motivation was the leading saving motivation among the Hungarian population, although it showed a decreasing tendency even then. "Savings for unexpected events and illnesses have decreased, while on the other hand, the amount of saving for investments has significantly increased" (Tóth and Árvai, 2001. 1022.). As a result of the financial and economic crisis of 2008/2009, the caution motive came to the front again in the accumulation of financial assets. However, with iterative disengaging of the cautionary motive, a slight decline in household savings can be expected (Csortos and Sisak 2016.). For cryptocurrency investors, we did not find any strong cautionary motivation. Surveyed investors rated development motivation as moderate importance, when people invest for a higher consumption in the future or, for example, they gradually improve their standard of living (3.01). They are less likely to identify with inheritance motivation (2.75) and stinging motivation (1.31). For cryptocurrency investors the obsessive behavior to save money or irrational aversion to spending money is not decisive. Surveyed people are not motivated to leave money for their heirs as an inheritance from cryptocurrency investments, this is one of the least motivating factors for them.

We examined the retaining forces of investment motivations of cryptocurrency investors. The surveyed cryptocurrency investors see income (2.62) as the main obstacle of investment motivation. The lack or the availability of financial resources negatively influences investment motivation. The low value on the 1-5 Likert-scale is also due to the fact that only 6.2 % of respondents believe that the motivation to invest in cryptocurrency is completely retained by income. Lack of information is considered as the second most discouraging factor by the investors, and it followed by the lack of experience in investment. These last two factors also have almost the same negative leverage among cryptocurrency investors. However, the lack of education and the lack of necessary technology are less of an obstacle for investors. Finally, lack of decision-making is the least importantretaining force for investors. Overall, respondents did not consider the examined factors (1.87) as decisive for obstruct the motivation for cryptocurrency investments.

Acceptance of cryptocurrency investors towards innovation

13.8% of surveyed investors believe that the use of innovations has improved their image. However, the number of those who believe the opposite is higher (16.2%). All in all, the claim can be judged positively (2.46), so innovations typically improve the image of investors. 26.7% of respondents use individual investment innovations to gain a competitive advantage, and only 4.8 % of the respondents disagree with this practice (3). It can be stated that most cryptocurrency investors use individual investment innovations for efficiency, effectiveness, success, and competitive advantage. 38.1% of surveyed cryptocurrency investors use blockchain-based innovations and only 1.9% do not use them (3.23). 47.6% of respondents are investing online, and among surveyed investors, there was no one who would not do the same way (3.38). Only 1% of investors prefer the traditional paper-based investment, while 56.2% of them do not want to do their investments in paper at all (1.54). Examining the adaptation and use of innovations on a 1-4 Likert scale, it can be concluded that cryptocurrency investors agreed the most with the following statement: "The innovations I apply are correspond with my existing values and needs." They least thought they would do their investments in a traditional paper format.

We examined how the respondents describe themselves in terms of innovation level by combining the questions. Percentiles give their views. (Figure 3) Percentiles for values of 3 or above indicate that they tend to agree, while those with a value below 3, do not agree. 74.30% of the respondents consider themselves to be innovators, while only 41.4% consider themselves early adopters. 67.6% of cryptocurrency investors described themselves as early majority, 94.8% as late majority and less than 10% as laggards. The nature of cryptocurrency investing is that adopting new technology can mean that one person considers him- or herself as an innovator, follows, considers innovation necessary, but does not want to influence others.
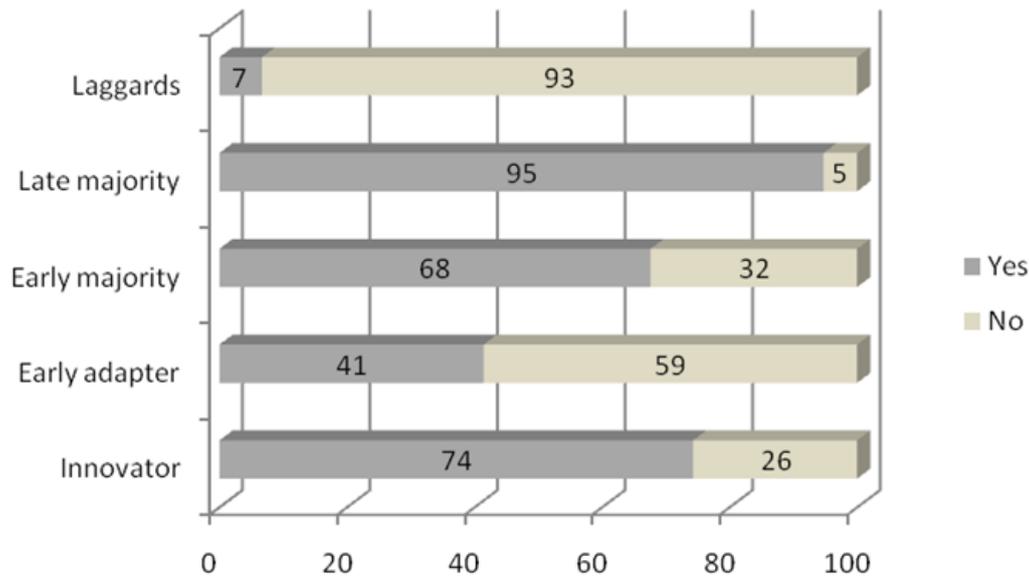
Figure 3. Distributions by combined indicators (%)
Source: own construction according to the quantitative research, 2020. N=210

We examined whether there was a difference between self-esteem of men and women in a combined index. Hypothesis testing was performed with the Mann-Whitney test, because the variables are not normally distributed. In each cases the evaluation of men and women did not differ. The next consideration was whether school education influences the opinions formed, but there is no significant difference in this aspect either. The assay was performed with the Kruskal-Wallis test at a significance level of 0.05. Significance levels were as follows: innovators $p = 0.409$, early adapters $p = 0.624$, early majority $p = 0.465$, late majority $p = 0.098$, laggards $p = 0.332$. Then age groups were formed: under 30 years, 30-40 years, 41-50 years, 51-60 years and over 60 years. The assay was performed with the Kruskal-Wallis test at a significance level of 0.05. We studied whether age influences the level of innovation, but this does not show any statistically justifiable differences either. Significance levels were as follows: innovators $p = 0.963$, early adapters $p = 0.350$, early majority $p = 0.880$, late majority $p = 0.485$, laggards $p = 0.656$.

We examined whether the respondents could be divided into homogenic groups from the point of view of "innovators" and whether there was a significant difference between the clusters thus formed in the other variables. First, we did a hierarchical cluster analysis to get a visual representation of the number of groups that could be formed. Based on the results, we found that there are several levels of opinions. By examining the upper levels of the dendrogram, 3, 4 or 5 distinct branches can be selected. Lastly, we used k-center cluster analysis on groups containing 3,4 or 5

options. In the k-center cluster analysis, we get the most balanced clusters as a result of 4 cluster grouping, but there was no significant difference between them. Finally, after division into three clusters, a well separated grouping was established. (Table 1)

Table 1. Adaptation groups

Adaptation groups made by Rogers	Adaptation groups made by primary research
Innovators	Cryptocurrency innovator (Cluster1)
Early adopter	Medium cryptocurrency innovator (Cluster2)
Early majority	Less cryptocurrency innovator (Cluster3)
Late majority	
Laggards	

Source: own construction according to the quantitative research, 2020. N=210

People in Cluster 1 are the most innovative (named cryptocurrency innovator), here is the highest mean and median in the innovator dimension. Cluster 3 is in the second place, while last one is Cluster 2. Based on the above, the following groups can be formed:

Cluster 1: cryptocurrency innovator, cluster 3: medium cryptocurrency innovator, cluster 2: less cryptocurrency innovator. Third of surveyed people can fit into the cryptocurrency innovator group. The largest cluster is a group of less cryptocurrency innovators, it owns more than half of all sample elements, while the number of medium cryptocurrency innovators is only 22.

We analyzed whether there is a significant difference between clusters in the dimensions of innovators, early adopters, early majority, late majority and laggards. The assay was performed at 5% significance level. Significance levels were as follows: innovators $p = 0.000$, early adapters $p = 0.000$, early majority $p = 0.628$, late majority $p = 0.119$, laggards $p = 0.000$. The tests were performed with the Kruskall-Wallis test. From the test results, no significant difference can be revealed between the clusters of the early and late majority variables. In the case of complex variables with significant differences a conjugate comparison of the clusters was made by the Dunn test.

Innovator: In the case of innovators, there is a significant difference in all cluster pairing, so the above cluster order is statistically reasoned. Early adopter: There is no verifiable difference between the 2-3 clusters, but there is in the other pairs. Laggards: There is a significant difference in the laggard's variable in each cluster pairing. Summarizing the results of the comparisons in couples, we can state that one cannot include the early and late majority variables in the explanation of the innovation self-esteem of the three clusters created based on two items belonging to the innovator variable, because there is no statistically justifiable difference between the medians of the different levels of "innovator groups".

Cluster 1 rated their innovation level significantly higher in both innovator and early adapter variables. This is contradicted by the fact that they also scored the highest points on the laggards. We would expect lower scores on these questions because it seems a bit controversial that a person who is constantly seeking innovations is resistant to change. The contradiction is softened by the median of 2,5 in the cluster, which means that more than half of the cluster members disagree with the statements at some level, and we can declare that the members of Cluster 1 are innovators and adapters. Cluster 3 ranks second in terms of innovation level; however, it only differs from the following Cluster 2 in a way that the rate of those who agree to the items of the laggards' question is significantly lower here.

Conclusion

Concerning the research questions listed at the beginning of the study, the following research results were answered:

RQ1: What are the investment habits of cryptocurrency investors?

Examining the investment habits and attitudes of cryptocurrency investors, it can be stated that almost 70% of investors have been interested in cryptocurrency investments for less than 3 years. Most investors get cryptocurrency by purchases, but mining and investing in mining companies are also a popular way to get in the cryptocurrency businesss. Approximately 50% of cryptocurrency investors own Bitcoin, but they also open to choose other cryptocurrencies as investments. Half of cryptocurrency investors would choose real estate or piece investments beside their existing cryptocurrency investments. Typically, at least 50% of investments of cryptocurrency investors are cryptocurrency investments.

RQ2: What are the factors that inhibit and motivate cryptocurrency investors' investment habits?

Cryptocurrency investors are most motivated by gaining wealth and income, and the "fun factor" is also significant. Among the types of savings motives in the Keynes interpretation of Tóth and Árvai (2001), cryptocurrency investors are most often characterized by the independence and the life-cycle motives. The motivation for investing in cryptocurrency is mostly discouraged by lack of income and information.

RQ3: How open are cryptocurrency investors to innovation?

It can be stated that most cryptocurrency investors are open to innovations and consider innovations necessary. They are curious and welcome to be the first among innovators.

RQ4: Which adaptation categories can be used to classify cryptocurrency investors?

The majority of cryptocurrency investors can be classified as innovators or late majority, the least typical of them is the laggard category. Studies have shown that there is no difference in opinions on the acceptance of innovation based on the gender, age and education level of the investors (there was no significant difference). Nearly three fourths of cryptocurrency investors consider themselves as innovators, open to innovation, and consider innovation necessary.

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