School of Social Sciences

Social and Solidarity Economy

Postgraduate Dissertation

The Role of Blockchain Technology and the Use of Cryptocurrencies in Social and Solidarity Economy

Nancy Lymperi

Supervisor: Prof. Achilleas Kontogeorgos

Athens, Greece, January 2022

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Nancy Lymperi

Supervising Committee

Supervisor:
Prof. Achilleas Kontogeorgos
International Hellenic University

Co-Supervisor:
Dr. Georgios Alexopoulos
Hellenic Open University

Athens, Greece, January 2022

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Abstract

This dissertation refers to Social and Solidarity Economy's (SSE) organizations through the prism of innovative technology of Blockchain and the use of cryptocurrencies. Traditionally, SSE promotes, among others, collective dimension and principles of solidarity, autonomy, voluntary participation, and protection of environment. On the other hand, there has recently begun a vivid conversation around new innovative technologies of Blockchain and the use of cryptocurrencies, whose function is based on distributed ledger technology. Research is conducted to explore the possibility of connection between SSE and benefits of blockchain technology. Initially, an effort is made to clear the landscape of SSE by defining the sector and referring types of its organizations. It is of high significance to demonstrate how traditional system functions nowadays so pathogeneses can be identified. The careful and analytical approach of the application of new technologies (through transactions management) gives the opportunity to indicate those functions, which benefit SSE's organizations and replace the aforementioned pathogeneses. More analytically, the author explains thoroughly what cryptocurrency is, how can someone buy and sell cryptocurrencies, how to secure and to store them and generally how transactions are performed. Continuing, a careful glance on the regulations around cryptocurrencies indicates how governments around the world face these radical technological changes. The dissertation's main aim is to enlighten the connection (if any) of SSE with these technologies; therefore, all relative sectors around SSE will be analyzed. Finally, two examples are reported, which implement simultaneously social principles and blockchain innovations; a 'social' cryptocurrency named FairCoin, and a 'social' platform called GiveCrypto. To have a full picture about the mentioned cryptocurrency three interviews of three different social organizations in Greece were conducted, which depict the current situation, threats, challenges, and possible solutions.

Keywords

Social and solidarity economy, social economy organizations, blockchain technology, cryptocurrencies, distributed ledger technology, smart contracts.

Ο Ρόλος της Τεχνολογίας των Αλυσίδων Συστοιχιών και η Χρήση Κρυπτονομισμάτων στην Κοινωνική και Αλληλέγγυα Οικονομία

Νάνσυ Λυμπέρη

Περίληψη

Η παρούσα διατριβή αναφέρεται στους οργανισμούς της Κοινωνικής και Αλληλέγγυας Οικονομίας (ΚΑΟ) μέσα από το πρίσμα της καινοτόμου τεχνολογίας των αλυσίδων συστοιχιών και της χρήσης κρυπτονομισμάτων. Παραδοσιακά η ΚΑΟ προάγει, μεταξύ άλλων, τη συλλογική διάσταση, τις αρχές της αλληλεγγύης, της αυτονομίας, της εθελοντικής συμμετοχής και της προστασίας του περιβάλλοντος. Από την άλλη μεριά, έχει ξεκινήσει πρόσφατα μία ζωηρή συζήτηση γύρω από τις νέες καινοτόμες τεχνολογίες της αλυσίδας συστοιχιών και της χρήσης κρυπτονομισμάτων, των οποίων η λειτουργία είναι βασισμένη στην τεχνολογία κατανεμημένου καθολικού. Διεξάγεται έρευνα για να διερευνηθεί η δυνατότητα σύνδεσης ανάμεσα στην ΚΑΟ και τα οφέλη της τεχνολογίας των αλυσίδων συστοιχιών. Αρχικά έγινε μία προσπάθεια για να ξεκαθαρίσει το τοπίο της ΚΑΟ ορίζοντας τον τομέα και αναφέροντας τους τύπους των οργανώσεών της. Είναι πολύ σημαντικό να δειχθεί πως λειτουργεί σήμερα το χρηματοπιστωτικό σύστημα με σκοπό να εντοπιστούν παθογένειες. Η προσεκτική και αναλυτική προσέγγιση της λειτουργίας των νέων τεχνολογιών (μέσω της διαχείρισης των συναλλαγών) δίνει την ευκαιρία να υποδειχθούν αυτές οι λειτουργίες, οι οποίες ευνοούν τους οργανισμούς της ΚΑΟ και αντικαθιστούν τις προαναφερθείσες παθογένειες. Πιο αναλυτικά, η συγγραφέας εξηγεί αναλυτικά τι είναι κρυπτονόμισμα, πώς μπορεί κάποιος να αγοράσει και να πουλήσει κρυπτονομίσματα, πως μπορεί να τα διασφαλίσει και να τα αποθηκεύσει και γενικά πώς γίνονται οι συναλλαγές. Συνεχίζοντας, μία προσεκτική ματιά στους κανονισμούς γύρω από τα κρυπτονομίσματα φανερώνει πως οι κυβερνήσεις ανά τον κόσμο αντιμετωπίζουν αυτές τις ριζικές τεχνολογικές αλλαγές. Κύριος σκοπός της διατριβής είναι να διαφωτίσει τη

σύνδεση (αν υπάρχει) της ΚΑΟ με αυτές τις τεχνολογίες˙ συνεπώς, όλοι οι σχετικοί τομείς γύρω από την ΚΑΟ θα διερευνηθούν. Στο τέλος, αναφέρονται δύο παραδείγματα, τα οποία εφαρμόζουν ταυτόχρονα κοινωνικές αρχές και καινοτομίες αλυσίδων συστοιχιών˙ ένα 'κοινωνικό' κρυπτονόμισμα, που ονομάζεται FairCoin και μία 'κοινωνική' πλατφόρμα, που ονομάζεται GiveCrypto. Για να υπάρχει μία ολοκληρωμένη εικόνα σχετικά με το προαναφερθέν κρυπτονόμισμα διεξήχθησαν τρεις συνεντεύξεις από τρεις διαφορετικούς κοινωνικούς οργανισμούς στην Ελλάδα, οι οποίες αποτυπώνουν την τρέχουσα κατάσταση, τις απειλές, τις προκλήσεις και πιθανές λύσεις.

Λέξεις – Κλειδιά

Κοινωνική και αλληλέγγυα οικονομία, οργανώσεις κοινωνικής οικονομίας, αλυσίδες συστοιχιών, τεχνολογία κατανεμημένου καθολικού, έξυπνα συμβόλαια.

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List of Abbreviations & Acronyms

SSE	Social and Solidarity economy
EESC	European Economic and Social Committee
CIRIEC	International Centre of Research and Information on the Public, Social and Cooperative Economy
AI	Artificial Intelligence
IoT	Internet of Things
P2P	Peer-to-peer
GPU	Graphics Processing Unit
CBDC	Central Bank Digital Currencies
BTC	Bitcoin
ETH	Ether
DApp	Decentralized Application
ETC	Ethereum Classic
XRP	Ripple
LTC	Litecoin
ZEC	Zcash
DASH	Dash
BCH	Bitcoin Cash
USD	United States Dollar
ATM	Automated Teller Machine
QR CODE	Quick Response Code
KYC	Know Your Customer
AML	Anti-Money Laundering
ICO	Initial Coin Offering
IEO	Initial Exchange Offering
DeFi	Decentralized Finance
IDO	Initial Decentralized Exchange Offering
STO	Security Token Offerings
NFT	Non-Fungible Token
VC	Venture Capital
DEX	Decentralized Exchange

CEX	Centralized Exchange
IOU	I Owe You
GIF	Graphics Interchange Format
SA	Société Anonyme
ESMA	European Securities and Markets Authority
EBA	European Banking Authority
EC	European Commission
SEC	Securities and Exchange Commission
MAS	Monetary Authority of Singapore
CSA	Canadian Securities Administrators
ASIC	Australian Securities & Investments Commission
FinTech	Financial Technology
IT	Information Technology
NGO	Non-Governmental Organization
GDPR	General Data Protection Regulation
CVN	Cooperatively Validated Node
PoC	Proof of Cooperation
PoS	Proof of Stake
PoW	Proof of Work
DpoS	Delegated Proof of Stake

1. Introduction

1.1 Introduction to the Topic and Historical Data

The dialogue on the possibilities of a radical social, economic, and political change through alternative forms of organization of the economy dates to the 19th century. Change, according to Proudon, cannot come through the violent overthrow of the existing system. Instead, emphasis must be placed on the democratic functioning of economic, political, and social life. He believed that the commons should be developed, the state should be criticized, and freedom of individual should be promoted. The change in the organization of the economy must come through the creation and development of cooperative communities, organized in federations (Kavoulakos and Gritzas, 2015).

Going forward, in the middle of the 20th century, Polanyi tries to prove the importance of all parts of society as a whole. He does not accept the terms "economic man" or "rational man" and considers that the dominant element but also the starting point is society, concluding that a society that considers financial incentives as absolute priority cannot survive (Block & Somers, 2011). He criticized the classical liberals, arguing that the laws of nature and self-regulation in the market could not be practiced; he also criticized Marx because he prioritized economics when it came to interpreting social and political reality and human behavior. After all, for Polanyi it is inconceivable that the economy should be separated or cut off from society as the economy is founded through social relations. The reorganization of the economy will come through the exercise of the principles of reciprocity and redistribution, to develop an economy that will serve society as a whole (Kavoulakos and Gritzas, ibid).

Continuing, at the end of the 20th century, Holloway proposes the creation of alternative economic and social practices after the socio-political developments-collapse of the existing socialist regimes but also failures of the left reformist parties. He very vividly suggests the beginning of change through screams and cracks. The scream denies the capitalist way of life, without trying to characterize it in a new society. It is more the manifestation of hope for something that can happen. Then the cracks indicate the rupture that has occurred with

the capitalist system. He advocated those forces should not be used to destroy the existing system but to create something new[1] (Kavoulakos and Gritzas, ibid).

This is exactly what is happening with blockchain technology and cryptocurrencies. They don't battle the existing economic system; they are creating a new one. Simultaneously with the existing financial system (which doesn't promote social ventures) a new economic life has been created on the internet. Innovative technological steps have been made and the result is a new, promising economic system which can also benefit people with social incentives.

1.2 Motivation and Scope

The purpose of this paper is to explore blockchain technology and the possibility to make a positive contribution to the SSE. The way this technology is built and operated (transparency and compliance, non-breach of conditions and the absence of trust as a 'necessary good' of the whole process) and especially the lack of intermediaries[2] are elements that challenge SSE's ventures. Moreover, through this new technology those who do not have access in the classic banking system[3] can be parts of new financial system. At the same time, it will be investigated whether there can be a transfer of the governance system from the existing forms of collaboration to blockchain technology application platforms. Another issue to be enlightened is legal framework around blockchain technology and cryptocurrencies. There is no doubt that when a new technology makes an entry some will accept it, some will question it, and some will fight it. Therefore, it will be very interesting to see how countries around the world react in this admittedly radical technology. Also, there will be an attempt to locate one cryptocurrency with social impact and one platform that uses blockchain technology but has social aims. The purpose is to indicate whether their mode of operation

[1] The process of change starts from the ego, from a self that already carries dominant social relations and that cannot therefore act as a tabula rasa.

[2] State and private sector.

[3] Commonly referred as 'unbanked'.

offers to SSE's financial system, in which way and what obstacles it overcomes in relation to fiat currencies[4] and respective cryptocurrencies.

Lastly, motivation remains a personal ideological and moral preference towards SSE's approach. Traditionally, new technologies were firstly adopted by main players of existing financial system, the so called 'elite'. Therefore, this dissertation is an attempt to enlighten other players too, who can take advance of innovations and strengthen their economic strategy and their social impact.

1.3 Research Methodology

For the integration of this dissertation, primary and secondary data were used. Specifically, aim is to conduct social research. Social research is a research process on topics that fall into the field of social sciences (sociology, political science, human geography, etc.). It is systemic (i.e., includes a specific set of steps that must be followed to get reliable and valid results) and organized asking questions and getting answers. The tools for successful research are in-depth interview, focus groups, observation, and content analysis. For the elaboration of this work, the qualitative research's methodological tool which will be used is the structured in-depth interview. This methodological tool provides flexibility, immediacy of the interviewer-interviewee, extraction of in-depth information and extraction of additional information that was not designed and completes the picture of the studied subject. Moreover, it demands preparation before the interview. At the same time, there was an attempt to follow the rules of ethics in full. Good manners were showed to interviewees, such as polite behavior and special interest from the beginning to the end of the interview without being importunate. Interviews were conducted at convenient times for all interviewees. Interview wasn't let to escape into areas that are not of interest to the research. Moreover, interview was made as soon as possible and there was no insistence on information that interviewees didn't want to give. Every interviewer has his own opinion over some matters and there was no guidance towards the answers. Due to pandemic in

[4] Fiat money is a government-issued currency that is not backed by a physical commodity, such as gold or silver, but rather by the government that issued it. The value of fiat money is derived from the relationship between supply and demand and the stability of the issuing government, rather than the worth of a commodity backing it. Most modern paper currencies are fiat currencies, including the U.S. dollar, the euro, and other major global currencies (www.investopedia.com).

Greece (Covid 19) all interviews were made by distance. The interviewer made the questions (predetermined and intermediates) and the interviewees gave the answers, which were written down on paper. There was no record of any of the interviews because none of them wanted. The interviewer chose to take three interviews from three different individuals from Greece (Thessaloniki, Crete, and Athens), who work or volunteer in social organizations that use FairCoin, a social cryptocurrency for an amount of their transactions in everyday life.

Finally, secondary data-bibliographic research has also been used for this dissertation. Sources were mostly books, articles, and internet. This stage was challenging enough because one part of dissertation topic-blockchain technology and cryptocurrencies-is relatively new; therefore sources- mainly the institutional ones-are limited. The bright side is that researchers who want to study SSE through blockchain technology are raising rapidly. Therefore, author researched among interesting and enlightening sources.

1.4 Dissertation Structure

This dissertation consists of seven chapters. In the first chapter is described the topic of the dissertation and are given historical data of SSE. More analytical, significant personalities such as philosophers and sociologists tried to explain how a society should function without separating economic from social life. Moreover, they proposed alternatives in both aspects of life since socio-political developments have been occurred. Then it is given an explanation about the connection of SSE and blockchain's technology and how this will have positive effects in people's life. Continuing, author reports the methodological tools that will be used in this dissertation. In few words, they have been used primary and secondary data. As far as primary data are concerned tool of structured interviews has been proved very helpful in depicting the use of 'social' cryptocurrencies in Greece.

In the second chapter term of SSE is clarified through several definitions that exist on the field. For the scope of this dissertation, it won't be necessary to distinguish terms like social and solidarity economy, social economy, social organizations, social ventures and social sector. Each term will be used to indicate the opposite of public and private sector, without identifying the differences between them. Moreover, types of social organizations will be referred to have a common understanding about the entities to be enlighten. Subsequently, traditional financial system in which SSE's organizations function will be analyzed; how

cash flows operates and how money circulate. After that, pathogenesis of this system will be mentioned. Then there will be a depiction on how SSE's actions in the society brought the need for change and which human characteristics and principles must prevail for better results. Moreover, financial problems SSE's field must face due to special characteristics (e.g., reinvestment of profits) will be shown. Finally, trying to make the connection with the second part of dissertation's thesis-blockchain technology and cryptocurrencies-there is a reference to the bigger change done in late years, as far as the financial system is concerned-the bitcoin.

Next two chapters are more technical and based to new technologies and innovations. It will be explained in simple words how crypto system works. In the third chapter will be explained how blockchain technology functions through crypto system, that is via cryptography and algorithms. Then there will be focus on blockchain's technology itself, what is the 'block' and how becomes a 'chain', why there is no need of a third trusted party by using decentralized or distributed networks. Then another crucial innovation will be mentioned, smart contract. It will be explained what this is, how they function and why they are so important. Complementary elements which upgrade this technology is two innovative facts: Artificial Intelligence and Internet of Things. No one can deny that all these terms are new and maybe difficult for all to understand them. That's why an analytical example about how smart contracts, Artificial Intelligence and Internet of Things function together will be given. Finally, in an effort to be objective, existing vulnerabilities and some well-known cases of malicious actions will be mentioned.

In the fourth chapter author explains what cryptocurrency is, which are the differences between that and digital money and how transaction with cryptocurrencies are made. In addition, two sovereign cryptocurrencies are mentioned; Bitcoin and Ethereum, how they began and the way they function (platform, consensus mechanism each of them use, procedure of mining and validation). Then will be explained that success of the above cryptocurrencies was the reason for the creation of alternative coins and stablecoins. They are all cryptocurrencies, but the division derives from separate characteristics. Continuing, it will be explained the ways someone has to buy and sell cryptocurrencies and how can store them with different levels of security. Also, in order for the reader to understand it will be given details about everyday procedures; exchange and transactions. Finally, author will analyze what exists with regulations around the world and particularly in Europe, United States of America, Singapore, Canada, Australia, and China. This will give an understanding

about how new technologies have been received from each country (positively, negatively, or neutrally) and why.

In the fifth chapter will be analyzed the ways through which funds can be raised in crypto economy which will depict how social organizations can take a direct advantage of new financial tools. Also, in this chapter author is trying to locate fields of social and economic life that blockchain technology has a key role. The results seem unexpectedly many and various. Specifically, one of most significant fields is open and participatory governance and public sector. Also, donations and fundraising can have a guaranteed transparency. Arts and property rights can be protected, skills can be certificated and most of all social and health services can be promoted through e-care systems. Vulnerable people can upgrade their lives though new technologies with the help of social services and environmental/energy sector can be upgraded. Moreover, agriculture sector and specifically cooperatives can use blockchain technology to ensure their operation and their production. But mainly, those who benefit the most from blockchain technology is people who don't have access to bank systems.

In the sixth chapter author refers to two case studies. Both two are examples of social achievements, when technology and human will be combined successfully. The first is the cryptocurrency FairCoin, which was created by a Spanish team with social and solidarity background. Its characteristics, the way it functions and differences with other cryptocurrencies are being referred; but mostly is underlined the difference in consensus mechanism (proof of cooperation) to indicate its social nature. The fact that it doesn't use much electric power and that an assembly takes place for predefined matters depict social characteristics to the specific cryptocurrency. The second is a 'social' platform which refers ways to help people in need though cryptosystem. Moreover, is advocating that with only the use of a cell phone, money can be directed immediately where they are needed. In this chapter is also referred to in-depth interviews and it is mentioned who the interviewees are. Special conditions which concern the pandemic crisis in Greece didn't allow the interviews to be conducted closely. However, results have been exported since interviewees have been analytical and specific. People from Thessaloniki, Crete and Athens explained their experience they had while trading with FairCoin and expressed their ideas, their preferences, and their concerns. Author tried to capture their real views on the subject keeping in mind that people sometimes are getting emotional engaged when they are trying to counterpoise social ideology and economic viability.

In the last chapter author is referring to dissertation's conclusions. Having examined dissertation's scientific sources and empirical data concludes that significant innovative and technological steps have been made from which SSE can benefit the most. However, threats and challenges around new technologies shouldn't be passed by. Blockchain and Bitcoin must confront significant issues of reliability and transparency. Towards that direction some suggestions are made for further research.

2. SSE Seen Through the Existing Financial System

2.1 Definitions

Before highlighting the role of Social and Solidarity Economy (SSE)[5], it would be useful for the reader to clarify conceptually the terms 'social' and 'solidarity' with each other but also in relation to the term 'economy'. First, it should be mentioned that the need to create this framework came from the failure of both the market and the state to provide collective goods. This gap has been filled by the so-called "third sector". The term solidarity economy came to the fore mainly due to the attempt of radical solutions while the term social economy fits more into an already structured cooperative framework (Adam and Papatheodorou, 2010). The use of the term "third sector" while identified globally with the differentiation from the terms private and state, however in the USA it includes mainly associations and institutions while in Europe cooperatives are also included (Kavoulakos and Gritzas, ibid).

However, the Report for the European Economic and Social Committee (EESC) by the International Center for Research and Information on the Public, Social and Cooperative Economy (CIRIEC) shows that it is not just the lack of a definition of the social economy that makes things difficult. The non-commitment to the analysis of the object of the Social Economy in relation to the activities of other economic factors also contributes to this direction.

2.2 Types of Social and Solidarity Organizations

At this point it would be very useful to look at the categorization of corporations and organizations of the Social and Solidarity Economy, as reflected in the work 'Social and Solidarity Economy: Building a Common Understanding' (Fonteneau, 2010). Categorization of these anthropocentric economic organizations should begin with cooperatives, an autonomous organization of people who voluntarily unite to meet common needs through a jointly owned and democratically controlled enterprise. There are also

[5] Although there are different definitions in the Greek and international literature, in the present work no distinction is made between the terms social economy and social and solidarity economy as well as the terms SSE's project, social enterprise and enterprise of social and solidarity economy.

mutually beneficial societies, whose main goal is to provide social services. These societies pool resources and share risk. Moreover, there are the community-based organizations and associations. These includes associations, voluntary organizations, community-based organizations, and non-profit organizations.

There are also social enterprises, which emerged as a solution to unsatisfied social needs. The beginning was made with some voluntary associations that wanted to offer work to people excluded from the labor market. Finally, institutions will be mentioned, but emphasis is given to the fact that not all institutions function as SSE projects. Therefore, the criteria are the social and solidarity orientation but mainly the democratic decision-making process.

2.3 Traditional Financing System

The financial system primarily promotes the cash flow between those who lend and those who borrow money. This can be done in both two ways: through direct and indirect financing. In the first case lenders (households, business firms and government) channel their funds directly to borrowers (households, business firms and government). In the case of indirect financing lenders channel their money through financial intermediaries who decide the allocation of funds. As a result, it could be said that the financial system facilitates flow of funds from where they stand to where they are needed. However, this function cannot be done successfully without trust between parties of the system. It is the most important prerequisite, which ensures that no one will lose their money or their economic advantages (Daskalakis and Georgitseas, 2020).

The function of the financial system has to do with payment, clearing and settlement arrangements. Banks play a key role in that system, plus they ensure the rights of their customers. Other functions involve fundraising, finance pooling (funds derived from small amounts of capital), liquidity transformation (long-term funding as a result from sort-term investors approach), cost reduction, risk pooling (the risk is divided) and advice providers. Furthermore, the traditional financial system uses shares, bonds, and derivatives as a vehicle to channel funds.

It is understood that the way the financial system exists is, more or less, clear, given and stationary. However, the recent years technology makes important steps of innovation in the direction of improvement, facilitation of procedures and effectiveness of the whole system.

Blockchain technology is such an innovation and claims to be the solution to many inadequacies of the financial system (Daskalakis and Georgitseas, ibid).

2.4 Pathogenesis of the System

According to Gibson-Graham, while there is a will to change the capitalist system, it nevertheless fails. The economic approaches that seek to achieve this change (capitalist and structuralist Marxist), because of their efficiency, that is, a perpetual process of building an identity under construction, they don't reinforce the non-capitalist system; on the contrary, they weaken it by highlighting the hegemony of the capitalist system. This is because non-capitalist practices are not promoted. Therefore, perhaps action should take place within the existing system (in this case the capitalist one) and aim at the empowerment and multiplication of alternative spaces. These can be succeeded through a variety of economies (based on ethical choices), which is feasible and 'bloodless', instead of looking for future-delayed radical, time-consuming and visionary solutions (Gibson-Graham, 2013 in Kavoulako and Gritza, 2015). Through alternative practices, ventures emerge that participate in the economy and promote values such as equality, solidarity, and environmental protection. Bibliographically, all these ventures are part of the Social and Solidarity Economy, in a type of economy where the center is man, the environment and their prosperity (Kavoulakos and Gritzas, ibid).

What is important is not to reduce the space occupied by the capitalist mode of operation of the market, nor to expand alternative economic activities. After all, alternative economic practices are not insignificant at all, quite the opposite: they are all around us and in fact produce at least half of the world product. The aim is to achieve the building of community economies (Gibson-Graham, 2008). The existence of diverse economies has proved that there is no solid and unbreakable capitalist system. Along with the economic activities of capitalism, alternative ventures and practices have emerged.

2.5 The Need for Change

The answer to the demand for change is that economic activities have already begun to emerge through the development of communities, focusing on the social man and the environment and framing them with the values of equality and solidarity. Alternative

economic activities are an event with an economic impact: they produce half the world product. A new form of economy that includes these activities has come to the fore, the Social and Solidarity Economy, which has brought about changes in the existing economic system. What remains to be seen is whether its contribution will result in a change of the existing economic system.

At this point it shouldn't be neglected the importance of team's contribution when seeking to make the change. According to Forsyth (2010), factors such as the democratic functioning, the creation of appropriate conditions for the participation of all members, their proper communication, the creation of a climate of trust and the optimistic-positive emotional tone contribute to the smooth functioning of the group. Proper team formation and operation is important because teams influence their members and society. Therefore, it is clear that societies evolve through collectivities. After all, the individual interest is intertwined with the collective interest. However, the personal values of the participants should be emphasized (such as perseverance, diligence, conscience, and integrity), because they will create a sense of trust within the team (Burns et al., 2004). After all, the group is much more than the sum of its members, showing results that at first glance are not a consequence of the individual characteristics of its members (Forsyth, 2010).

Despite the contribution of SSE\s organizations to the financial system, a variety of economic difficulties exists. The financing of SSE's companies (as well as the other companies) is important for the development and the evaluation of their possibilities; for this purpose, funds are required. The special characteristics of SSE field such as the aim of social benefit and not profit, but also the lack of state support in the field of financing, require social enterprises themselves to take initiatives for the development of financial solutions. According to the European Economic and Social Committee (2016), financing solutions include self-capitalization, participatory financing and participation in social financing partnerships, the mobilization of their own resources as well as the creation of bodies and organizations, which aim at financing and support for social enterprises.

More specifically, SSE's companies re-invest their profits in the company resulting in lower profitability than other companies. They also attach particular importance to non-financial outcomes, such as the social impact they wish to have. In addition, the legal form, governance, and management of social enterprises have special characteristics in relation to the corresponding conventional ones. Even the terminology around the companies of SSE is complex, as reflecting the inhomogeneity of the space; it is about social economy, social

entrepreneurship but also about social enterprises. Among other things, there is an attempt to take over the space by individual entrepreneurs, who falsely characterize their businesses as social, aiming at financing (ULESS & Luxembourg Ministry of Labour, 2015).

In addition, there are barriers within SSE's field that prevent social enterprises from gaining access to traditional sources of funding. According to GECES (2016) there are obstacles related to capacity building in the field of SSE[6] with the need for financing at different stages of the business development[7] and with the infrastructure needs regarding structural issues of access to finance[8]. Finally, from the point of view of classic investors, the companies of SSE are considered of high risk and are identified with high transaction costs per agreement (due to the small amounts of financing required). Consequently, the lack of state support as well as the inherent obstacles of the SSE space itself contribute to the absence of stable financial flows in all stages of development of SSE business (before start-up, start-up's initial stage and mature stage). For this reason, it becomes necessary to explore alternative funding proposals and design financial solutions.

The space of SSE has the possibility to develop a healthy and integrated ecosystem; through it, it will be provided financing support to social projects starting from their design until their successful operation and consolidation in the space or -in case of bankruptcy- finding safe solutions for their absorption by other social enterprises.

Democratic governance of social enterprises, their social impact, innovation, reinvestment of profits and the central role given to man within the economy are some of the differences between social enterprises and conventional ones. The financing of both is a necessary condition for their development. However, the lack of entrepreneurship and skills, the lack of networks / resources and the insufficient or insufficient support of investment readiness, the lack of identification in the field of SSE and its reduced visibility combined with the small size of the market, represented by social enterprises, ultimately prevent the use of classic financial solutions (EESC, 2016.).

[6] Ignorance on the part of social entrepreneurs about how to find and approach funders and the communication between them.

[7] Different types of funding for each stage, which are not easily accessible due to lack of funding in the community.

[8] There is talk of a lack of coordination between public and private funding priorities.

Therefore, the multi-stakeholder approach, based on the principles of the SSE, such as trust and solidarity is able to offer financial support and contribute to the development of a wider ecosystem for social enterprises.

2.6 A New Financial Perspective-Bitcoin

The beginning of the transformation of the transactions (and therefore the transformation of the whole financial systems) was in 2008. Back then Satoshi Nakamoto (as he, she or they called themselves since the real identity is not yet revealed) published a white paper titled "Bitcoin: A Peer-to-Peer Electronic Cash System". Bitcoin (BTC) was described as "a purely peer-to-peer (P2P) version of electronic cash, which would allow online payments to be sent directly from one party to another without going through a financial institution" (See App. A). Particularly, Bitcoin is an electronic and decentralized cryptographic currency system. Components that made it well-known and pushed his price up[9] are the lack of central authority or central bank to control it and the fact that it relies on a peer-to-peer architecture to function (Lischke and Fabian, 2016).

However, the innovation was not the idea of digital currency˙ that existed since 1980s[10]. The contribution was the confrontation of the 'double spending problem'. In other words, how someone can be sure than any digital asset won't be spent more than one time. Satoshi Nakamoto solved it though technological implementation, which will be explained in next paragraphs. Satoshi Nakamoto's idea was to create a system in which financial institutions wouldn't be needed (or any other intermediary). Considering that trust is fundamental among intermediaries, this declaration might be sounded at least strange. However, the creation of a cryptocurrency (a digital currency) in combination with the technology of the blockchain seemed to deal with issues of trust. Since the information is distributed among different agents, it cannot be altered and the double spending problem is not a matter anymore (Gimenez and Ibanez, 2019). Also, it is of high importance the fact that in crypto economy surplus units are channeled in deficit units (i.e., where the need is) through technological infrastructure of blockchain, with cryptocurrencies, coins, and tokens as transactions vehicles and capital pumping via Initial Coin Offerings (ICOs), Initial

[9] Bitcoin is nowadays (December 2021) traded for 42.215 € (www.bitcoin.org).

[10] 1980: "e-cash" by David Chaum,1998: "Bit Gold" by Nick Szabo, 1998: "B-money" by Wei Dai.

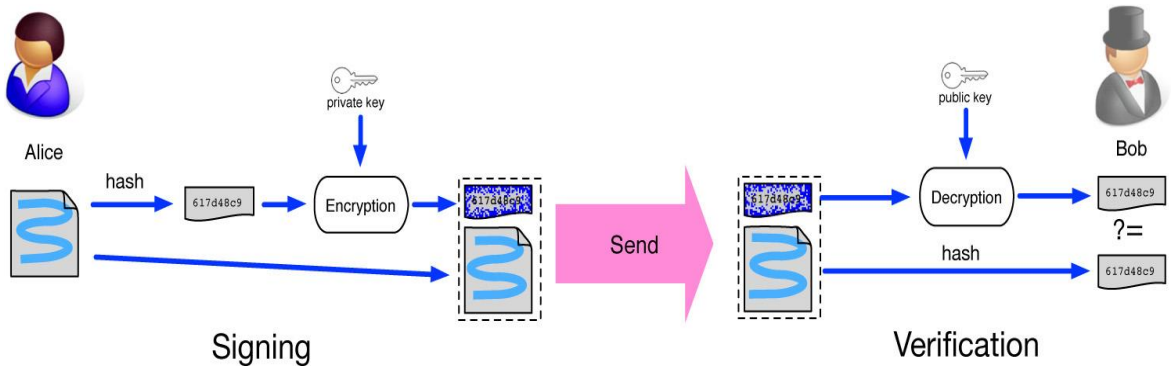
Exchange Offerings (IEOs) and Decentralized Finance (DeFi). (Daskalakis and Georgitseas, ibid). All these new terms will be explained in the next paragraphs. At this point, it is important to be understood how this technology works to be easy the connection with aspects of economic and social life.

3. Blockchain Technology

3.1 The Encrypted Financial System

Before blockchain's technology is analyzed, it should first be explained that it uses cryptography, a technology that gives the opportunity of encrypting and decrypting information. This is feasible through composite mathematics (algorithms). Via cryptography people that are not supposed to have access in the information are excluded. Blockchain uses cryptography to create hash functions, which guarantee the order of transactions. These transactions are stored in distributed public ledgers in computers all over the world.

Figure 1: Digital signature used in blockchain.



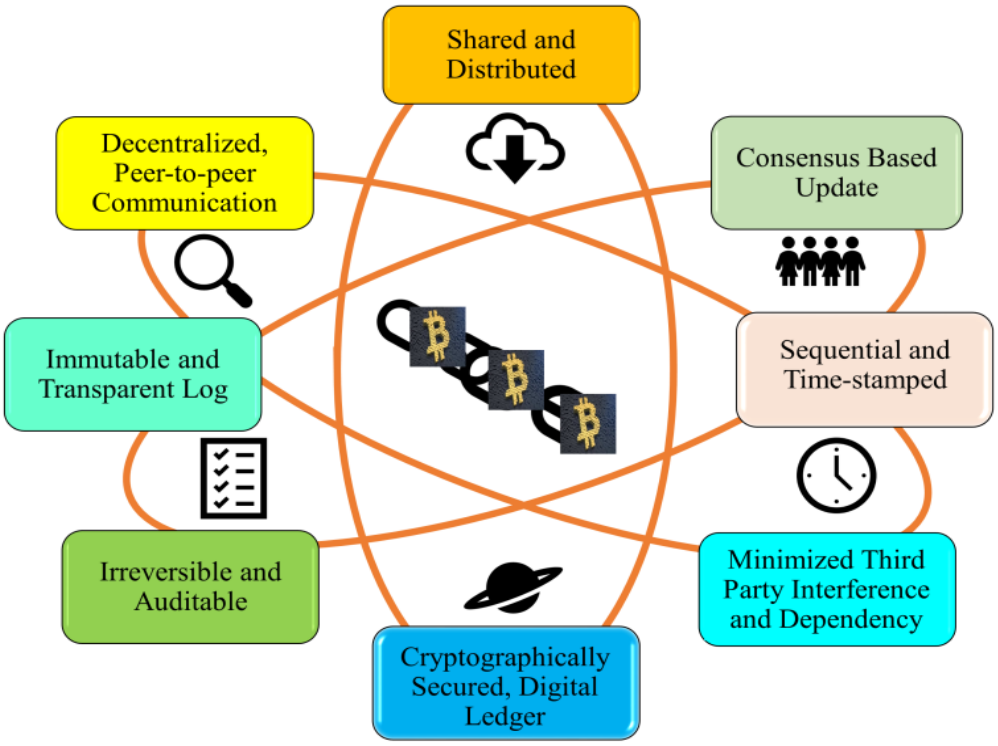
Source: Zheng et al., 2018.

This is how blockchain technology solves the double spending problem. If someone would think of intervening in one transaction and changing it, he should hack all the computers who retain a copy of the public ledger, which is practically impossible. Furthermore, as it is shown in the figure above, cryptography is used to validate the authentication of the data through digital signature. Therefore, this validation brings trust to the system because anyone who involves takes for granted the components of the transaction (amounts, senders, recipients, and balances).

As shown at the figure above, blockchain technology uses asymmetric cryptography. In other words, a set of a public and a private key is created through an algorithm. Public key provides, via a hush function, the public address of the user and, as a result, his uniqueness. Users are supposed to notify their public address on the internet. On the other hand, private

key is used in every transaction in combination with the digital signature. Private key proves that someone is the owner of a digital wallet, therefore it should not be disclosed for no reason. In order to make clear the way that public and private key work, they could be compared with the e-mail address of a user and his password. The first one should be notified in order to be able to interact with other users of the net but the password should remain secret so no one would be able to access his account (Zheng et al., 2018).

Figure 2: Blockchain characteristics.



Source: Puthal et al., 2018.

As it is depicted on the figure above blockchain's technology is characterized, as it has already been told, from cryptographic, therefore secure methods. So, the ledger created, which is using Public Ledger Technology (PLT) is impenetrable. Also, provides a decentralized, peer-to-peer communication, due to the way the network has been set up. It is shared among users, and no one is excluded, as long as there is a connection to the net. There are no central nodes· ledger is distributed equally to all. In order to function, nodes (i.e., any user of the internet) must consent to several rules, which have been set in a primary stage and differ depending on the consensus mechanism. One of the main characteristics

which empowers blockchain's technology is the fact that is sequential and time stamped meaning that it never stops its operation and through its operation facts can be chronically proved. In most cases, blockchain's technology eliminates third party interference, whether they are financial or governmental institutions. Therefore, users can feel independent to execute their economic-among others transactions, mostly when they do not enjoy bank valuation. Transactions are irreversible because there is no central authority to address if a mistake is occurred, so extra attention is needed. This means that ledger remains immutable, since no one can intervene and transparent because all users can see others transactions (which is not possible in bank systems), without knowing of course which name is behind each public's address (Puthal et al., 2018).

3.2 The Function of Blockchain Technology

Since encryption's contribution to the function of blockchain technology has been explained, now priority is to be indicated the analysis of the blockchain technology itself. First of all, as the word implies, blockchain consists of block and chain. As it is shown in the figure below, block contains digital data (transactions, personal data, properties, music etc.). Chain is the connection between blocks which have timestamp (proof of the block's generation) and are stored in a public ledger. The public ledger can be accessed from all nodes at any time during the day. A block, as shown in the figure below, contains data such as: the number of the block (the first block is called genesis block), the timestamp, the hash[11] of the previous block, the merkle root[12] hash of the block and the nounce value[13]. All these

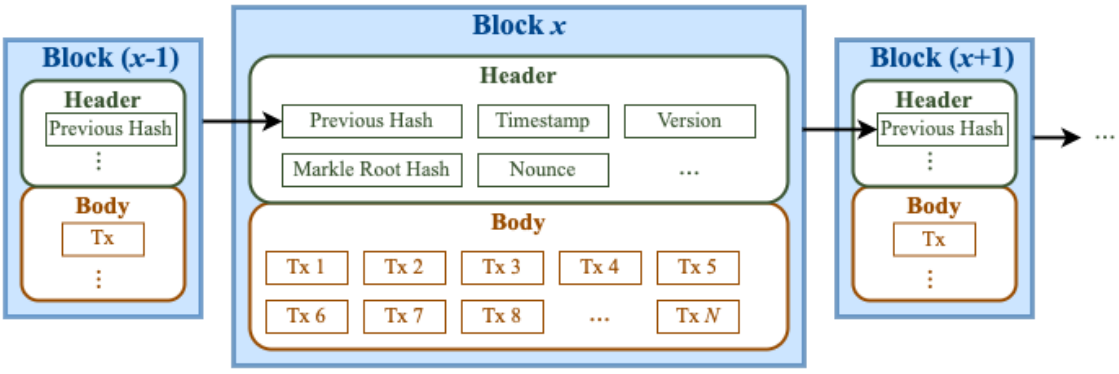
[11] A hash is a mathematical function that converts an input of arbitrary length into an encrypted output of a fixed length. Thus, regardless of the original amount of data or file size involved, its unique hash will always be the same size. Moreover, hashes cannot be used to "reverse-engineer" the input from the hashed output since hash functions are "one-way". Still, if someone uses such a function on the same data, its hash will be identical, so he can validate that the data is the same (i.e., unaltered) if he already knows its hash (www.investopedia.com).

[12] A merkle root is the hash of all the hashes of all the transactions that are part of a block in a blockchain network. Merkle roots are used in cryptocurrency to make sure data blocks passed between peers on a peer-to-peer network are whole, undamaged, and unaltered (www.investopedia.com).

[13] A nounce is an abbreviation for "number only used once," which, in the context of cryptocurrency mining, is a number added to a hashed—or encrypted—block in a blockchain that, when rehashed, meets the difficulty level restrictions. The nounce is the number that blockchain miners are solving for. When the solution is found,

data provide a hash value through hash function and via encryption provides a cipher text, which is very difficult, if not impossible, to hack. In order each block to be added to the chain they should first be validated (Lin et al., 2020). Validation is up to the consensus mechanism, a set of rules that are commonly accepted. Consensus mechanisms will be explained in chapter 4 and especially how many kinds of consensus mechanisms exist accordingly to each platform, how they function and the basic differences between them. When the data are validated then the block can be added to the chain, but since then it cannot be reversed.

Figure 3: The data structure of a blockchain.



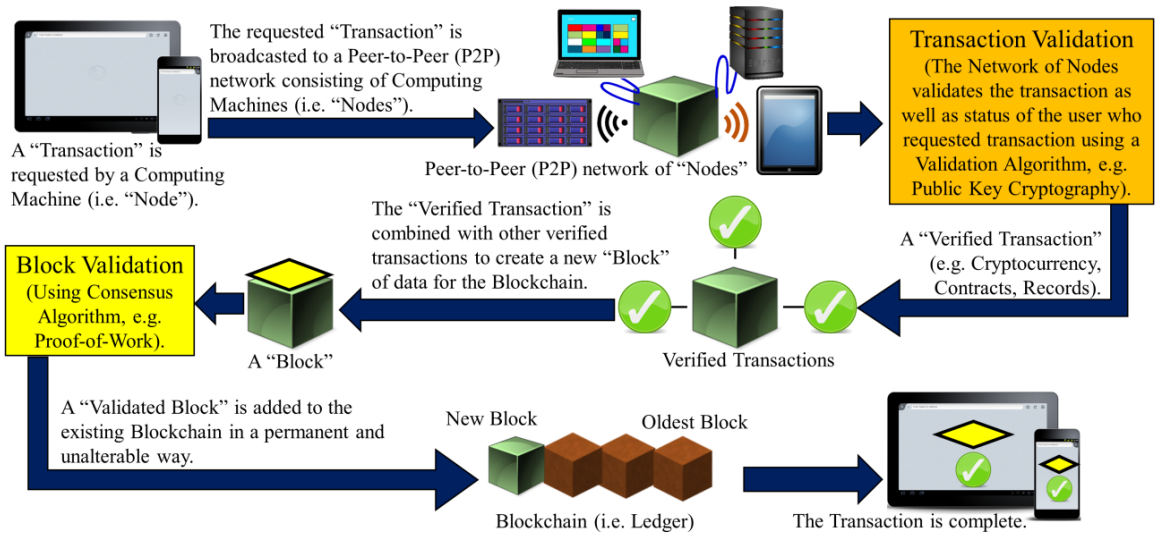
Source: Lin et al., 2020.

The innovation of that technology is that the existence of a third party is not needed. Each platform itself determines the rules through the consensus mechanism· as a result there is trust between untrusted parties. In order to function successfully such system, it is necessary a decentralized or a distributed network (whether sharing management rights exist or not). As a result, such network can be public (distributed) or private (decentralized), in which anyone can read or register data on the blocks (permissionless) or predetermined nodes can register data on the blocks (permissioned). The common base in those different kinds of blockchain networks is the lack of central authority and the fact that they are secure and transparent.

the blockchain miners are offered cryptocurrency in exchange for their time and skill (www.investopedia.com).

Having described blockchain's characteristics and its structure it is easier to describe the way it functions. According to the figure below, when a user, who is defined as 'node' wants to make a transaction has to make a request through his computing machine (either this is his PC or his cell phone). Then the transaction is broadcasted to the network and nodes must validate the transaction by trying to solve a difficult mathematical problem to find the nounce value. The first to find the nounce value is revealing the result to other nodes and if it is correct, transaction is verified by nodes. Then the verified transaction is added with other transactions to the block, which is added to the existent chain as a permanent unalterable transaction. After the block is added to the chain the transaction is completed. If it is not added it means that either is rejected from nodes for reasons of verification or is transferred to transaction's pool for further verification (Puthal et al., 2018).

Figure 4: Function of Blockchain.



Source: Puthal et al., 2018.

3.3 Smart Contracts, Internet of Things and Artificial Intelligence

Beyond trading, blockchain technology promotes several operations in everyday life. Fields in which is applied will be mentioned in Chapter 5. But first, it would be more enlightening to be explained in simple words the scientific method through which such a technological innovation can be achieved. The key word is Smart Contracts in combination with Artificial

Intelligence (AI)[14] and Internet of Things (IoT)[15]. A smart Contract[16] is a source code which implements the rules of a contract according to event triggers. Terms, conditions, and penalties of an ordinary contract are now transformed into source code, which is stored in the distributed ledger (in other words it cannot be changed or modified). When a function of the code is activated, then the terms are implemented automatically.

As it illustrated in the figure below with the use of a DApp[17] an invoke is made and requires endorsement from ordering services in a peer-to-peer network. As it has been already explained these requests and transactions followed by cannot be altered. Blockchain platform is supported by smart contracts to fulfill the different business logics behind these applications (Lin et al, 2020).

An example will be given in order these new terms to be understood. If someone wants to buy something from a platform which is using blockchain technology will firstly sign a smart contract; 5G technology and the technology of Internet of Things (IoT) will interfere making their contribution. First, he will make an order. Then, he will deposit the payment (the money will be committed from e-wallet). The sender will issue a receipt code (a hash passphrase) and then he will prepare the order-and the required documents.

[14] Artificial intelligence (AI) is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience (www.britannica.com).

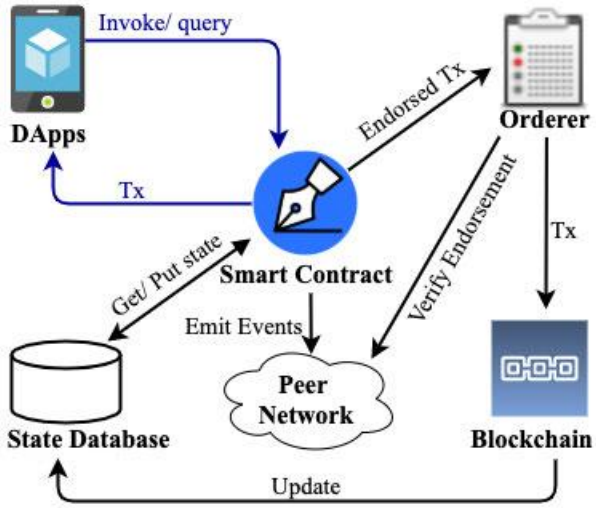
[15] The Internet of Things (IoT) is a name for the aggregate collection of network-enabled devices, excluding traditional computers like laptops and servers. Types of network connections can include Wi-Fi connections and Bluetooth connections. These devices use Internet protocol (IP), the same protocol that identifies computers over the world wide web and allows them to communicate with one another. The goal behind the Internet of things is to have devices that self-report in real-time, improving efficiency and bringing important information to the surface more quickly than a system depending on human intervention (www.investopedia.com).

[16] The idea was initialized by Nick Szabo in ``Formalizing and securing relationships on public networks," 1st Monday, vol. 2, no. 9, Sep. 1997, to automatically execute contracts to improve efficiency of business models involved (Lin et al, 2020).

[17] Decentralized applications (DApps) are digital applications or programs that exist and run on a blockchain or peer-to-peer (P2P) network of computers instead of a single computer. DApps (also called "dapps") are outside the purview and control of a single authority. DApps can be developed for a variety of purposes including gaming, finance, and social media (www.investopedia.com).

A transport company will transfer the products (which have sensors) to the port of departure and the ship will be travelling. When the ship will arrive at the destination port, recipient must enter the hash passphrase on the smart contract within 48 hours. When the code is confirmed, the amount of money is released to the sender (deposit on e-wallet). Then, customs clearance will be done, and the product will be received.

Figure 5: Transaction in smart contract-endorsement and verification.

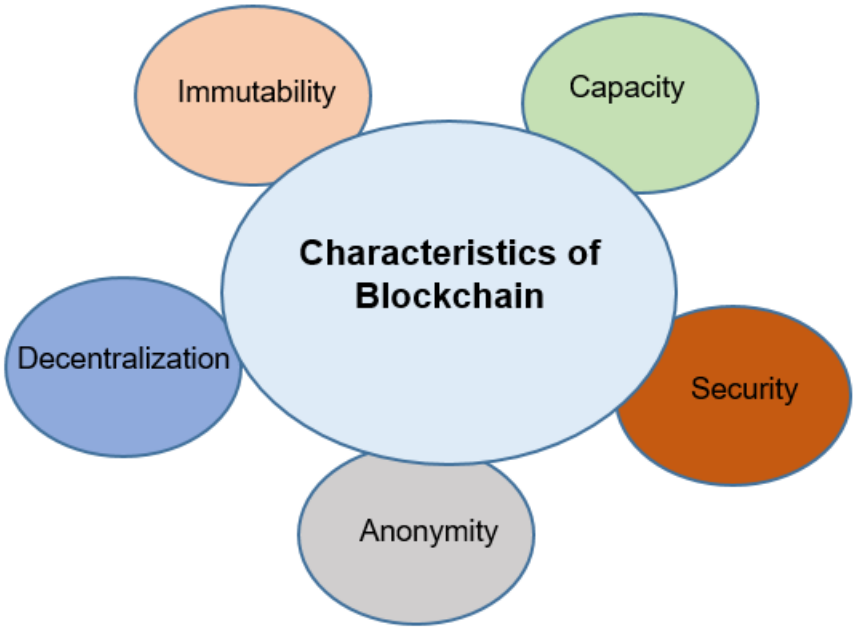


Source: Lin et al, 2020.

Now, if a damage will be occurred at the container (if for example the product gets wet), then the moisture sensor number 1 will activate the function number 1. The late function will activate the moisture sensor number 2, to detect if moisture levels of the second sensor are higher than the firsts. If so, then the function will activate an antenna, which will send a message to the recipient saying that the product has been exposed to moisture above the limits. Moreover, the recipient will have the opportunity to select button number 1, if he does not want to keep the defective product (so the product will be retuned) or to select button number 2, if he wants to receive the product with a refund of 40% of the reserved amount of money. If the moisture sensor number 2 detects that moisture levels of the second sensor are lower than the firsts, then the function will activate an antenna, which will send a message saying that there is a possible fault at the sensor number 1, that a new check was made, and the product is in perfect condition.

It can be easily perceived from all above that if blockchain technology brought a revolution in social and economic life through its operation, then its combination with auxiliary components such as IoT can launch its functionality. As figures 6 and 7 illustrate characteristics of blockchain such as decentralization, anonymity, security, capacity[18] and immutability (which have already been explained above) have given several perspectives through platforms and have surpassed obstacles and risks.

Figure 6: Characteristics of blockchain.



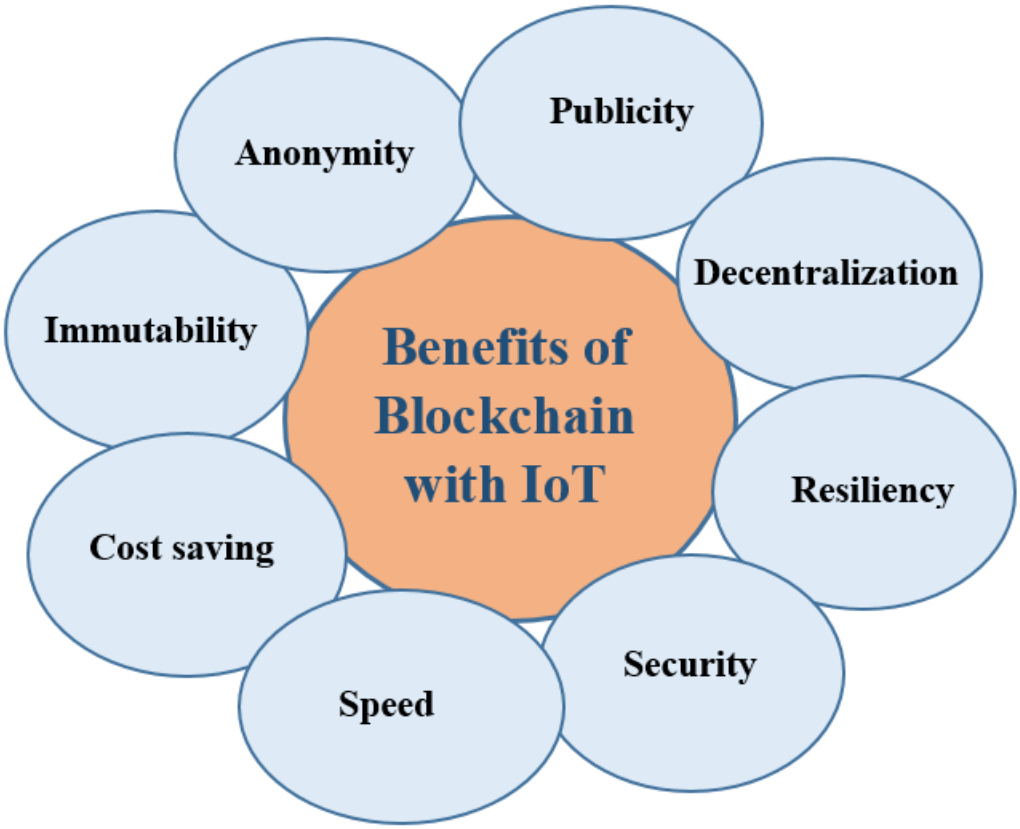
Source: Atlam et al., 2018.

Thus, the added use of IoT benefits the most blockchain's operation. Analytically, it promotes publicity because each user has its own ledger and yet all devices are connected, and information can be shared together and at the same time users' privacy is protected. Also, there is a massive amount of trust included since the majority of the participants in the network have to reach an agreement to validate transactions. Therefore, blockchain will provide a secure platform for IoT devices promoting decentralization. As it has already been explained blockchain allows each node to have a copy of all transactions in order to prevent attacks; in the IoT information sharing needs will be improved. Numerous and

[18] Having thousands of computers working together as a whole can have greater power than a few centralized servers, therefore capacity is increased.

heterogeneous devices in IoT promotes though blockchain technology security over untrusted parties. Costs of IoT are nowadays high expensive because of the high infrastructure which is associated with centralized architecture. In blockchain use thus there is cost saving due to decentralization. Major challenges in new technologies are security and privacy. These can be confronted by having an immutable ledger for IoT data. Finally, anonymity is for granted and it is of high importance when it's about electoral voting systems for example (Atlam et al. 2018).

Figure 7: Benefits of integrating blockchain with IoT.



Source: Atlam et al., 2018.

A very interesting perspective, as far as the smart contracts are concerned, are the named Oracles. It's about a software, which connects smart contracts with the real world, the world outside blockchain. Smart contracts do not have direct access to data outside the blockchain. Many times, some smart contracts need this information to comply with the terms of the contract. For example, in decentralized forecast markets something must confirm the result of the actual event, so winners to be paid. This can be solved through oracles, which cross

reference information to minimize the risk of error. Depending on the blockchain's interaction with real world, we can see a categorization˙ oracles that provide data from the outside world to blockchain and smart contracts and oracles that provide smart contracts with the ability to send data outside blockchain. In other words, depending on how oracles are used, they are separated in oracles, which are used when smart contracts need data directly from the outside world (e.g., sensors, IoT) and in oracles that handle information data from the internet (e.g., match results, coin prices).

3.4 Vulnerabilities

Although the innovation of blockchain and its advantages can be understood the fact that cryptosystem confronts several vulnerabilities cannot be passed by. Those vulnerabilities have been presented in consensus mechanisms, in smart contracts, in e-wallets and in blockchain technology in general. As far as vulnerabilities in consensus mechanisms are concerned selfish miner attach could be faced. This means that miners become part of mining pools to find the possible nounce values and as a result to share the reward according to their contribution. Moreover, miners could only deal with transactions that give more transaction fees (that means that there is a delay in completion for small amounts' transactions). Also, a malicious miner could intentionally create a fork [19] (by adding his own blocks behind a specific block) and the right moment to notify his false chain˙ this could lead to the rejection of the true chain from the users of the network. There is also the vulnerability of the 51% DLT network. This could happen if a user or a group of users manage to get more than 51% of computational power, mining power or total hash rate˙ then they could interrupt the transaction between some/all users or to reverse transactions that have already been completed and steal the money (double spending). One more vulnerability of consensus mechanisms is Sybil Attack˙ a miner could create many fake accounts (by creating more than one public addresses) and voting one of his addresses as the next validator (trusted node). Finally, there is time jack attack. A malicious user makes one node read the time of his computer (which has been set wrong but is validated through other malicious nodes of his own) to make transactions with this node. Since the timestamp will be wrong (because the transactions will be overdue) the malicious user could make

[19] When blocks of false chain are more or even than blocks of true chain plus 1.

money his own without even a proof on the net because of the rejection (Daskalakis and Georgitseas, ibid).

Smart contracts dealt with the biggest blow in the history of blockchain, named DAO Attack/DAO Hack. In 16/6/2016, a malicious user located an error in the source code of one smart contract in Ethereum's platform. Initially, he deposited a small amount and then he asked to withdraw, demanding his compensation. He did that by executing a function multiple time because this smart contract did not contain criteria if someone had cashed his compensation. Therefore, malicious user managed to collect 12.7 million Ethers (about 150.000.000$)[20].

Moreover, parity multi signature wallet attack was a malicious action which cost 500.000 Ethers (at about 77.000.000$). Wallet contracts are smart contracts through which someone can automated pay his bills. This wallet could be owned jointly by several users (exactly as it goes for a bank account). By using some open functions, malicious user enters his public address in the account and the system assumes that he is one of the wallets' owners who use that account. After a default date, malicious user gets access in cryptocurrencies he doesn't own.

Finally, a vulnerability in technology is mining malware. A malicious user installs a malware (crypt jacking ransomware) into someone's computer to mine cryptocurrencies by using resources from his graphics processing unit (GPU). To understand the extend of the problem, China only reported that over 1.000.000 computers have been infected and the intruders managed to mine over 26.000.000 cryptocurrencies of various kinds. As a result, it is observed that technological innovations are prone to vulnerabilities˙ and because of that, systems are forced to become better. All of the referred vulnerabilities have not only been fixed but, in addition, developers focused in searching for such gaps (Daskalakis and Georgitseas, ibid).

[20] Ethereum Foundation corrected that with the use of an intentional hard fork. Fork is an alternative chain, which must be done to make changes to protocol. It is called intentional because there is intention to create it and it is called hard fork because, since the changes are done, all nodes must upgrade their software (to prevent a permanent break of the chain).

4. Cryptocurrencies

4.1 From the Exchange of Products to Digital Money: The Evolution

Since humans began to trade between them, they found several ways to make transactions. Truth is that changes from one way to another had evolutionary and improving elements. Begging with transactions in kind and moving to coins, humankind was seeking each time to promote his economic life. In recent years governments and central authorities tried to control money though inflation[21] and deflation[22] accordingly to what they thought it was appropriate each time. A new and innovative way to minimize inflation and deflation effects is the use of cryptocurrencies.

Before scope of cryptocurrencies and their role to the blockchain technology is analyzed, it should first be reported that money, since their first appearance, has certain characteristics: they are durable, portable, divisible, and interchangeable. Moreover, money is used to store value, to price and compare goods, services, and assets and finally in order to exchange (buy and sell). As far as fiat currencies[23] are concerned, everybody knows how to use them (i.e., how to trade with them). At this point it would be useful to distinguish virtual and digital currencies from cryptocurrencies. Virtual currencies are not real currencies˙ they are tokens without nominal value. Digital currencies are conventional currencies on the internet (e.g., digital euro [24]). They are called Central Bank Digital Currencies (CBDC), they are issued

[21] Inflation is the decline of purchasing power of a given currency over time. A quantitative estimate of the rate at which the decline in purchasing power occurs can be reflected in the increase of an average price level of a basket of selected goods and services in an economy over some period of time. The rise in the general level of prices, often expressed as a percentage, means that a unit of currency effectively buys less than it did in prior periods (www.investopedia.com).

[22] Deflation is a general decline in prices for goods and services, typically associated with a contraction in the supply of money and credit in the economy. During deflation, the purchasing power of currency rises over time (www.investopedia.com).

[23] Fiat money is a government-issued currency that is not backed by a physical commodity, such as gold or silver, but rather by the government that issued it. The value of fiat money is derived from the relationship between supply and demand and the stability of the issuing government, rather than the worth of a commodity backing it. Most modern paper currencies are fiat currencies, including the U.S. dollar, the euro, and other major global currencies.

[24] The European Central Bank published a report in 2020 about digital euro˙ according to this, all citizens will have access to digital euro, which will not replace cash. However, the increasing demand for digital payments

and controlled by each country's central bank and represent the digital form of fiat currencies. CBDCs are not the same as cryptocurrencies (Rose, 2015).

Cryptocurrencies are digital currencies which use cryptographic methods for the validation of the transactions. They are characterized by decentralization˙ there is no need of a central trusted party nor a central server because each user operates on the net as a peer-to-peer. Transparency is another characteristic of such currencies. Blockchain technology allows the depiction of all transactions in the public ledger. Moreover, consensus of the nodes is necessary for validation, so malicious actions can be avoided. In addition, every single user can have a copy of all transactions which have been occurred in the platform since day one but cannot see who makes those transactions, the real identity of platform users. This happens because it can only be seen one's public address (which does not reveal a real name). In addition, validation takes place only through the verification of digital signature (Rose, ibid).

It should also be mentioned that, in blockchain technology a transaction cannot be changed or amended in the case of an error. Since a transaction is validated, it cannot be reversed. As the creation of one cryptocurrency is concerned there are two ways: the first is to predetermine the accurate number of the specific cryptocurrency's units which will be distributed according to a timetable. The second is to create those specific units at intervals, while users validate transactions. Both ways give cryptocurrencies an important advantage˙ the absence of inflation. One main risk of fiat currencies is exactly the inflation[25] that happens when central authorities intervene in the number of the issued currencies. This usual happens in economic crisis when public authorities try to avoid products and services increase by publishing more money[26].

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in the euro zone plus the diminishing need of cash payments (particularly at the post Covid era) will probably 'impose' digital money (www.ecb.europa.eu). Also, the Bank for International Settlements and seven major central banks published a special report in 2020 in which they describe the key features those digital currencies should have. However, the report, although outlining the key features of CBDCs, does not comment on whether or not they should be issued (www.bis.org).

[25] In a well-balanced economy, stability of prices should be maintained. To achieve that it should be assured that the inflation-the rate at which prices change over time-should remain stable and predictable at about 2%.

[26] This is happening since the gold one country owned and the number of local currencies could publish were disconnected between them.

Finally, everyone that owns cryptocurrencies is allowed to convert them to any other fiat currency prefers (e.g., United State Dollar, Euro, Great Britain Pound). However, until today, cryptocurrencies do confront a major issue˙ intense price volatility. This happens due to the combination of the lack of a commonly based valuation method and an intrinsic value. One way to surpass the price volatility, as will be examined in the next paragraphs, is stablecoins, a different category of cryptocurrencies (Daskalakis and Georgitseas, ibid).

4.2 The Sovereign Cryptocurrencies

The most powerful and well-known cryptocurrencies nowadays are two: Bitcoin and Ethereum. The reason is actually obvious˙ Bitcoin is the first cryptocurrency. In addition, Bitcoin's white paper managed to solve the double spending problem of digital money and also to operate through blockchain technology. On the other hand, Ethereum is not only the second cryptocurrency ever existed˙ it also managed, among others, to upgrade the operation of cryptosystem though the implication of a new mechanism of consensus. Particularly, Bitcoin uses consensus mechanism called Proof of Work (PoW) whereas Ethereum functions though consensus mechanism called Proof of Stake (PoS).

Mechanism of consensus is a set of rules which are accepted by all network users and is often called as 'protocol'. It is used for the validation of transactions which are stored in a block with the aim to add it to the chain. It is identified at an early stage by project team. PoW mechanism is the first to be proposed and it has been used in Bitcoin. Each miner tries to solve a difficult problem to locate the price of the variable nounce. The problem-solving time is about 10 minutes and the first who will locate him correctly, announces it to others to confirm his result. The mathematical problem becomes more and more difficult if the same miner often finds its value. The great disadvantaged of this mechanism is also one of the main reasons for which bitcoin has been criticized; it requires a lot of processing power (electricity) from miners to locate this value (nounce). Also, as it will be explained later, problem might be created if two miners find simultaneously the correct value for the variable nounce and its cold "fork". Moving on, the next more known cryptocurrency is Ethereum; it should be mentioned that the most radical use of Ethereum's platform is the implementation of smart contracts. Ethereum uses consensus mechanism called Proof of Stake (PoS), in which user must own a remarkable quantity of cryptocurrencies. In other words, if a miner owns 0.5% of network cryptocurrencies, then he cannot mine (i.e.,

validate) more than 0.5% of blocks. Technically, that is possible through a pseudo-random algorithm which selects next miner-node, who will validate block's data. Every miner deposit to the network his currencies or an amount of them as a stake/gas, so that he can be selected as the next validator. PoS is safer than PoW because if any user behaves maliciously there is the risk to lose all his currencies. And above all, PoS needs less processing power (electricity) than PoW (Daskalakis and Georgitseas, ibid).

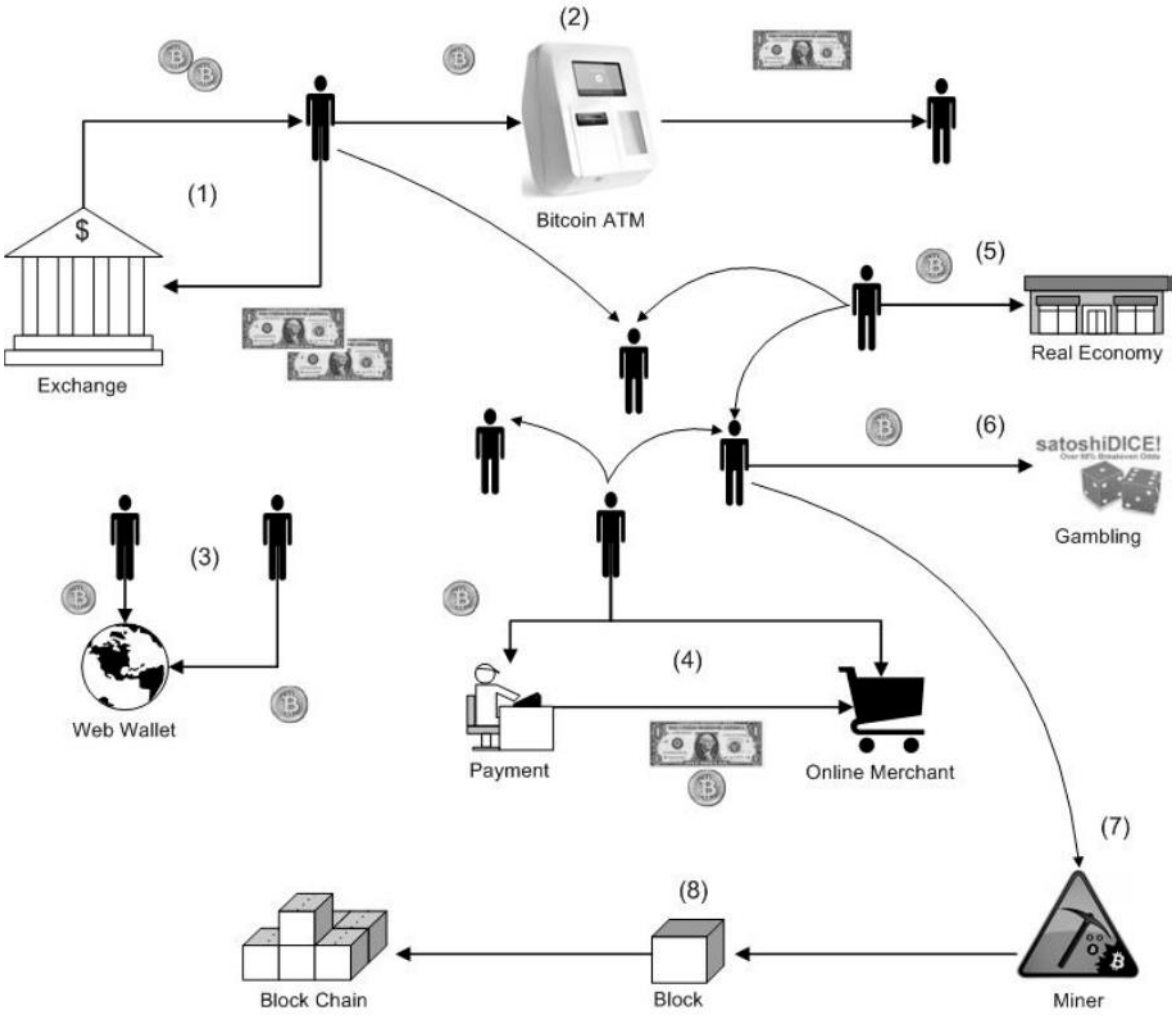
4.2.1. Bitcoin

As it has been mentioned in Chapter 2, the creator of Bitcoin has been the named Satoshi Nakamoto. Operation of technology through which Bitcoin is transferred -blockchain- have been already explained. Trying to give Bitcoin a definition, that would define it as a chain of digital signatures. By transferring the electronic coin to the next user, it gets digitally signed with a hash of the previous transaction and the public key of the next owner. An innovating idea of bitcoin is to avoid inflation in the system. To manage that a unique feature of the currency is that it has a predetermined limited number of 21 million coins in circulation. Until that point, which might be reached around the year 2140, the money supply will increase at a certain rate.[27] Descriptive time-series analysis showed that Bitcoin can act as a hedge against expected inflation. Also, Bitcoin seems to influence expected inflation and it appears that Bitcoin behaves similarly to a commodity that can be used as a means of exchange. These results can and should be a guidance for investors, firms, and policymakers as far as inflation-risk protection by the use of an electronic currency is concerned (Blau et al., 2021).

As far as the consensus mechanism protocol that Bitcoin uses is concerned, it is to make it expensive for a single user or a group of users to rewrite the history of transactions once it has been accepted as definite. PoW system should prevent malicious users from double spending their Bitcoins (Lischke and Fabian, 2016).

[27] Life expectancy of a currency is average 27 years. Oldest currency of our days is the Swiss franc, which has been in circulation for 350 years. The US dollar is 120 years old. The euro is about 20 years old. Most common causes for currencies disappearance are hyperinflation, monetary reform, war and independence from sovereignty (www.dollardaze.org).

Figure 8: The Bitcoin Economy.



Source: Lischke and Fabian, 2016.

Now, it would be useful for better understanding on the part of the reader to analyze how Bitcoin's economy function with its major participants. In the figure above are shown the basic parts. Initially, users can exchange their fiat currencies into Bitcoins via exchange platforms or local exchanges. They can also withdraw money from Bitcoin ATMs. Then they can store Bitcoins in an online wallet (or in generally cold and hot wallets as will be referred in Chapter 4) and pay online for goods and services or in local shops or gamble on gaming platforms. All these transactions are incorporated into a block, called mining. By this way transactions are verified and published it to the network via the block chain (Lischke and Fabian, 2016).

4.2.2. Ethereum

The platform of Ethereum was created in 2015 by Vitalik Buterin, a 21-year-old Russian Canadian programmer. The coin which is used is called Ether (ETH) and is nowadays (December 2021) traded for 3.374€ (www.ethereum.org). The main characteristic, except for financial use, is the implementation of smart contracts. In other words, this platform gives the opportunity to run a source code and as a result to perform a variety of arrangements in several fields (they have already been referred the fields of supply chain, real estate, public and health sector). As a result, Ethereum platform has been characterized as the platform of Decentralized Applications (DApps). Since 2016, and after the cyberattack at DAO, Ethereum was split to Ethereum (ETH) and Ethereum Classic (ETC). Ethereum's consensus mechanism (i.e., "Proof-of-Stake") diversified it from Bitcoin and upgraded its reputation as a more ecological and protected from malicious actions cryptocurrency.

4.3 Alternative Coins/Stablecoins

When someone refers to alternative coins (known as altcoins), he means every cryptocurrency existing except Bitcoin. Altcoins have been designed in the base of blockchain technology. Most of them have been created after the summer of 2017, which was marked by the enormous increase of Bitcoin's price. This droves anyone who believed in the rapid growth of crypto market to create a cryptocurrency with the expectation of fast and easy profit. The procedure was plain since there was absence of central authority or regulatory framework. In order those altcoins to be competitive to Bitcoin their creators tried to make improvements in the field of speed and privacy. Overall, the total amount of market value is about 2,5$ trillion (May 2021) in cryptosystem, while the daily investment of cryptocurrency is about 240$ billion, keeping in mind that are estimated over 9.500 cryptocurrencies.

The most significant altcoin is Ethereum (ETH), for which a description has already been given. Some other important altcoins are Ripple (XRP), Litecoin (LTC), Monero, Zcash (ZEC), Dash (DASH) and Bitcoin Cash (BCH). Ripple is a remittance network and an exchange currencies system. It allows banks to settle cross border settlements in real time at a lower cost˙ plus the transaction is fully transparent. The main difference between Bitcoin is that in Ripple there is no mining. Litecoin is named as 'silver to Bitcoin's gold'. In

comparison to other altcoins, Litecoin is closer to Bitcoin because there is a mining procedure and also it can be used for trading in goods and services. The only difference between them is that the rate that blocks are produced in Litecoin is faster and as a result it can offer to users' faster validation of the transactions. Monero is a decentralized, open-source code cryptocurrency. It provides the opportunity of complete privacy of the transactions through the technology of ring signatures, which hide the amount, the origin, and the destination of a transaction. As a result, the real identity of the users will not be revealed. Below is depicted a list of top 30 Cryptocurrencies and their market cap.

Table 1: List of top 30 Cryptocurrencies (as of 23/01/2022).

Rank	Name	Symbol	Market Cap	Price	Circulating Supply
1	**Bitcoin**	BTC	$687.012.848.062	$36.276,80	18.938.075
2	**Ethereum**	ETH	$302.389.263.380	$2.535,04	119.283.868
3	**Tether**	USDT	$78.350.199.961	$1,00	78.311.766.178
4	**BNB**	BNB	$63.393.933.785	$383,93	165.116.761
5	**USD Coin**	USDC	$47.651.385.218	$1,00	47.644.490.426
6	**Cardano**	ADA	$37.644.141.351	$1,12	33.539.825.364
7	**Solana**	SOL	$31.336.377.846	$99,58	314.691.080
8	**XRP**	XRP	$30.014.890.499	$0,6288	47.736.918.345
9	**Terra**	LUNA	$28.144.622.469	$69,79	403.283.833
10	**Dogecoin**	DOGE	$18.821.109.378	$0,1419	132.670.764.300
11	**Polkadot**	DOT	$18.594.909.764	$18,83	987.579.315
12	**Avalanche**	AVAX	$15.847.028.100	$64,73	244.834.724
13	**Binance USD**	BUSD	$14.029.380.716	$1,00	14.014.646.584
14	**Shiba Inu**	SHIB	$12.325.072.655	$0,00002245	549.063.278.876.302
15	**Polygon**	MATIC	$12.037.638.847	$1,62	7.447.892.513
16	**TerraUSD**	UST	$11.095.466.743	$1,00	11.095.021.401
17	**Wrapped Bitcoin**	WBTC	$9.815.456.850	$36.278,64	270.557
18	**Cosmos**	ATOM	$9.850.236.650	$34,40	286.370.297
19	**Dai**	DAI	$9.619.016.838	$1,00	9.613.700.162

20	**Crypto.com Coin**	CRO	$9.546.822.477	$0,3779	25.263.013.692
21	**Litecoin**	LTC	$7.787.951.669	$112,09	69.479.757
22	**Chainlink**	LINK	$7.736.122.598	$16,57	467.009.550
23	**NEAR Protocol**	NEAR	$7.272.595.039	$11,74	619.597.012
24	**Uniswap**	UNI	$7.164.273.470	$11,42	627.320.518
25	**Algorand**	ALGO	$6.450.112.582	$0,9877	6.530.371.791
26	**TRON**	TRX	$5.861.547.467	$0,05757	101.811.534.401
27	**Fantom**	FTM	$5.808.191.787	$2,28	2.545.006.273
28	**Bitcoin Cash**	BCH	$5.723.344.745	$301,81	18.963.531
29	**Stellar**	XLM	$4.975.135.089	$0,2006	24.802.247.123
30	**FTX Token**	FTT	$4.978.703.196	$35,95	138.472.817

Source: www.coinmarketcap.com

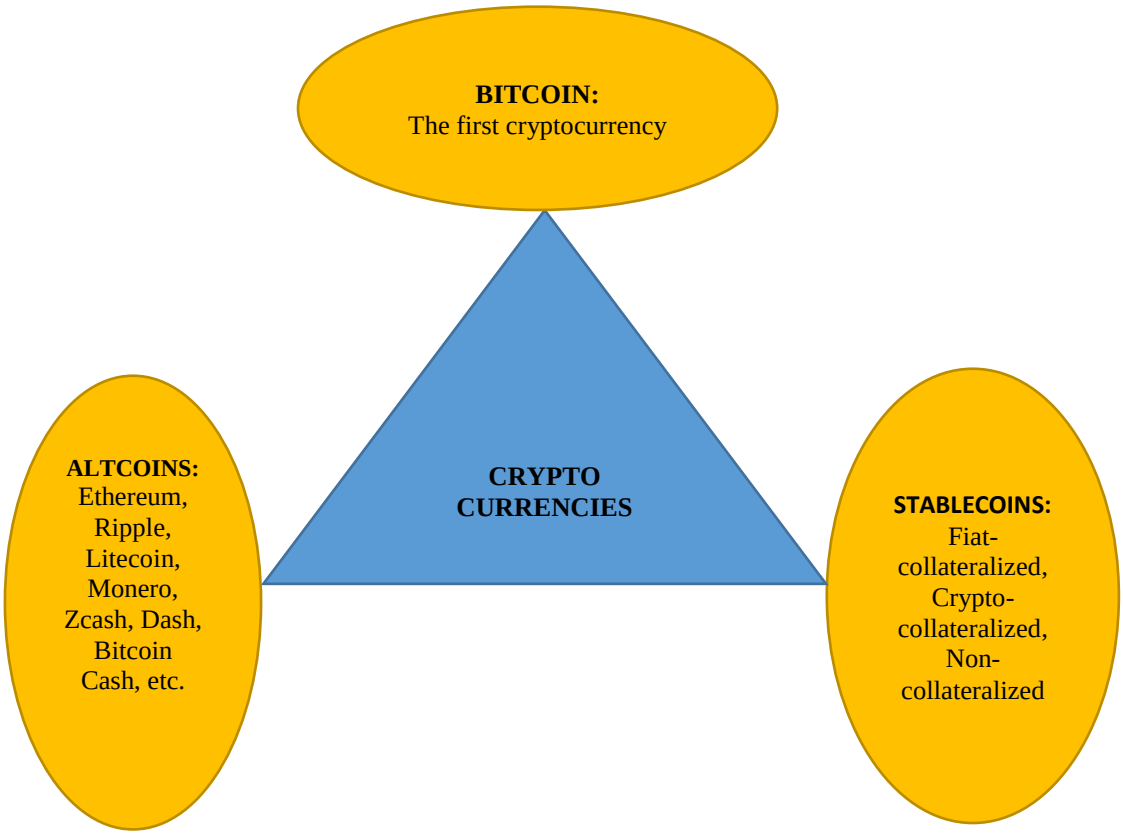
On the other hand, stablecoins are probably the solution to the problem of volatility of main cryptocurrencies (that is Bitcoin and Ethereum). Stablecoins are digital assets-coins or tokens, designed to maintain their value stable. This can be feasible through algorithmic mechanisms, connection with another stable asset (e.g., a fiat currency-USD, EUR) and through a process of over-securing other cryptos (e.g., Bitcoin, Ether). There are three main categories of stablecoins:

- Fiat-collateralized stablecoins: each coin issued is supported by the equivalent fiat currency. As a result, stablecoins and fiat currencies ratios will always remain at 1:1. The coin is produced and cleared by the coin issuer (this is usually a central authority).
- Crypto-collateralized stablecoins: they are backed from deposits in cryptocurrencies, which should be over-collateralized (they must have greater value than the value of cryptocurrencies to avoid possible losses).
- Non-collateralized stablecoins: they are not baked from any asset. A smart contract has the role of a central bank. The purpose is to issue currencies that will be traded at $1. The algorithm burns the coins when stablecoins price is very low and issues new coins when stablecoins price is very high.

To sum up, stablecoins are useful to protect profits in cryptocurrencies trading but they are not suitable for-profit investments as they do not depict fluctuations. In overall, stablecoins can be used as a means for daily transactions and storing value and as a safety net when investors expect falls in crypto markets.

Cryptocurrencies categorization is depicted in the figure below and it helps to understand their operation.

Figure 9: Categories of Cryptocurrencies.



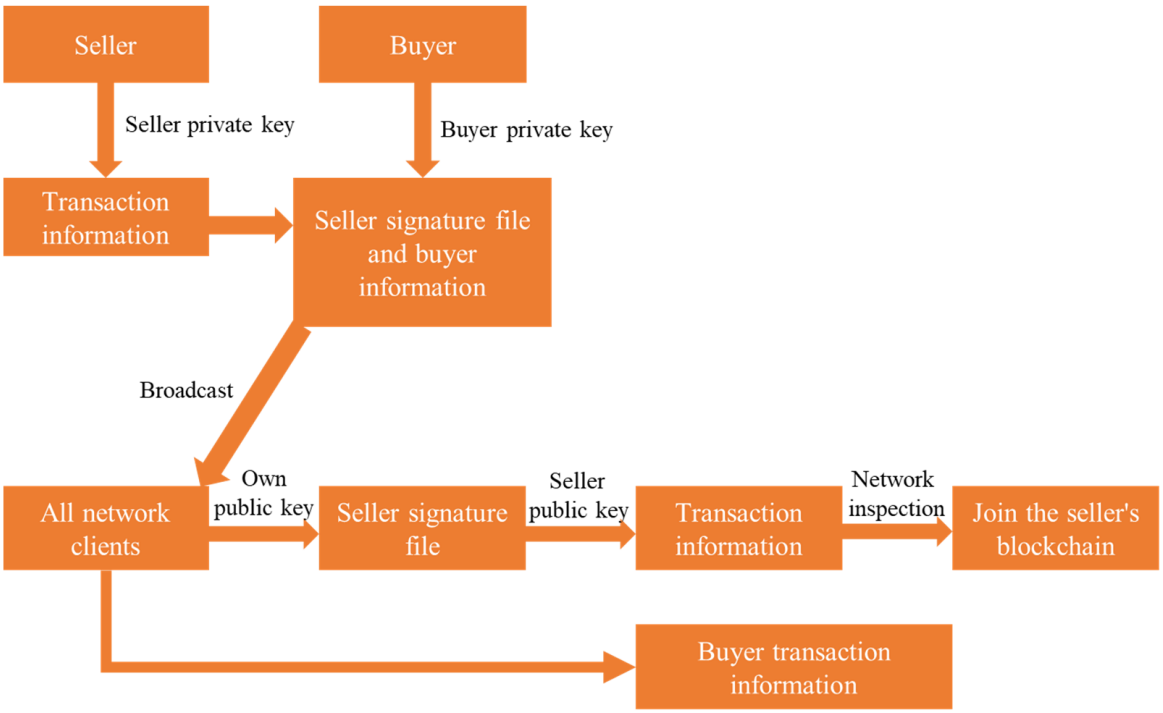
Source: Processed by the author, 2022.

4.4 Management and Regulation of Cryptocurrencies

4.4.1. Ways to buy and sell cryptocurrencies

Since blockchain technology has already been explained, how it functions and how cryptocurrencies have been set to crypto system, it can also be explained how this system works in everyday life. In Figures 9 and 10 reader can easily follow the route of workflows from the side of buyer and seller respectively. Analytically, seller uses his private key to give transaction's information. On the other side byer using his private key a block with seller's signature and buyer's information can be created. This block is broadcasted to all network clients. Each client will first decrypt it with its own public key to obtain the signature file of the seller, and then use the private key signature. Buyer with his own public key validates seller's signature file and through seller's public key is validated transaction's information. After the transaction has been inspected though users the block is added to the chain (seller's blockchain).

Figure 10: Workflow of accounting information system of seller based on blockchain technology.

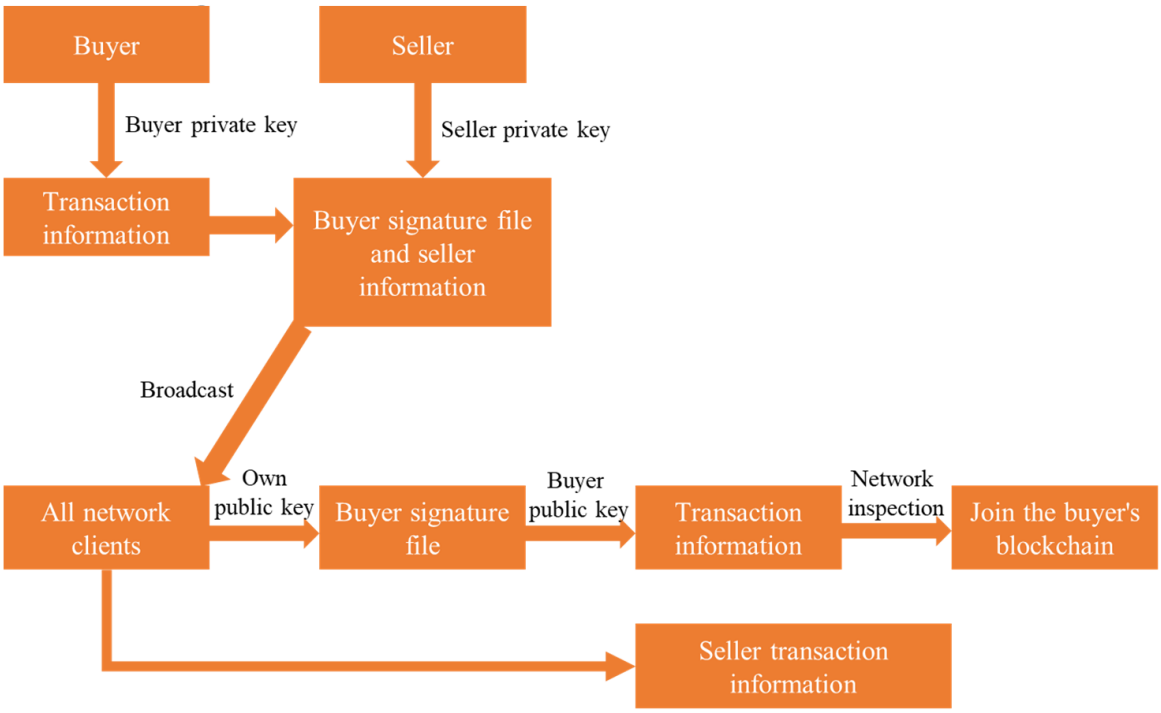


Source: Zheng, 2021.

The same procedure is followed but this time from the perspective of buyer. When each transaction occurs, the system will send the signature file of the transaction content, buyer,

amount, and product information to the seller. Then buyer's signature file and seller's information will be broadcasted to the network with private key signature. After that follows the decryption with the public key to obtain the buyer's signature file and to check whether the information in the buyer's signature file is verified with seller's file. If validation exists a block will be created, which will be stored in the buyer's blockchain (Zheng, 2021).

Figure 11: Workflow of accounting information system of buyer based on blockchain technology.



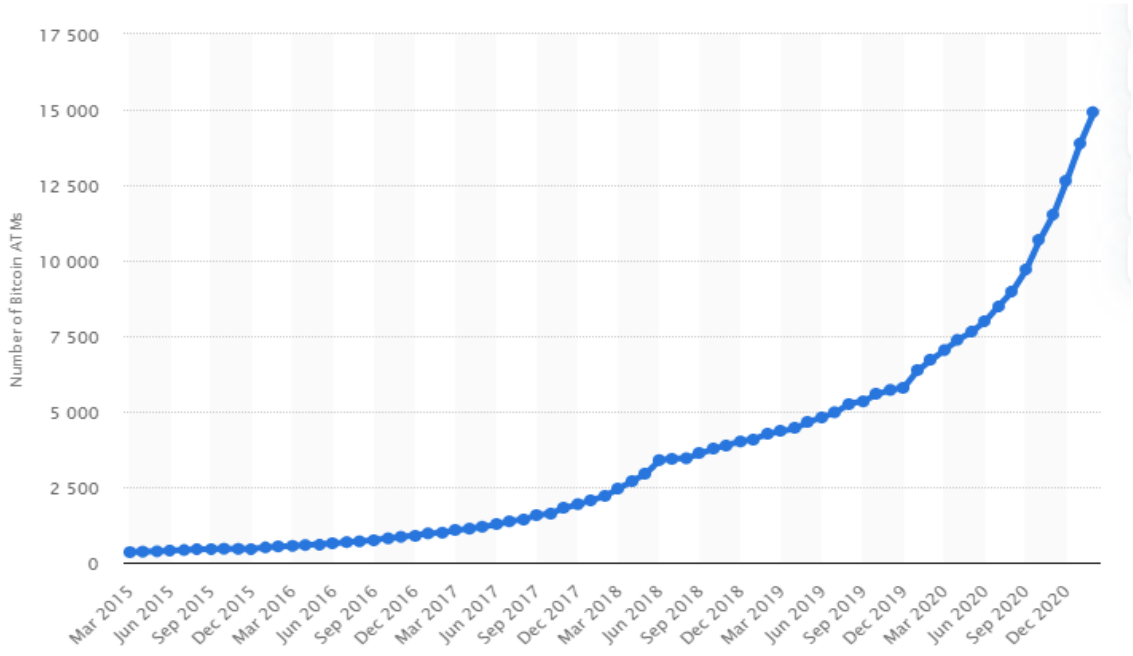
Source: Zheng, 2021.

As the transactions are concerned, there are four ways to buy and sell cryptocurrencies.

- Peer-to-Peer: easiest and simplest way to trade˙ if someone knows that someone else possesses cryptocurrencies, he can trade with him if he already has a compatible wallet. The transaction can be private.
- Local Bitcoins: someone can trade again directly with a user, but in this case, he doesn't know him. A platform acts as an intermediate and an escrow to secure the transaction. When both parties agree that the transaction is valid, then the pawns are released. If there is a disagreement, the platform intervenes to resolve it, based on specific rules set. If someone has a compatible wallet he can trade internationally.

- Automated Teller Machines (ATMs) Cryptocurrencies: they operate like ATMs for fiat currencies. As depicts below (Chart 1), the increase was exponential. In almost six months (from June 2020 to December 2020) Bitcoin ATMs had been doubled (www.statista.com).
- Cryptocurrencies Exchanges: cheaper and safer way to obtain cryptocurrencies. Cryptocurrencies exchanges are essentially digital markets where buyers and sellers 'meet' and trade. There are two categories of cryptocurrencies exchanges· centralized exchanges and decentralized exchanges.

Chart 1: The numerical increase of Bitcoin ATMs.



Source: www.statista.com

4.4.2. How to secure cryptocurrencies

Since the way of transactions has changed, there are differences also in the way someone stores and secures his money. Until now a wallet and a credit card have been enough. Digital transactions through cryptocurrencies are a new method and requires alternative ways to keep the money safe. Technology gives the opportunity to save money in various ways, whether someone wants to do it himself or assign the right to a third part or if someone wants his capital to be online or offline. In more detail, there are three ways to store and secure cryptocurrencies:

1. Self-custody: when the holder of cryptocurrencies is also responsible for ensuring them. This is the recommended way from the community, and it considered to be the appropriate way for someone to secure his capitals. There is a full control of funds and direct access to them. Also, the holder has the possibility of privacy of his transactions. Despite all these, if holder loses the wallet keys, the funds are lost forever. In conclusion, self-custody is more difficult to manage for the average user.
2. Third party custody: when the preservation of funds is done through a third-party company, which guarantees them. Beyond that, there is no other benefit because user has no access to funds, nor complete control. Also, the privacy of transactions is lost, and it costs more.
3. Partial third-party custody: when two or more parties control funds. To have access in those funds is required the coordination of all parties (they usually are multi-signature wallets). This service costs too and there is greater security but less privacy.

4.4.3. How to store cryptocurrencies

Since cryptocurrencies are money on the internet e-wallets are needed to store them. Except from that, e-wallet allows user to interact with each blockchain network. Its main parts are its address, public and private key. Private key has been replaced in more wallets from a key phrase[28] (12 or 24 words); the reason for which private key is especially important is because this allows user to access and control the wallet as well as to repossess it.

E-wallets are categorized in two large groups: hot wallets and cold wallets. Hot wallets are essentially a software-it is also known as software wallet. Hot/software wallets are connected to the internet. Keys are created and stored in it. They are the easiest to use (easy to create and easy/quick access to funds). Also, they are recommended for beginners with small funds and for those who frequently move their funds. But this is the least secure type of e-wallets. They are divided into three categories:

[28] Its advantage is that someone can create multiple wallets and can control them with the same key word phrase.

- Web wallets: user does not have to download or install any application, just interacts through the program browser by installing a browser extension. It is quite easy in use. They can also be supported by hardware wallets (it will be explained below how hardware wallets operate), which increases safety but becomes less easy to use. Finally, they can support one or more cryptocurrencies.
- Desktop wallets: user must necessarily download, install, and run a software or an application. Those wallets can be supported by hardware wallets too. To some extent, they are safer than web-wallets. Security risks involve viruses and malware.
- Mobile wallets: user must download, install, and run an application in his mobile phone. It is safer than web wallets but less than desktop wallets because mobile phone is less secure than PC. Plus, it is the most convenient to use due to portability. Loss of device without proper back up can lead to permanent loss of capital.

Cold wallets are the safest e-wallet type but at the same time they are the least convenient way to store capital. They are more suitable for users with substantial amounts and with long term horizon in their investments. User does not need connection to the internet. They are divided into two categories:

- Paper wallets: keys are printed and stored in paper. Initially, it was considered the safest way for someone to protect his cryptos. If the paper with the keys is lost, the funds can never be recovered. It is almost completely abandoned in recent years as a method of storing and saving cryptocurrencies.
- Hardware wallets: it is a physical device. Keys are created offline; they are stored into the device and remain offline. Although it is portable, it is difficult and uncomfortable to use (e.g., it does not support QR codes). Now they also work with a key phrase. Loss of device without proper back up means that funds are non-recoverable. There are ways to break it (hardware and software) however it is quite difficult. Therefore, hardware wallets are the safest method of crypto storage.

4.4.4. Exchanges and transactions

The 'place' where someone can trade with cryptocurrencies is cryptocurrency exchange. There are many options, but users must consider a lot of factors before they make their choice˙ such factors are legal and geographical restrictions, security, liquidity, trading pairs, trading choices and deposit/withdrawal options. The above features help us to categorize cryptocurrency exchanges. There are two main categories: centralized exchanges and decentralized exchanges. Their main difference is that the first have corporate status. Those two categories will be analyzed and the way that operate in crypto system will be explained thoroughly.

Centralized exchanges have legal/corporate status. It is subjected to a regulatory framework, which depends on the country that exchange belongs (in the next paragraphs will be given more details about regulatory framework in crypto economy). This company acts as a mediator between buyers and sellers. There is no need in pre-existing an e-wallet because centralized exchange provides one. However, keys do not belong to users, they only have access to an accounting balance. This means that users do not have direct access to their account. Also, the security of capitals depends on the person owning the capitals and on the exchange. They operate with order books, which is extremely convenient for users, because they allow them to set purchase and sale prices different than the existing. Only in centralized exchanges there is possibility of depositing, withdrawing, and trading with fiat currencies. Account privacy may exist under certain conditions, since KYC[29] and AML[30] procedure isn't always necessary (however, without KYC and AML procedure there is no possibility of depositing or withdrawing in fiat currencies). Characteristics of centralized exchanges are greater liquidity, higher cost of transferring funds, user friendly interface (although the variety of platform choices might confuse users, especially at the beginning) and easier execution of transactions. The cost of executing transactions is sometimes higher and sometimes lower than decentralized exchanges. Lastly, there is possibility of leverage

[29] Know Your Customer (KYC) standards were initially designed to protect financial institutions against fraud, corruption, money laundering and terrorist financing. KYC involves several steps to establish customer identity and qualify that the source of funds is legitimate (www.swift.com).

[30] Anti-money laundering (AML) refers to the laws, regulations, and procedures intended to prevent criminals from disguising illegally obtained funds as legitimate income (www.investopedia.com).

funds and there are additional amenities, such as capital lending (Daskalakis and Georgitseas, ibid).

The second category is decentralized exchanges, which do not belong to any company, and they are not subjected to any regulatory framework. In fact, it is a decentralized application (DApp), which brings together sellers and buyers, via smart contracts[31]. As far as how sellers and buyers trade between them, some exchanges function with order books[32] and other with liquidity pools[33]. In decentralized exchanges there is no possibility of deposit, withdrawal, or transaction with fiat currencies. Also, KYC procedure does' t exist in decentralized exchanges as no personal information is requested. As a result, there is privacy of account and transactions. However, users do need to already have an e-wallet, which should be compatible with blockchain network where the exchange operates. This means that users have fully and direct access to their funds. In decentralized exchanges, each transaction is recorded on the blockchain network; after the transaction is executed the security of the funds depends on the user, because money is stored directly to user' s e-wallet. In addition, transaction's costs, which are sometimes small-scale and sometimes large-scale, are depended on the blockchain's network that decentralized exchange functions. Also, there is a friendly user environment because platform's interface is structured in a simple way. Finally, although users have fewer options, decentralized exchanges offer unique amenities, such as liquidity pools. It would be very useful to mention that in DEX's users exchange cryptocurrencies directly through their e-wallets due to smart contract whereas CEX's exchange itself has direct access to user's e-wallets (Daskalakis and Georgitseas, ibid).

[31] They operate on some blockchain network, which allows the creation of DApps, such as Ethereum, Solana, BSC etc.

[32] Order books are essential tools which connect buyers and sellers on an exchange. The main purpose of this book is to help match potential buyers with the most appropriate sellers (and vice-versa). If a new order cannot be matched, it remains in the book until a match is found, or until it expires (www.cryptodefinitions.com).

[33] A liquidity pool is essentially a pool of tokens that are locked by a smart contract. The main purpose of these pools is to help provide liquidity and facilitate trading on exchanges. They do this by giving users of the exchange a means to buy and sell (www.cryptodefinitions.com).

Table 2: Depiction of cryptocurrencies management.

CRYPTOCURRENCIES MANAGEMENT			
BUYING & SELLING	**SECURING CRYPTOCURRENCIES**	**STORING CRYPTOCURRENCIES**	**EXCHANGING AND TRANSACTING**
Peer-to-Peer	Self-custody	**Hot/software wallets**	Centralized exchanges
Local Bitcoins	Third party custody	Web wallets	Decentralized exchanges
Automated Teller Machines (ATMs) Cryptocurrencies	Partial third-party custody	Desktop wallets	
Cryptocurrencies Exchanges		Mobile wallets	
		Cold wallets	
		Paper wallets	
		Hardware wallets	

Source: Processed by the author, 2022.

4.4.5. Regulatory framework in crypto economy

The continuous increase of the cryptosystem's users brought, as a result, the effort of its regulation. Keeping in mind that the invested capitals in Initial Coin Offerings (ICOs)[34] have been more than double relative to venture capitals, it is almost certain that the risk for the investors has been high. For those reasons in 2017[35] regulatory authorities started to deal with crypto markets. There is no doubt that the lack of regulations had as a result security issues, scams in cryptocurrency exchanges, ICO scams and market manipulation. Apart from the objective difficulties that derive from new and innovative fields (e.g., how to define tokens-which are their characteristics- how similar they are to financial assets, differences between tokens and financial assets), each country expose its own perspective about the crypto markets. Others select to support ICOs (and blockchain technology), others have active discussions and warnings, others prefer to take no position for ICOs, others to regulate ICOs according to the relevant legislation and according to their nature and finally others prefer to prohibit ICOs.

European Union (EU) considers the increasing activity around crypto economy. In 2017, European Securities and Markets Authority (ESMA) alerts investors to the high risks of

[34] ICOs is a tool which is used in crypto economy to raise funds. More details will be given in Chapter 5.

[35] In 2017 the raised funds through ICOs were 6,2$ billion whereas in 2018 were 7,8$ billion.

ICOs -capital loss due to the volatility of prices. Moreover, investors are not protected in case of scam (www.esma.europa.eu). After almost two years, in 2019, the perspective seems to change. European Banking Authority (EBA) published a report on crypto assets with advice for the European Commission (EC). According to that report, crypto assets raise concerns about market integrity and consumer protection. It is also reported that the activity around crypto assets is expected to increase (www.eba.europa.eu). In addition, ESMA in 2019 published an advice about ICOs and crypto assets, in which is recommended a special framework about them, adopted to the risks and their characteristics (www.esma.europa.eu). Finally, EC published a proposal for regulation on Markets In Crypto Assets (MICA), in which defines crypto assets as digital representation of a value that can be transferred and stored electronically using distributed ledger technology or similar technology. Particularly, anyone who wants to make a public offering within the EU should comply with obligations (e.g., to be legal entity). Moreover, stablecoins issuers must maintain own funds at least equal to the amount of 350.000€ or 2% of the average amount of reserve assets. They should also implement policies on redemption right against the issuer or against the reserve assets- however there were differing opinions about the preferred solution in relation to supervision (www.eur-lex.europa.eu).

Worldwide, regulatory authorities of United States of America were the first to take a stand about how they intend to regulate the crypto market. Until today there isn't any law, which prohibits ICOs. In July 2017, the Securities and Exchange Commission (SEC) published a report in which the ICOs must register in SEC and receive special permission. Also, tokens which will be issued must also be registered in SEC (www.sec.gov). In September 2017, SEC creates Cyber Unit. The jurisdiction includes, among searching for illegal activities on the cyberspace, the illegalities on distributed ledger technologies (www.sec.gov).

Moreover, Singapore was the first country in Asia (and the third worldwide), which took place about ICOs. The Monetary Authority of Singapore (MAS) supports ICOs not only for maintaining the country as a financial center but also to promote the country as innovative (www.mas.gov.sg). Canada also issued papers and notices about ICOs. In August 2017 Canadian Securities Administrators (CSA) issued a notice about cryptocurrencies offerings (www.osc.gov.on.ca)˙ in March 2019 a consultation paper was issued though which a regulatory framework was proposed for the new trading platforms that manage crypto assets (www.securities-administrators.ca). Australia issued an information sheet in which

Australian Securities & Investments Commission (ASIC) points out that every ICO must comply with the relevant laws and companies running ICOs must keep a register of tokens (www.asic.gov.au). In addition, Australian government introduced a bill about a special enhanced regulatory environment, which will allow Financial Technology (FinTech) startups to operate under this special regulatory environment (www.treasury.gov.au). Finally, we should mention that China is the first country to formally ban ICOs (September 2017). The reason was profiteering and suspicion of illegal economic activities (www.pbc.gov.cn).

5. Blockchain Technology and SSE's Economy: The Connection

5.1 Raising Funds in Crypto Economy

Before the analysis of how funds can be raised in crypto economy and consequently how projects in social and solidarity economy can benefit, it should first be underlined that there is lack of institutional framework, as it has already been shown in the previous Chapter. While traditional system's investors are protected from a strong regulatory framework, this is not yet feasible for crypto market. This happens because, while there are specific rules for financial assets, there are no corresponding rules for coins. However, in crypto economy several tools can be used to raise funds. Some of those are Initial Coin Offerings (ICOs), Crowdfunding, Initial Exchange Offerings (IEOs), Initial Decentralized Exchange Offerings (IDOs), Security Token Offerings (STOs) and Non-Fungible Tokens (NFTs).

In order readers to understand better the philosophy behind these innovative tools, tokens are distinguished from coins and cryptocurrencies. Tokens gives emphasis on utility while cryptocurrencies on transactions. Both use cryptography to operate in a decentralized environment and they are digital representation of a value˙ moreover, they function as a means of exchange and storing value and as a unit of value measurement. However, tokens have more functions than that (e.g., discount coupons on a platform), they are not just a currency/coin. They emphasize on utility by giving privileged access to owners. Moreover, while tokens and coins are both mean of trading, value measurement unit and mean of storage value, coins are just currencies which operate on their own blockchain while tokens have broader role. At this point it should be clear that tokens and shares (plus bonds) are different things. Tokens, as it has already been said, emphasize on operation, while shares on cash flows. Each token has value only in the system that operates. Also, each token is unique because each project is unique. Finally, shares incorporate property rights while tokens incorporate utility rights (Daskalakis and Georgitseas, ibid).

Starting from ICOs, it should be mentioned that they are an innovative form of raising funds. They rely to blockchain technology. There are three stakeholders: those looking for funds (start-ups, projects), those who are going to invest/finance and the platforms (that administer ICOs). The basic idea is that companies (usually start-ups) issue a fixed number of tokens, which sell to investments. Investments do not have ownership rights to the business, but they do have usage rights. Those issued tokens are exchanged for basic cryptocurrencies

(Bitcoin, Ethereum). ICOs do not have a long duration[36]. No one can deny that there are many advantages for both businesses and investors˙ however, there are also significant risks, especially for investors. The main risk is that there is not specific regulatory framework on how ICOs should be conducted and at the end how the project will be controlled (Chen, 2019).

A chronology of ICOs could help the reader understand better their range. In 2008, Bitcoin network is created. At the same time blockchain technology is used to create altcoins. In 2013, Mastercoin-the most successful ICO-draws 5.000 Bitcoin, with a total value of 500.000$. As the years pass by and Bitcoin gains ground in the crypto market field, in 2017, a burst of ICOs happens. The significance is rather huge˙ compared to venture capitals (VCs), funds raised through ICOs are doubled. Through years ICOs issue in less time with more volume (of money)[37].

At this point ICOs five stages of implementation will be analyzed:

1. Pre-announcement: project team informs the public about project˙ they describe shortly the idea, the purpose, and the stages of implementation. This is done through websites and fora related to crypto market[38]. Through this procedure the public can also give to the team feedback about the project.
2. Offering: final form of the project is presented to the public. Central point of the project is the Whitepaper. This includes program summary, specifications, idea, incentives, project's marketability, information on tokens distribution, implementation guide with corresponding milestones and finally information about project team.

[36] Except for EOS that lasted a year. EOS was a project which aimed at New Blockchain for Big Data applications with more speed and cost free. The problem which tried to solve is managing multiple applications at the same time. The way to solve it is a new method of consensus (Delegated Proof of Stake – DpoS). Total amount of EOS cryptocurrencies was 1.000.000.000.

[37] 'Brave' tokens (May of 2017) raised 35,5$ million in only 30 seconds 'Bancor' (June of 2017) raised 153$ million in 3 hours.

[38] Such as reddit, twitter, telegram etc.

3. Campaign: project team advertises the upcoming ICO to attract investors through talks in conferences, online presentations, and social media campaigns. They also use marketing strategies, such as airdrops[39].
4. Sale of tokens: this is the most important stage because this is where funds are raised. Investors exchange their basic cryptocurrencies (Bitcoin, Ethereum etc.) with the newly published coin in default value. Third parties might be used from project team to increase confidence. For this purpose, escrow accounts are used in which funds are stored. Project team does not have access to them until certain conditions are met.
5. The last stage includes introduction of the newly issued currency in exchanges. The exchange process requires filling out a form-information about project, team, and technical information about token (www.binance.com).

ICOs have benefits for both investors and businesses. The first ones can have access to a specific product/service in the secondary market[40] expecting capital gains (through price increase if the project succeeds). On the other hand, businesses can raise funds directly from the investing public in global scale through an easy and fast process with no transaction costs. The result is fast and high value fundraising where millions of dollars are drawn in a short time, as it has been mentioned above (Chen, 2019).

Undoubtedly, ICO's have several risks, mainly for investors. Firstly, there are analytical risks when an investor chooses a failed startup. This can happen either due to lack of information and reviews about the relevant startups or to the lack of issuers behalf to publish Whitepapers. There are also technical risks which are related to careless handling of funds and fraudulent actions. While in classic financial market is difficult to steal money from a bank account, in crypto market scammers are taking advance of lack of formation and stability and steal money from digital accounts. Finally, there are financial risks, which cannot be predicted due to cryptocurrencies high volatility. Solutions to the above risks

[39] Many crypto companies distribute free coins to their communities to increase their project's visibility, increase the circulating supply and stimulate trade. These free distributions are commonly known as airdrops (www.airdrops.io).

[40] Capital market is divided in primary market (securities are offered for the first time to receive a public subscription) and secondary market (listed securities are traded between investors).

could be publication of Whitepaper, identification of crypto investors through the KYC/AMC process, diversification of the investor's portfolio and diligence on the behalf of the issuer for an escrow agent, who will control the allocation of financing (Karpenko et al., 2021).

Subsequently another innovative form of funding (which was recently developed) will be examined˙ it is crowdfunding. As the word implies it's about a process of raising money through the crowd. The success is based on the fact that a large number of people (supporters) are contributing with small amounts of money. There are four basic categories:

1. Donation crowdfunding: it has no-profit orientation (it is more about reasons of ideology) in areas of public welfare, environment, culture etc. There are no rewards in return (e.g., a political campaign, Greenpeace's actions etc.).
2. Reward crowdfunding: there are small contributions from many people. The reward is some symbolic object or service (such as CD, books, type somebody's name to the product etc.). There is direct contact with customers through platform (feedback).
3. Peer-to-peer lending: borrowers pay less interest compared to bank loans. Lenders receive higher interest rates compared to bank loans. The crowd may reject the borrower who receives an individual credit rating. Borrowers can be individuals or legal entities. The platform evaluates the request and gives approval or rejection. If crowd approves it, the loan is classified in one of the already formed interest rate categories (based on risk). Therefore, the crowd invests in loans, not in projects.
4. Equity crowdfunding: crowd financing for the acquisition of company's shares. There are similarities with venture capitals because of profit shares. The minimum contribution amount varies and there is investment risk (project failure) (Daskalakis and Georgitseas, ibid).

Another tool for fundraising is IEOs. They are similar to ICOs, as they concern initial offers of digital data (tokens) for raising funds. The main difference between them is that IEOs are offered through cryptocurrency exchange platforms. That means that tokens to be issued are already listed on an exchange, which is a benefit for investors because they know in advance that, when the fundraising process is completed, they will be able to exchange their tokens. Therefore, funds are raised on behalf of the start-ups from exchanges and start-ups must meet necessary commitments and pay a fee to the platform for their registration. The IEOs

tokens are not offered to general public but only to registered users of the exchange. There are undoubtedly advantages such as more trust and security and easy of conduct but there are also disadvantages: thorough control of the project from the platform, risk of leakage investors personal data and exclusion of some investors because of minimum distribution limits (Daskalakis and Georgitseas, ibid).

IDOs are considered a natural continuation of IEOs. In an IDO, fund raising takes place when a digital token is issued and distributed through a decentralized exchange. The approval is decentralized and given by the community who manages the Decentralized Exchange (DEX), if are met the requirements set by the platform. Then there is a public offer and sale˙ project creates a token pool and users can buy 'I Owe You' (IOU)[41] tokens of the project. In other words, investors pay in advance for their tokens, but they receive them at a later date. Finally, the digital token is introduced to the DEX once the IDO is successfully completed. The advantages of IDOs are the immediate liquidity (liquidity pools) and trading process and better access for investors (because several altcoins are only accessible via DEX). On the other hand, disadvantages exist too. First of all, the risk for investors is very high due to lack of control procedures. Also, there are difficulties of 'Know Your Customer' (KYC) and Anti-Money Control (AMC) methods plus price manipulation is possible because there is risk of buying large quantities of tokens from few investors.

STOs are securities of traditional economy (such as shares and bonds) which are digitized and exchanged to cryptocurrency exchanges in the form of tokens. As a result, STOs give access to cash flows, participation rights and dividends. It is of high significance the fact that every company which has the legal form of type SA[42] (i.e., has shares) can take part in secondary market. The procedure has five stages.

- The first stage concludes the preparation of a STO. Initially the idea-business plan is planned, and the newsletter comes up.
- Offer design happens at the second stage in which publishers decide the structure of the token and offer's duration.
- At the third stage the selection of "providers" of the offer is made, i.e., they select the platform, the mediators (token distribution, escrow accounts) and the exchange.

[41] IOU is a document that acknowledges the existence of a debt. An IOU is often viewed as an informal written agreement rather than a legally binding commitment (www.investopedia.com).

[42] Société Anonyme.

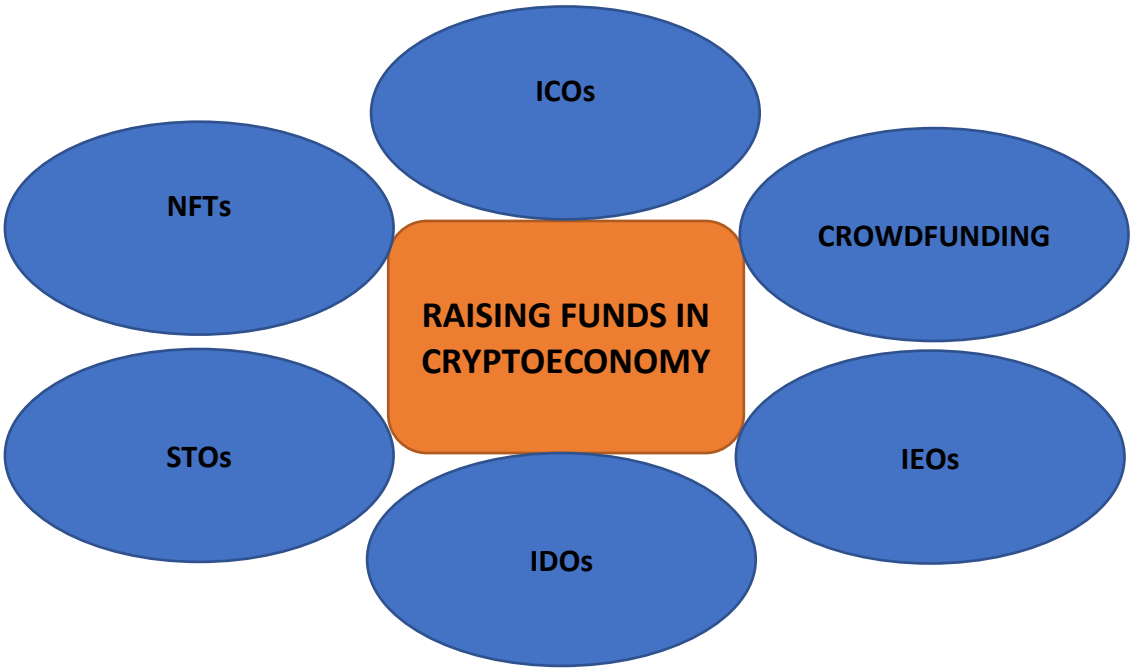
- The fourth stage includes offering's conduction and marketing. Token is promoted to targeted categories of investors, then is distributed from brokers and finally funds are raised from investors.
- The last stage it's about introduction of the token in the exchange. In that stage there is audit and selection of investors, clear definition of token issuance limits, liquidity guarantee and generally maintenance of due diligence rules.

One of STOs benefits is they subject to the existing regulatory framework which increases their credibility, and it prevents scams due to sanctions. Also, it is very easy to clear because STOs are easy to liquidate in a cryptocurrency exchange. Finally, the fact that STOs are more secure than ICOs and IEOs plus that they are supported by something tangible have as a result a large number of investors. On the other hand, STOs have more difficult process than ICOs, IEOs and IDOs. Moreover, there are restrictions on investor participation and specialized platforms are required as intermediaries (Daskalakis and Georgitseas, ibid).

The last tool that can be used in crypto economy to raise funds are Non-Fungible Tokens (NFTs). According to their name, it's about tokens that cannot be exchanged. They represent ownership and authenticity of unique items. Examples of NFTs are music, artwork, collectibles, videos, cards, and Graphics Interchange Format (GIFs). They can only have one official holder at a time and are protected by blockchain Ethereum˙ as it has already been explained, when a block is validated and is added to the chain no one can modify it. Therefore, no one can modify property registration or copy/paste a new NFT. To make NFTs clearer to the reader it will be compared with Tokens/Cryptocurrencies. Thus, while they all use same technology, cryptocurrencies are interchangeable with each other, which means that they have same properties and they have same value (e.g., 1 BTC is always equivalent/same with another BTC). NFTs are not interchangeable because each one is different (every NFT has a digital signature which makes exchange between them impossible). A piece of art which is digitized in NFT is not the same with another digitized piece of art just because they are both NFTs. Whoever buys an NFT essentially buys the right to transfer the token to his digital wallet. Token is the proof that a copy of a digital file is the prototype. Just like original artwork can have copies, anyone can have a digital cory of an NFT-the original is unique. The public key of the creator serves as the certificate of authenticity. The private key of the holder is proof of ownership. The pair of the public key of the creator and the private key of the holder determines the 'value' of an NFT. Moreover,

the creator or the owner of an NFT can store specific information within the NFT˙ they can sign their work by including their signature in the metadata[43] of an NFT (Daskalakis and Georgitseas, ibid). In order the aforementioned ways for raising funds in crypto economy to be understood better they have been summarized in the Figure below.

Figure 12: Ways to raise funds in crypto economy.



Source: Processed by the author, 2022.

5.2 Fields of Reference

Blockchain and cryptocurrency technologies have various implications in the collaborative economy. First of all, emergence of collaborative consumption made possible for individuals (i.e., suppliers, users seeking to rent or obtain the proposed products and collaborative platforms acting as an infrastructure for sharing goods or services) to interact on a large scale. In addition, with the use of blockchain technology, collaborative platforms are subject to transformations in terms of governance, transaction costs, and user confidence (Ertz and Boily, 2019).

[43] Metadata describes other data. It provides information about a certain item's content. For example, an image may include metadata that describes how large the picture is, the color depth, the image resolution, when the image was created, and other data (www.techterms.com).

It is of high significance to mention that official initiatives around blockchain technology not only depicts but also recognize the importance of crypto system; at the same time, European Economic and Social Committee (EESC) of EU, through an own-initiative opinion, sets blockchain and DLT as ideal infrastructure for Social Economy. In more details, EESC argues that the mentioned innovative technology isn't just a matter of Information Technology (IT), but mostly 'involves a fully-fledged process of disruptive social innovation'. The Committee also believes that organizations of social economy can help to promote benefits of blockchain technology, as far as forms of open and participatory governance is concerned. Moreover, not only social organizations themselves can benefit from new technologies, but also their members and the end users. Through conclusions and recommendations, EESC points out that disadvantages of blockchain technology must not benefit only a new digital economy elite, but social economy's organizations should secure transparent access and participation of all. It can also be observed the prediction on behalf of the Committee that those new technologies will allow applications in economic and social life too. There are several technological characteristics that may be used from social organizations to promote their goals, their capability, and their impact in the society. Apart from others, it should also be reminded that PLT guarantee trust between partners, who want to collaborate; however, new blockchain technology ensures transaction but not the content or quality of the content. So, it must be clear that technology cannot substitute human's behavior characteristics, such as trust and loyalty. Nevertheless, it is sure that social economy's organizations can contribute to democratize the economy by promoting the spread of a digital social economy (EESC, 2016).

Moving on in solutions, there are many practical ways in which blockchain technologies can be used in social economy's organizations. This is because blockchain technologies increase transparency and trust. It provides freedom of action to individuals in the face of oligopolies, large corporations, and States. The free exchange of crypto currencies implies no need for banks. As a result, someone who wants to donate or fundraise money can easily make the process secure and traceable by following the flow and destination of money donated for example in a Non-Governmental Organization (NGO). At the same moment the NGO itself could ensure that money invested is used for proper purposes, only by supplying what is needed to provide information about expenditure stream.

Moreover, social organizations can improve the way they manage their governance through blockchain technologies. One example is consultation and voting of members. This can be ensured by making easier to participate even those who are geographically spread out or when members are numerous, and it is difficult to follow traditional procedures.

Another field in which blockchain technologies can contribute to is cultural activities such as art and training, in which social organizations are active. Through them they could protect intellectual property rights and copyright by establishing smart contracts for the transfer of content. Digital image of intellectual property is registered by the rights holder in the journal. Coding of the exact content is made through a hashing, which produces a hash of 64 symbols. This represents the unique identification of the file. Non-material assets are registered in register-journals and are managed by those, possessing secret key therefore, blockchain guarantees intellectual rights and is moving towards detection of fake products through innovative applications (Shatkovskaya et al., 2018).

Also, associations and cooperatives on occupying on these areas could authenticate activities carried out at a distance and to tailor them to users' needs. As far as the field of training and education is concerned, social organizations could use blockchain technologies for certification of skills by transferring securely qualifications in digital format and issue digital certificates for students and workers (EESC, ibid).

Continuing, there is a wide area in which organizations of social economy have been mostly spread out; this is social assistance and consequently the area of personal care and health. New technology can contribute by securing storage of data and information, by accessing those data and by rightly identifying of the people concerned. Also, social organizations provide their help even at a great distance in decentralized areas, where services of telemedicine and e-care systems could have a considerable impact on people's quality of life. Blockchain technology helps to maintain and share the patient’s medical record with hospitals and health providers. Also, some significant applications of healthcare are drug traceability, patient electronic health record and managing medical records and other data (Ratta et al., 2021).

Furthermore, it is well known that technological innovations meet vulnerable people[44] at the end because they are required skills and resources, which cannot be found by all individuals. So, social organizations can play a key role and be the access point for those people.

In the agricultural sector, many cooperatives make efforts to prevent fraud and falsification, which harm both consumers and producers. What those cooperatives really try is to make their products traceable and identifiable. But, above all that, new technologies can promote the operation of those cooperatives by making members' relationships more transparent and by avoiding insurance cost against risks linked to natural disasters (EESC, ibid).

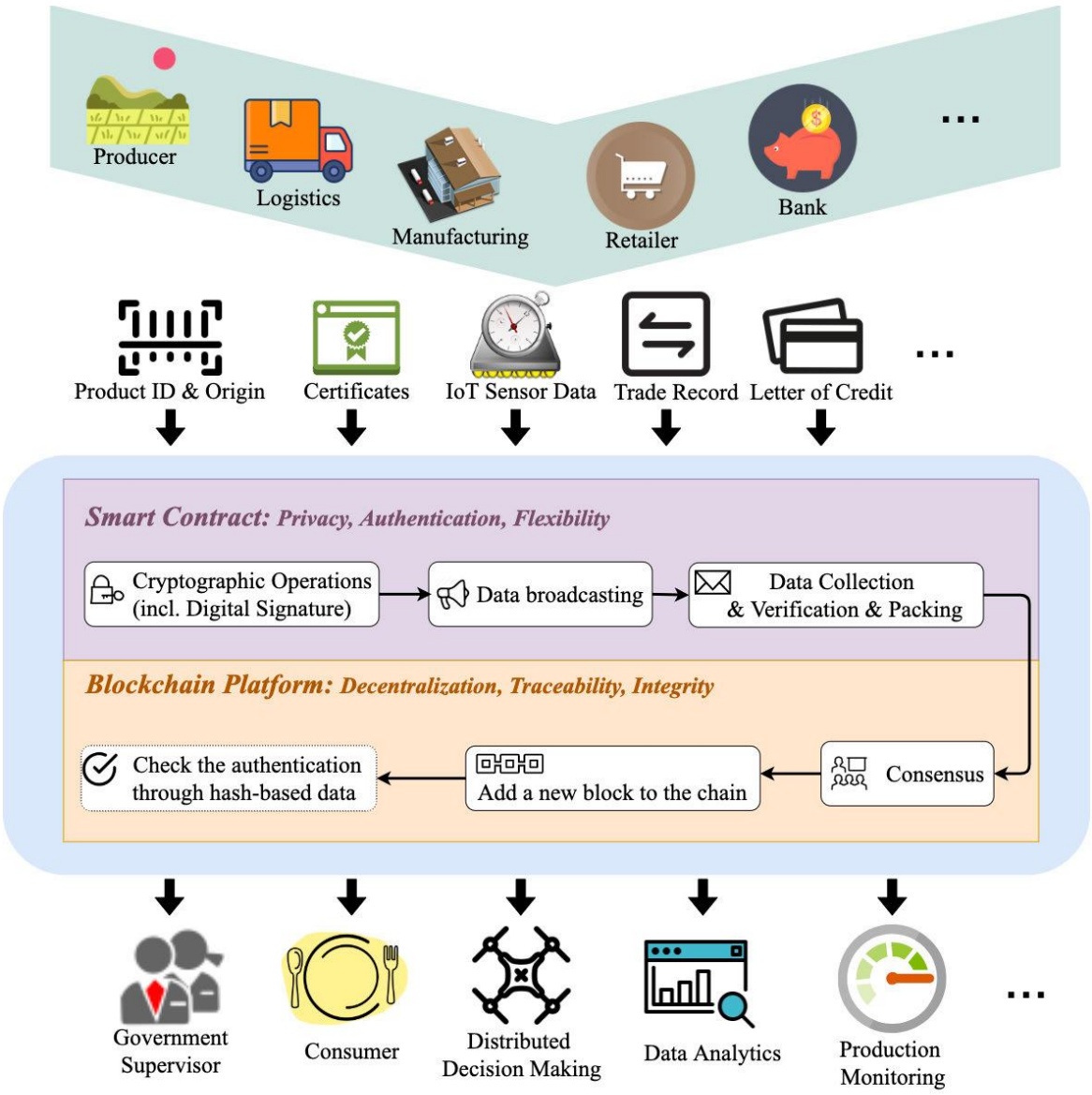
It is undoubtable that blockchain has attracted attention especially in agricultural sector and derives from important issues such as food contamination, data transparency and integrity of agriculture related information management systems. Applications designed are aiming into provenance of traceability and food authentication, in smart farming data management, in efficiency improvement of trade finance in the supply chain and in other agriculture related data management systems. As far as application of provenance of traceability and food authentication is concerned, it' s very popular because all relevant data related to the product origin and its movements can be stored with minimal risk.

As it is depicted in figure below, when something is produced is accompanied with a digital token to ensure that it is tracked at a real-time manner. E-certificates, including agricultural treatments, ID numbers, manufacturers, security issues, permissions and safety related records are all stored in the log files. Therefore, suppliers can trace information needed online in real time. Also, certification documents of the products are attached in transactions to keep up with the compliance with health and safety regulations. Smart contracts achieve productivity control and management through the way they function. Many agricultural projects have benefited from the convergence of IoT and blockchain techniques. By using these applications, farmers can trust the automated controllers because all decisions are accountable. Therefore, blockchain's main aim was to reduce transaction costs and to improve financial efficiency. These targets were in favor of small-scale farmers, who are suffering from high cost of trade transactions and accidental losses caused by environmental disasters. Relevant applications focus on making these agricultural producers profitable. Finally, it should be mentioned that blockchain based systems have also been developed in

[44] As vulnerable people are considered older people, the poor, people with disabilities, children, and marginalized families.

many other agriculture related information management systems as the backbone infrastructure (Lin et al., 2020).

Figure 13: Agricultural stakeholders, including producers, logistic companies, manufacturers, retailers, and financial institutions, can be involved to create blockchain applications to build up trust of data users, e.g., government supervisors, consumers, and other AI and machine learning based systems.



Source: Lin et al., 2020.

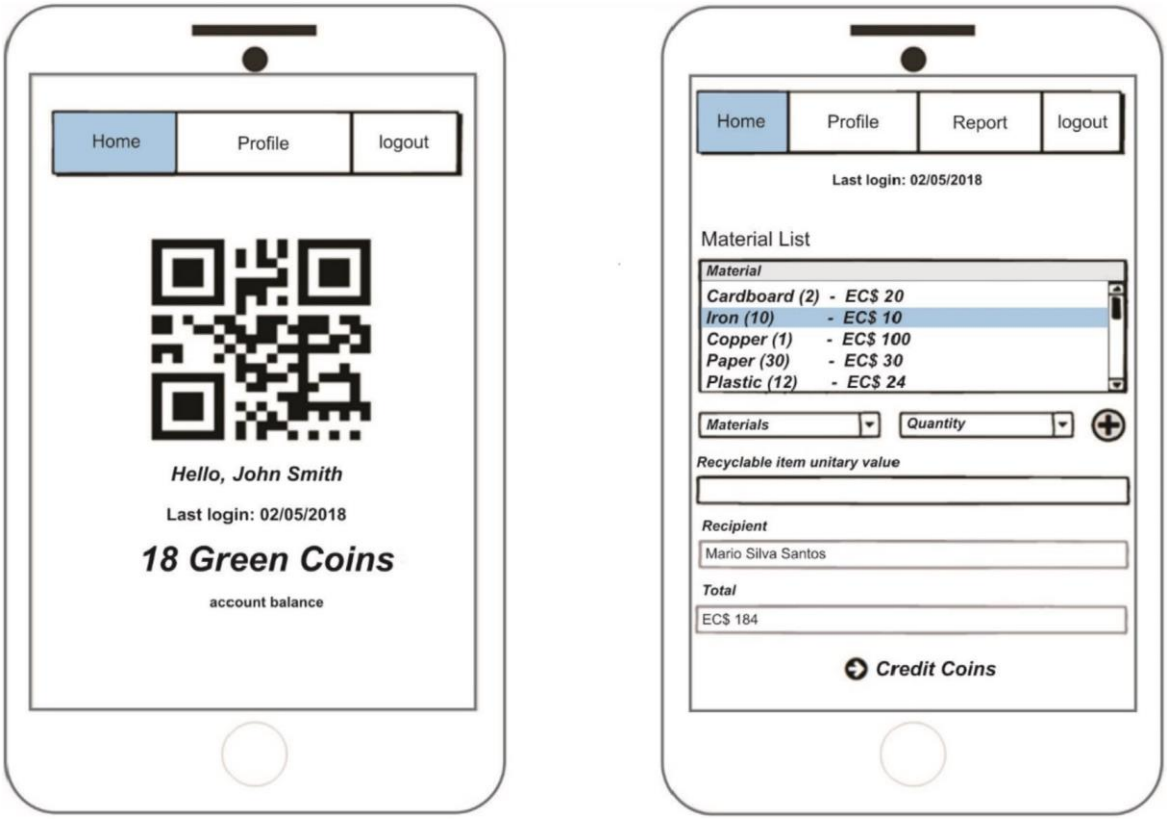
As it has been already analyzed, crypto economy regards to peer-to-peer transactions. Consequently, this practice benefits social economy organizations because they can manage

crowdfunding and micro-credit transactions for 'unbaked' people[45]. Moreover, social and solidarity economy primarily aims to environmental sector. It is of high significance the waste reduction and blockchain technologies can play a key role in the collection and differentiated treatment of waste. This is possible through upgrade of organizational level and human's interference by making use of new innovative technologies. Such an example is the implementation of solid waste management in a small municipality in Sao Paolo (Brazil). Low-income households selected their solid household waste (plastic, cardboard, and aluminum), took it to collection point and exchange it by the so-called Green Coins at market prices (plastic cards representing monetary values), which were used in local registered traders (bakeries, supermarkets, drugstores, grocery store) to buy what they needed. In the figure below is depicted application's interface (identification of collector through QR code and balance of green coins). Then, in a weekly basis, store owners exchanged amount to the topic authority, which was responsible for the program and receive the correspondent value in local currency. Therefore, through this program complementary earnings were provided to low-income families and the local economy was stimulated through the circulation of green money. Additionally, young people and children became aware of the benefits of the correct use of solid waste (França et al., 2020).

Another field that blockchain technologies can contribute is the energy sector. One of the most important problems globally faced is energy problem. Social and solidarity economy tries to confront relevant issues through renewable energy cooperatives. Only in Europe there are more than 1.500 such cooperatives with more than one million people actively involved. New technologies can give a boost towards optimization of their distribution network. Energy issue is of high importance especially in the blockchain technologies, because during the procedure of mining, as it has already been described, large amounts of energy are required. This is a point which those who are opposite to blockchain technologies criticize. Therefore, blockchain technologies should be made more sustainable by optimizing the use of energy (EESC, ibid).

[45] People who have no access to bank system/bank account because they are considered not eligible from the banks.

Figure 14: Prototype of the interface of identification of the collector (QR Code) and balance of green coins and prototype of the interface of register of discard, to credit coins to the collector.

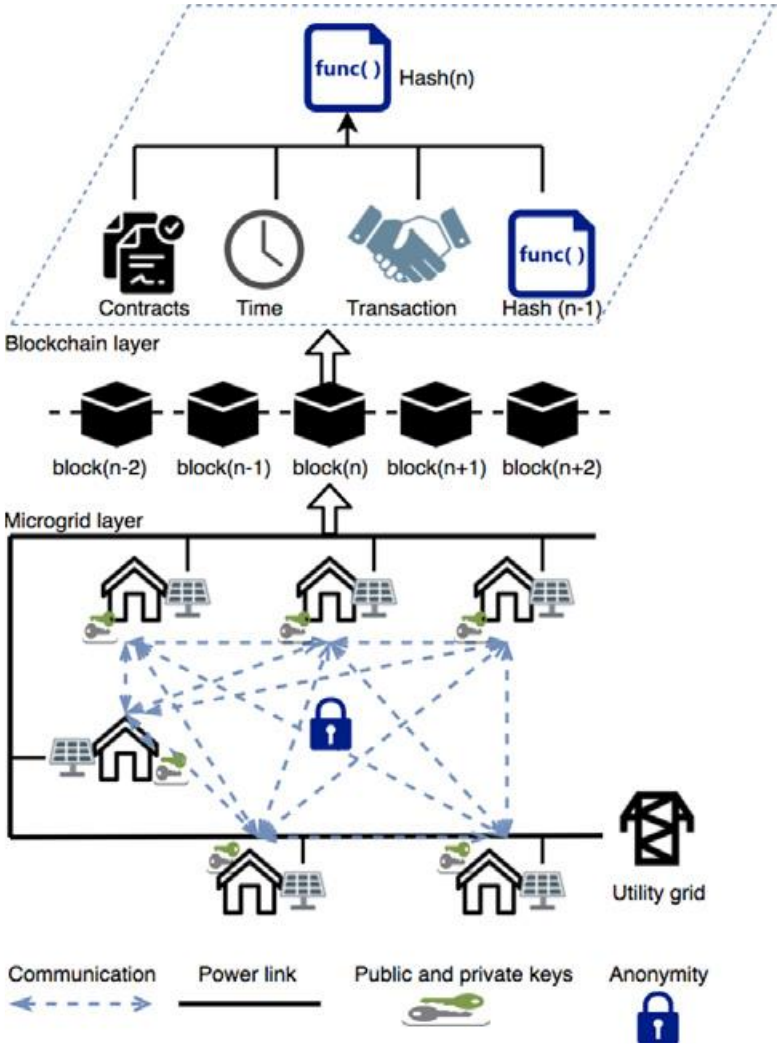


Source: França et al., 2020.

An excellent example in achieving sustainability in energy sector is through peer-to-peer (P2P) energy trading, which allows prosumers to trade energy directly without intermediaries. For that purpose, decentralized feature of the P2P market is designed according to blockchain structure. Consensus mechanism is PoS which defines the function blockchain's rules and the mining mechanism. As it has already been explained, in PoS consensus mechanism miners sacrifice something they own (i.e., cryptocurrencies). In this case miners sacrifice part of their stake to compensate for the power losses and reduce the price gap from the traditional prosumer-to-grid trading but miners get rewards for successful mining. Also, this model influence in a positive way social welfare's sector by improving producers' income and consumers' cost-saving through the designed pricing scheme, which eliminates the price gap between buying and selling. The following figure shows the graphical representation of a microgrid model with 27 prosumers with the implementation of smart contracts. The proposed blockchain is using Ethereum's platform and is

recommended to be public in order to record transaction information but also to conserve participants' privacy. Traders propose their transaction application by broadcasting to the whole network (microgrid), and then, this proposal is verified by the other prosumers. When everything is approved, smart contracts are automatically executed, and transactions are completed. Malicious attack is prevented by the mechanism embedded (an attacker should control more than (2⁄3) N of prosumers), which make the attack impossible considering enormous computation expense required. All values and components that form blockchain's technology, such as timestamped transaction, anonymity and secure through public and private keys are active and applied in this microgrid too (Yang et al., 2021).

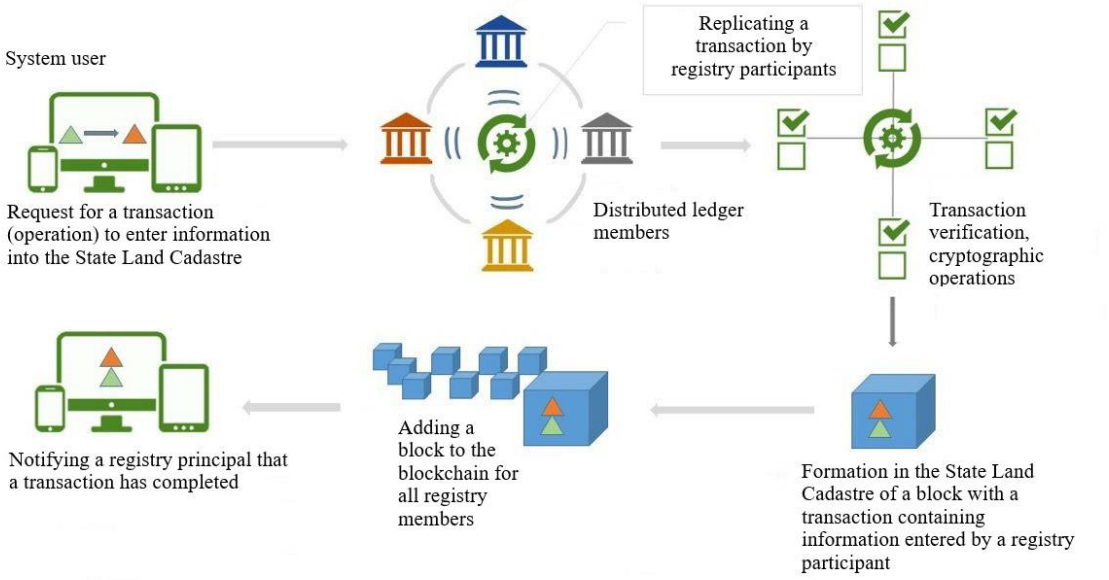
Figure 15: The structure of the P2P energy trading supported by blockchain system.



Source: Yang et al., 2021.

One of the fields that blockchain technologies can unfold is public sector. Since introduced data is impossible to change after the block's validation and its addition to the chain, public regulation should be very careful to develop in compliance with the rules of General Data Protection Regulation (GDPR), with reference to the so-called right to be forgotten[46]. Particularly, blockchain technologies are already in operation as far as land administration is concerned. In the figure below is presented a model of a land administration system with a blockchain infrastructure. Data and state of land resources are added to the blockchain in real time. At the same time, the database of the land information system may include data from the Unified State Register of Real Estate. Requests for transactions are distributed over the network between ledger participants. Each miner's node has only a part of all data on land resources. Finally, it should be mentioned that no node can access the data in full enforcing reliability (Beznosov et al., 2021).

Figure 14: Design model for entering information on land resources using blockchain technologies.



Source: Beznosov et al., 2021.

[46] Is called the right of the person, who's data are collected, to request the deletion of personal data concerning him according to article 17 of Regulation 2016/679, if some conditions are met (e.g., personal data are no longer necessary in relation to the purposes for which they were collected, personal data were collected or processed illegally) (www.en.wikipedia.org).

There is no doubt that new technologies accelerated the diffusion of social practices; peer-to-peer transactions are easier due to technological progress. But it doesn't end to economic relationships. Blockchain also favors for non-hierarchical self-organization and peer-to-peer collaboration. As it will be showed in the next chapter, this new technology boosts a cooperative consensus which could be seen as a form of ideological socialism is practiced through collaborative networks. Main goal remains promotion of participation and collective interest's upgrade.

6. Towards a New Social Era?

6.1 Case Study of a 'Social' Cryptocurrency

FairCoin is a cryptocurrency that claims to be the means of exchange used by several confederated collectives. It is supposed to create an innovative glocal[47] economic system from the bottom up in favor of an alternative and post-capitalist model, paving the way for a collective change towards a life based on values in common. Cooperation, ethics, solidarity, and transparency are key factors to create a value exchange system for everyone. The development and use of powerful interconnected global digital tools and regional hubs are crucial for its success.

FairCoin is supposed to implement a fair value-exchange system at a global level. The innovative Proof-of-Cooperation (PoC) blockchain mechanism is the unique consensus algorithm developed for FairCoin. It requires much less energy than other blockchains and also enables faster transactions. So far, FairCoin is the most ecological and resilient cryptocurrency available. Among its benefits it is its ecological footprint and the fact that it is accurate, fast, ethical, strong, with a growing reach, confederated with real networks. Specifically, FairCoin consumes very low power even with hundreds of transactions per minute. In addition, Cooperatively Validated Nodes (CVNs) ensure exact 3 minutes block time. Its transaction is visible within seconds with full confirmation in less than 3 minutes. Moreover, it supports fair business values and models, and it has strong and growing support from cooperatives worldwide. There are more than 50 global hubs providing local goods, services, and support. Most of them are in Europe (Spain, France, and Greece). Also, it is of high importance the fact that there is maximum freedom in each user community, but strategic decisions are taken by all parts. Lastly, they exist several communities with daily online collaboration & local meetings.

FairCoin as part of the FairCoop ecosystem supports independence from authorities, banks, and state interference. Therefore, a FairCoin wallet can be especially useful for refugees without official documentation, who have difficulties in obtaining a bank account, or for people who wish to minimize their activities inside the current economic system. You can

[47] Short of words ´global' and 'local'. It is used to describe something that is developed and distributed globally but is also adjusted to accommodate the user or consumer in a local market.

use FairCoins for storing value in a wallet, buying goods and services, receiving income, and exchanging to fiat money (www.fair-coin.org).

FairCoin started when 50 million FairCoins were initially distributed by an "airdrop" to 49,750 addresses in March 2014. Each person was able to claim 1000 FAIR per hour. Automated airdrop claiming methods had no effect, as each IP address could register once per hour, and 2 different captchas[48] had to be solved. These security precautions were hidden until the day of distribution. FairCoin is-like most other blockchain technologies-an independent mathematical model which cannot be stopped. It is a "common distributed database" and is available to every wallet for adding transactions. Algorithms control, how transactions are confirmed. In the case of FairCoin, the algorithm was changed on July 18th, 2017, from Proof-of-Stake to Proof-of-Cooperation. It required wallet holders simply to upgrade their software. All coins have been transferred.

Instead of thousands of computers competing to solve difficult validation puzzles (and thereby making the rich richer), cooperatively validated nodes (CVNs) do that job with cooperation in FairCoin. The big difference in FairCoin compared to other crypto currencies is that a certain level of trust and democratic values even at the technical level have been introduced. For example, team is discussing the development of FairCoin in a chat group. In monthly General Assemblies strategic topics, and decisions to add validated nodes or tasks for chain administrators are being decided. Moreover, instead of competing to solve a difficult puzzle in order to legitimize a block, the CVNs cooperate in a round-robin way. FairCoins could be directly bought until 2019 with credit card or wire transfer. Today FairCoin can be acquired through exchanges. Someone first has to buy Bitcoins elsewhere and then may sell them for FairCoin. FairCoop recommends the sellers to follow KYC and AML principles according to established local laws (www.fair-coin.org).

As it is shown in the table below, FairCoin comparable with the most sovereign cryptocurrency-bitcoin, and one sovereign fiat currency-dollar seems to excel in many points. Comparison makes clear that it is ahead not only from technical point of view, but it also expresses democratic and ethical values. It remains to be seen if it will be accepted by general public and if it will last over time.

[48] Captcha is a computer program or system intended to distinguish human from machine input, typically as a way of thwarting spam and automated extraction of data from websites.

Table 3: Comparison of the concepts of FairCoin, Bitcoin and traditional fiat money

	FairCoin (FAIR)	**Bitcoin (BTC)**	**Dollar (USD)**
Business	fair products & services	grey & dark business	industry & oil driven
Controlled by	Fair.Coop assembly (democratic processes)	Nerds & Chinese investors	FED (owned by banks, not controlled democratically)
Transactions validated by	Cooperatively Validating Nodes	Bitcoin miners	bookkeepers & auditors
Power consumption	a few hundred Watts (~30 validation nodes)	~300 Megawatts (mining ASICs)	hundreds of Megawatts (bank towers & money logistics)
Transaction speed	< 3 minutes	average 43 minutes, may take hours or even days	up to hours or even days
Fee per transaction	~0,003 € (=0,3 EuroCent to prevent spam transactions)	0.35-5 € (see chart)	SEPA: 0 €, other countries 3-20 € or up to 5%
Risk	low acceptance at merchants	51% attack	banks crashing
Money Supply	none, remains constant	54000 BTC per month by mining until 2020	180 billion USD per month by quantitative easing
Value creation by	honest products & services	speculators	bubbles & quantitative easing
Ethical values	equality, social justice, circumspection, patience, cooperation	speed, risk, competition	competition, exploitation, consumerism, eternal growth
Governance	democratic	oligarchy	monopoly
Exchange rate	1.20 Euro within the FairCoop community. Price on online exchange markets may vary a lot.	~ 3600 USD (as of March 2019, see chart)	1

Source: www.fair-coin.org

6.2 Case Study of a 'Social' Platform

GiveCrypto is a nonprofit created by Brian Armstrong, the co-founder of Coinbase[49], to distribute cryptocurrency to people living in poverty. By using crypto and blockchain technologies, the organization put funds directly in the hands of individuals living in difficult circumstances around the world. This is done by direct crypto payments to individuals living in refugee camps where currencies are forbidden and direct crypto payments also to women living with domestic violence issues and no financial means to leave their abuser. Organization also helps local merchants accept crypto payments and impoverished individuals to set up crypto wallets. Finally, GiveCrypto delivers simple financial services to individuals left behind by traditional banking systems (www.givecrypto.org).

According to Groundswell[50], there is substantial evidence that unconditional cash transfers are an effective way to help people. Distributing crypto is similar to transferring other forms of money to people. The organization expects many recipients will find ways to convert the crypto into their local currency. Some may transact crypto-to-crypto as well. It may also help spark economic growth by giving access to property rights and financial services on an open network. GiveCrypto mission is to financially empower individuals by distributing cryptocurrency to those most in need. GiveCrypto connects donors and recipients anywhere in the world. Over the past three years, this nonprofit organization impacted the lives of thousands of individuals and their families via direct crypto transfers. Over one billion people have a smartphone but don't have access to basic financial services. The organization not only identifies recipients in need and distribute funds to them–they also connect those people to a truly open financial system. All is needed is access to the internet (www.causeartist.com).

[49] Coinbase, is an American company that operates a cryptocurrency exchange platform. The company was founded in 2012 by Brian Armstrong and Fred Ehrsam, and as of March 2021 was the largest cryptocurrency exchange in the United States by trading volume (www.en.wikipedia.org).

[50] Groundswell is a non-profit organization in London, which works with people with experience of homelessness, offering opportunities to contribute to society and create solutions to homelessness (www.groundswell.org.uk).

6.3 Examples of Crypto Economy in Greece-In Depth Interviews

In-depth interviewing is perhaps the most common method of gathering information when conducting a survey. There is immediacy and interaction between the interviewer and the interviewee and flexibility in modifying the original design. The interview is structured; there are predefined questions, but their content can be modified (Isari and Pourkos, 2015). Interviewees are members of cooperatives, who chose to give FairCoin a chance. The interview (see Appendix C) was conducted in three individuals. Due to pandemic crisis in Greece (and not only) the interview was remoted, and no tape recorder was used because the interviewees did not want to. The first interviewee is a member of a social cooperative enterprise distributing directly from cooperatives, producers, and fair-trade products in Thessaloniki, named "The other way". He is rather old, and he is not familiar with new technologies. Although he believes in the ideas of the SSE, as mentioned above, he and some others of his age have difficulties to understand how blockchain technology and cryptocurrencies function and to follow evolution. As it can be understood by his answers given, he admits that the project didn't have the expected success for several reasons. He considers member's attitude (insufficient preoccupation and distrust around crypto) towards FairCoin the reason why the project has weakened. The volume of transactions wasn't big enough in comparison to total transactions (is estimated at around 5%). It was connected chronologically with economic crisis in Greece and the wave of immigrants. FairCoin's creators supported immigrants in Greece and donated to them the surplus from FairCoin's profitability. Immigrants were given for free Fair Coins through which they could buy from specific stores who accepted FairCoins, goods and services. Another reason why cooperative didn't meet their expectations was cooperative's articles of association. Specifically, their supplies were directly from producers, without intermediaries. This means that possible collaborators were even fewer. Nevertheless, they couldn't even liquidate FairCoins that had accumulated.

The second interviewee was a member of "Integrated Cooperative of Heraklion" in Crete. It is about an informal network which includes almost every company of SSE in this region without institutional background and therefore institutional restrictions. The interviewee is an active member, and he is among individuals who was involved with the implementation of FairCoin in collectivities in Crete. At initial stage in 2015, as he told, FairCoin's creative team chose Heraklion to organize a summer camp to inform whoever maybe was interested

about FairCoin's benefits. The camp was successful, and several businesses started to use FairCoin in their everyday transactions. Individuals used it in the Autonomous Popular Market; there someone could participate as a producer to sell products/services using alternative currencies, meet his needs for goods within a framework of solidarity and mutual support between producers and consumers and co-formulate the operating conditions, the objectives, and the course of the new "Autonomous Popular Market". As he revealed, "Integrated cooperative of Heraklion" was the creators of the alternative currency named "Kouki", which remains successful enough and operates simultaneously with FairCoin; perhaps "Kouki" was doing better, according to interviewee. Among total transactions 5% were made in "Kouki", 3% in FairCoin and the rest 92% in euro. Also, whoever wanted could use FairCoin abroad in cooperating companies. He believes in collective actions and their power for change, so FairCoin was a chance to promote solidarity through economic means and to strengthen social networks.

The third interviewee was a member of "European Village" in Athens. This is an alternative coffeehouse run by a non-profit organization with music, film & cultural events. They are at about 10 volunteers at an average age of 30+ who work there, and some members are very active in social field, especially in social movements. The interviewee was such a member so when their social organization learned about FairCoin she immediately grabbed the chance to be a part of an alternative economic system. The passion in her words about an alternative economic system and about how things can and mostly should change is remarkable. They also create an e-wallet and although they promote FairCoin's transactions as much as they could, all members knew that the place should remain viable, so they were very careful about trading's amount in FairCoin.

Interviewees aspects are analyzed thoroughly, as it has already been mentioned, in the Appendix C; in the table below, there are recorded corresponding data, in order to be easier to make a comparison and draw conclusions.

Table 4: Comparative data of the three social projects.

FAIRCOIN IN GREECE			
	"The other way"	"Integrated Cooperative of Heraklion"	"European Village"
Geographical region - type of business.	Thessaloniki social cooperative enterprise	Crete informal network of almost every company of SSE in this region	Athens non-profit organization
How got familiar with FairCoin?	Creators' team	Creators' team	Active member of FairCoop
Do you know another cryptocurrency related with SSE?	No	No	No
How long do you trade with FairCoin?	2015	2015	2015
What is the percentage in FairCoin in relation to the total volume of transactions?	5%	3%	5%
Do you use FairCoin for both business and personal transactions at home and abroad.	Just in business	Business and personal needs in Greece and abroad	Just in business
Have your expectations from FairCoin been fulfilled?	No	No	No
Positive side effects from the use of FairCoin.	None	Learn about cryptocurrencies, and we came even closer	Network grew
Would you suggest today to someone to join FairCoins network?	Yes	There is no one to suggest it, the net is actually inactive	Yes

Source: Processed by the author, 2022.

To sum up, information gathered from interviewees was valuable enough to estimate existing situation in Greece. Considering that interviews were remoted, interviewees couldn't even see to who they were giving the interview plus the fact that phone interviews have no interaction and last less than Sample is probably significant enough to indicate benefits and risks of the aforementioned cryptocurrency. It is remarkable the fact that all of them gave a pretty much same depiction of the situation nowadays. In addition, they all derive from active social organizations, but they didn't know any other activity around

crypto economy in Greece. Truth is that FairCoin started its journey favorably in a global socio-economic period of turmoil. This had as a result to prevail wherever creators tried to introduce it and to demonstrate its advantages and its perspectives. However, the lack of coordination and the fact that people involved didn't trust cryptocurrencies in general or didn't commit enough to the project made FairCoin fade. This happened as soon as major economic problems receded (when economic crisis started to reach a balance) and when directed interested individuals (e.g., immigrants) were given other alternatives, such as participation in governmental projects. Fact is that all individuals involved believed in moral idea behind FairCoin and its potentials. But above all, they expressed the wish to restart occupying with FairCoin or something equivalent as soon as they will be given the opportunity, the coordination, and the support to action.

7 Conclusions

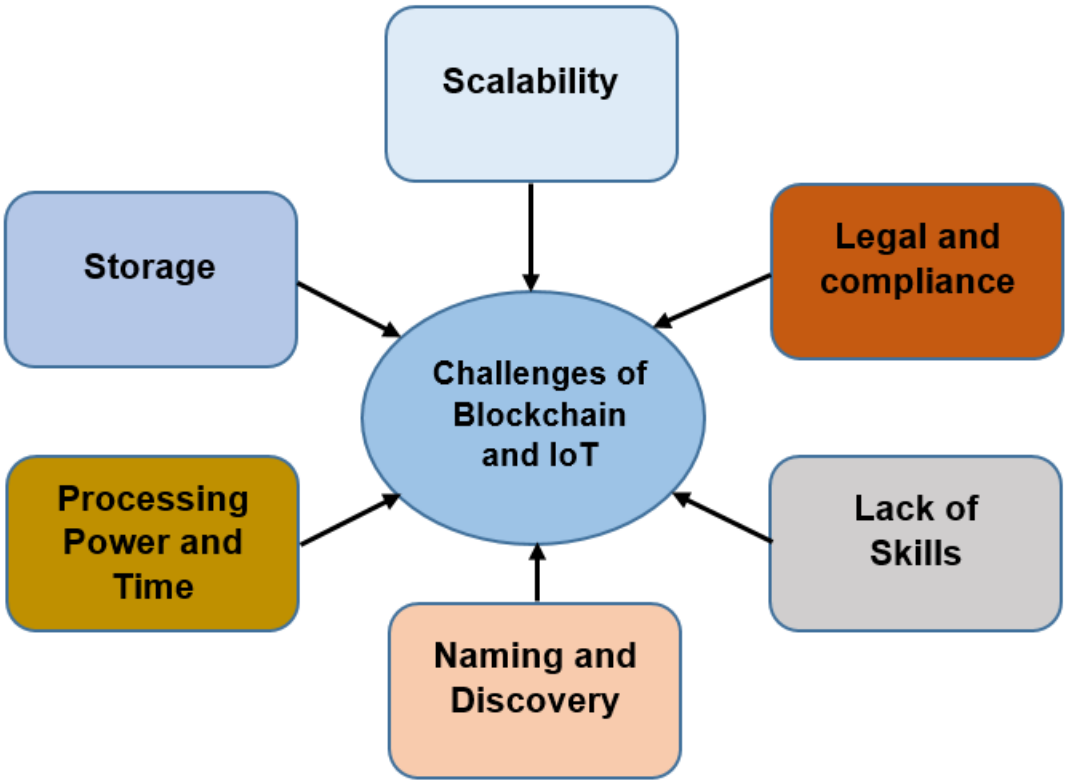
7.1 Threats and Challenges

Blockchain's technology and cryptocurrencies use have numerous benefits in many aspects of social and economic life. Perspectives for near future seem to upgrade even more procedures of everyday life. Thus, new technologies face several threats and challenges, which affects serious fields. Analytically, challenges are referring to financial security, the technology around blockchain and the most sovereign cryptocurrency-Bitcoin. Financial security is on stake due to globalization and the digital transformation of society form. Financial capabilities are not even for all players worldwide. Pandemic played a significant role in that direction. Except from leading to the shutdown of enterprises in various industries, it helped the increase of money laundering and terrorist financing. More analytically, pandemic is connected with crimes such as fraud, cybercrime, misdirection or exploitation of government funds or international financial assistance. Also, it prevented governments from implementing anti-money laundering and counter terrorist financing. Anyway, these cannot justify a negative forecast regarding the future of digital financial technologies; what is needed is a legal identification of these operations at official level (Reshetnikova et al., 2021).

Another challenge is referred to the technology of blockchain, especially when operates with the innovation of IoT. Specifically, as Figure below depicts, blockchain has several flaws such as, for example, scalability. Since nodes are added constantly the net is increased but there is lack of corresponding space. This problem becomes even bigger with IoT because nodes are even more, which might lead to centralization. Also, processing power and time in IoT are different from blockchain needs for encryption because IoT includes different devices with different algorithms. Moreover, one of main challenges is storage issue. As transactions increases ledger is also increased. Taking into consideration that IoT devices have low computational resources and very low storage capacity, concern is obvious. As a consequence of these technologies fetal stage very few people have large knowledge and skills on the field. While IoT devices exist everywhere, adopting the blockchain with IoT will make the situation even more difficult without public awareness about the blockchain. Also, even if Blockchain technology with IoT has positive effects for organizations, the lack of legal or compliance code in a country or among different countries might become a barrier

in the technological implementation. Finally, due to the fact that blockchain was not designed to operate in combination with IoT will create technical problems as IoT devices will keep moving all the time which will change the topology continuously creating difficulties for senders IP addresses which are embedded in blockchain application (Atlam et al., ibid).

Figure 16: Blockchain and IoT challenges.

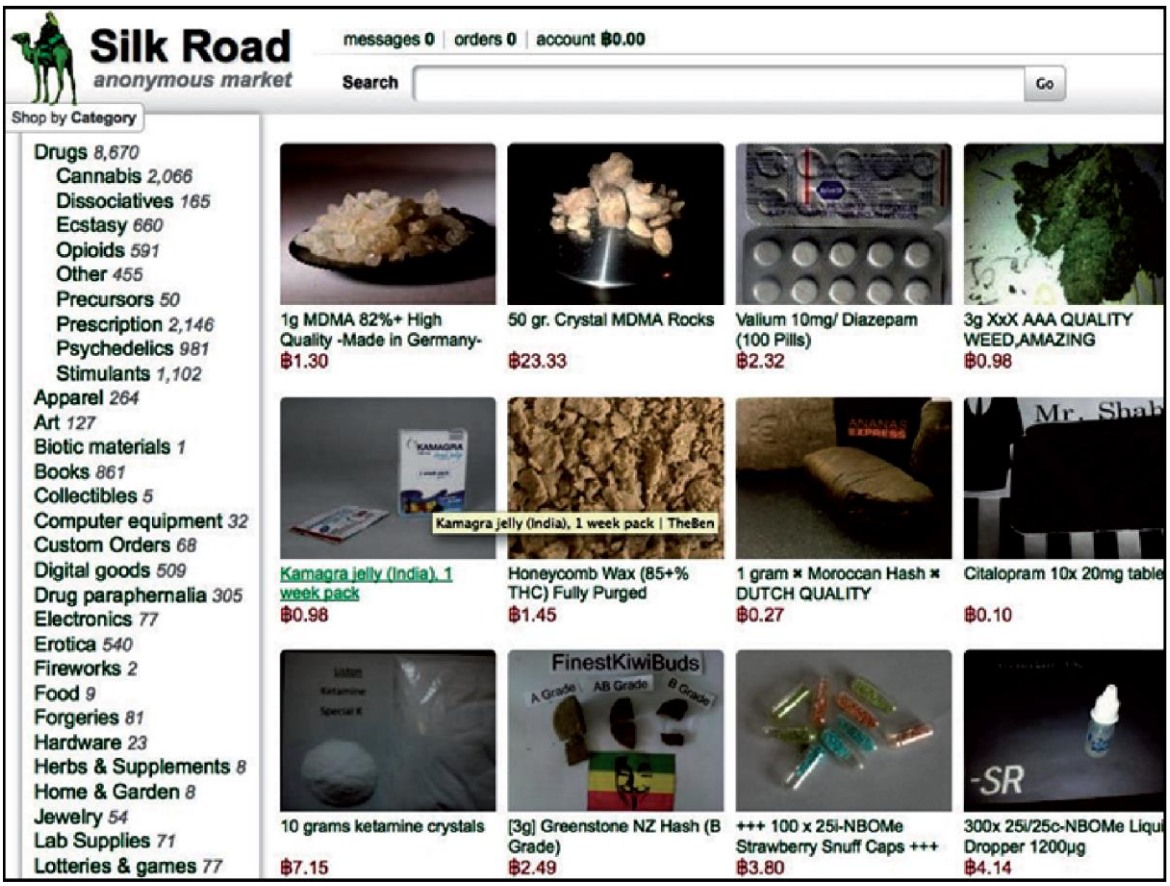


Source: Atlam et al., 2018.

Finally, cryptocurrencies and especially Bitcoin have received severe criticism. One of the main reasons is their involvement in illegal activities, especially through "darknet". This is a network like the internet, but that can only be accessed through particular communication protocols that provide greater anonymity than the internet and it contains online marketplaces. Such a marketplace's screenshot is depicted in the figure below and it shows details about illegal actions; Bitcoin is the payment currency in to order buyers and sellers to avoid legal consequences. There are 6,223,359 "observed" illegal users, representing 5.86% of all bitcoin participants. They account for an even larger share of transactions-a total of 196 million transactions, or around one-third of all transactions (32.38%). Observed illegal users control around one-quarter (26.33%) of all bitcoin addresses and account for

approximately 12.96% of the total dollar value of all bitcoin transactions. Therefore, above numbers indicate a real problem (Foley et al., 2019).

Figure 17: Screenshot from one of the first illegal darknet marketplaces, Silk Road 1.



Source: Foley et al., 2019.

7.2 Suggestions for Further Research

This dissertation was an attempt to describe the world of SSE and alongside to explain the innovative technology of blockchain and the operation of cryptocurrencies. Although at first glance those two topics do not seem to coexist in fact they do. There are several fields, as it was explained, in which blockchain technology has the ability to upgrade SSE's organizations through the use of cryptocurrencies. As it has been shown such a 'sociocurrency' is FairCoin and such a 'socioplatform' is GiveCrypto. This research showed that the adoption of crypto economy is still in its infancy in Greece. FairCoin managed to operate for a while but then faded due to the lack of coordination, knowledge around the system and therefore trust to its potentials. As far as GiveCrypto is concerned it is more

difficult for a researcher to locate the beneficiaries and to export conclusions because they are not easily traceable.

However, the research should be expanded in more countries in Europe and worldwide in order to have a more definite aspect of how SSE's organizations incorporate these new technologies. Moreover, research should include more social cryptocurrencies and social platforms. Key point is to manage to gather those elements in order the researcher to be able to study and analyze them. One major issue of blockchain technology and cryptocurrencies is that bibliographic data are rather limited and recent. Another issue of SSE is its fragmented character. In other words, it is difficult for someone to channel knowledge and/or possible financial solutions when he doesn't know where to address it. Experience has shown that informal networks do work and can contribute to some extent. But the truth is that in order these technologies to penetrate into SSE's organizations everyday life it needs more than efforts from diverse entities. What is needed is the field of SSE to be compact and uniform, which is a standing request for SSE.

Ideological socialism exists through collaborative networks. But networks should be expanded, and efforts should not end to economic relationships. Peer-to-peer collaboration, self-organization, collective interest's upgrade, and promotion of participation are key points in order SSE's organizations to meet their needs and continuously examine new financial options. New technologies do not corrode SSE's world nor SSE's followers have to wait until a better world is made; they make this world on their own "right here and right now". Thus, integration of technological innovations and its economic consequences could pave the way for major perspectives through two basic key words of this equation: channeling knowledge and trust between interested parties.

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Appendix A: Bitcoin White paper

https://bitcoin.org/bitcoin.pdf

Appendix B: The Proof-of-Cooperation Blockchain (FairCoin White paper v1.2)

https://fair-coin.org/sites/default/files/FairCoin2_whitepaper_V1.2.pdf

Appendix C: Questionnaire

1. General information (geographical region, type of business, relationship with social ventures, age of interviewee).
2. How have you got familiar with FairCoin?
3. Do you know more cryptocurrencies related with SSE?
4. How long do you trade with FairCoin?
5. What is the percentage in FairCoin in relation to the total volume of transactions?
6. Do you use FairCoin for both business and personal transactions at home and abroad?
7. Which expectations did you have from FairCoin? Have they been fulfilled today?
8. Positive side effects from the use of FairCoin.
9. Would you suggest today to someone to join FairCoins network? Yes-No/Why?

Interviewee No 1: Social cooperative enterprise "The other way"- Thessaloniki
Interviewee No 2: "Integrated Cooperative of Heraklion" – Crete
Interviewee No 3: "European Village" - Athens

Question 1: General information (geographical region, type of business, relationship with social ventures, age of venture's members).
Interviewee No 1: We are in Thessaloniki, and we run a cooperative grocery. We consider ourselves as a social venture. We supply whatever we need only from producers, we don't want to intervein intermediaries, and we support other solidarity ventures in our city. My age is 60years old and most of members have the same age too.

Interviewee No 2: Cooperative is in Heraklion, and it is an informal network which connects social ventures. It was our choice to be non-institutional because we didn't want to have obligations to the state or control by central authorities. Due to the large number of social businesses, we have members of every age group.

Interviewee No 3: We are a non-profit organization in Athens. We are very active in social movements, and I particularly have taken part in many social events, which aim to promote autonomy and self-management. Our average age is 30+.

Question 2: How have you got familiar with FairCoin?

Interviewee No 1: In 2015, a group of Spanish made a presentation about FairCoin. The man who made the presentation was one of the creators. They have gone to many social ventures in the city, and they have tried to spread the idea of operating with this cryptocurrency.

Interviewee No 2: The summer of 2015 creators' team came to Crete in a summer camp and presented FairCoin. Between the audience was many members of Cooperative so we got much information about it.

Interviewee No 3: I was an active member of FairCoop, so I was already familiar with the project.

Question 3: Do you know more cryptocurrencies related with SSE?

Interviewee No 1: No, I haven't heard about another cryptocurrency.

Interviewee No 2: No. majority of people know Bitcoin, the trust it more maybe because it is more famous.

Interviewee No 3: No, I don't. If it hadn't been for my participation in movement space in Greece and in Spain, even before the economic crisis, I probably wouldn't have known FairCoin either.

Question 4: How long do you trade with FairCoin?

Interviewee No 1: From 2015 until today. In 2015 some refuges started to visit the store and buy groceries.

Intermediate question: How come?

Interviewee No 1: Back them due to immigration crisis there were many immigrants North Greece. That was a common secret across Europe, so FairCoop decided to donate FairCoins to immigrants and they came here (in the store) to buy what they needed.

Interviewee No 2: From 2015. But the hole subject has faded. In the assembly FairCoop decided what they will do with the surplus. Unfortunately, there were disagrees when the price started to fall down. Merchants wanted to be supported by assembly's decisions in order not to lose money by the volatility of the price. Then many individuals stated to mistrust. In Greece assemblies faded; and to be honest pandemics was the last kick. Unfortunately, the network faded and so the community did.

Intermediate question: And what did you do with remain FairCoins?

Interviewee No 2: We still have them. We keep them in our e-wallets. We do nothing with them at the moment, but we hope that the whole matter will be shaked again. So, we believe that in the near future we might use them again.

Interviewee No 3: Since 2015. The project team made the presentation and we all stared using it. But the last four years we aren't active enough. Except for the obvious reason, and I am referring to pandemic, unfortunately we had some technical problems with our e-wallet which has not yet been fixed. This means that we cannot accept or give FairCoins, so our account seems inactive.

Question 5: What is the percentage in FairCoin in relation to the total volume of transactions?

Interviewee No 1: Very little, at about 5%. That happened at the beginning. Then, unfortunately things didn't go very well in the FairCoin field. Refuges left and we started to accumulate FairCoins, but we couldn't channel them elsewhere or liquify.

Intermediate question: Why?

Interviewee No 1: Because among our principles is to cooperate without intermediaries. But individual producers didn't accept FairCoin, only the intermediaries did. We made attempts to export some of our products to Germany, but the net couldn't support that and exports were of little volume, so it was of no interest.

Intermediate question: So, what did you do with remain FairCoins?

Interviewee No 1: We still have them, all of businesses I know. We keep them in case things get back to what it was, maybe even better.

Interviewee No 2: FairCoin didn't represent a large volume of our transactions. An additional reason for that is that here, in Heraklion, we use an alternative coin named "Kouki". For example, in the public market we have set up at Georgiadis Park almost everybody uses the "Kouki". So, to talk numbers it' s about 3% in FairCoin, 5% in "Kouki" and the rest in euros.

Interviewee No 3: About 5%. We are aware of the fact that the amount is rather small but we should not forget who we are and that we are confronting economic issues and we should remain sustainable. We used to accept bigger amount in FairCoin but there is a point, different for every business, that you have to stop. So, we don't want to be paid entire turnover in FairCoins.

Question 6: Do you use FairCoin for both business and personal transactions at home and abroad?

Interviewee No 1: No, just in business.

Interviewee No 2: We mostly used it in business but now that has faded it, we don't use it at all. Personally, when I travel abroad, I use FairCoin if there are businesses that accept it. For example, when I have been to Switzerland or to Spain, I paid in FairCoin for my hotel or to drink some beers.

Interviewee No 3: We used it only in Greece and only for business run. Now, due to the problems I referred, we don't use it at all.

Question 7: Which expectations did you have from FairCoin? Have they been fulfilled today?

Interviewee No 1: It is true that we had expectations from FairCoin, we though it could an alternative economy might work. Truth is that we have a large share of responsibility.

Intermediate question: In which way?

Interviewee No 1: First of all, in our store most of us are old enough. We are not familiar with new technologies, we cannot fully understand them and to be honest at the begging we couldn't even trust them, not only FairCoin but even more familiar cryptocurrencies. Of course, the most important reason for which things didn't go well with FairCoin was that we didn't deal with it, we didn't chase several opportunities that we had.

Interviewee No 2: To be honest, I expected that FairCoin could succeed in its goals. I believe that local communities would come closer and that we would manage to have a social economy. But reality is that people were disappointed while some others saw FairCoin speculatively.

Interviewee No 3: We had great expectations. We believed that people would become more active through networks and would give another perspective, an alternative way of living without the control of banks in our lives. Today, that remains an expectation. After all that had happened the last years, we have other priorities. For better or worse, pandemic had economic side effects and we decided to remain economically vivid; then we will redesign our path around social crypto economy.

Question 8: Where any positive side effects from the use of FairCoin?

Interviewee No 1: No, at least not some long-term side effect. Only the period with refuges it seemed that the idea could work and connect in an alternative way.

Interviewee No 2: From economy's aspect I wouldn't say so. But we all learn about cryptocurrencies, and we came even closer. This means that whenever circumstances are good enough to take it from where we left it as far as the use of FairCoin is concerned, we will be better prepared.

Interviewee No 3: Yes, we were all together, a community; our network grew. The previous years took place many festivals, workshops etc.; whoever believed in a fairer economy and in solidarity, in autonomy and self-management had a place to express and expand his ideas.

Question 9: Would you suggest today to someone to join FairCoins network? Yes-No/Why?

Interviewee No 1: Yes, I would. But, in order to function proper and in a long-term horizon, it needs organization and involvement.

Interviewee No 2: There is no one to suggest it, the net is actually inactive. Most people trust fiat currencies, not because they are better in any way but because all others do. It's rather ironic but people would use FairCoin if we could hypothetically make an agreement that from now on ever social and solidarity business would use only that currency for their transactions. But even then, conversion is difficult because people know what to do with euro for example, the procedure of trading is in their everyday life. With cryptocurrencies things are still new for the majority.

Interviewee No 3: Yes, I definitely would; but I don't consider us as a great example to imitate. We haven't succeeded too much or as much as we would like…at least not yet.