The Implementation of Blockchain Technology in the Development of Socioeconomic Environment: A Conceptual Framework

Nabil Ahmed Mareai Senan and Imran Ahmad Khan

1 Introduction

The reality of the twenty-first century reveals a long list of problems and social and economic situations, some of which have only recently appeared, that require attention. The construction of systemic solutions that make possible adequate responses represents a real challenge for our society, which in some cases is still not sufficiently prepared. The aging of society, the depopulation of the rural world and its consequent concentration in urban environments, the financial exclusion also in these environments, climate change, migrations and the realities that arise with them, and the structural increase in unemployment are just samples of the evidence of which societies are progressively becoming aware and demanding solutions from governments.

Another demographic phenomenon that, although it has occurred throughout history, takes on special relevance in the current context due to its impact on the composition of the demographic profile is that of migratory flows. Migrants constitute a subset of the population that will require specific services to enable them to achieve the objective for which they have left their countries of origin. In this new situation, one of the most relevant aspects of the migrant collective is made up of the

N. A. M. Senan
Department of Accounting, College of Business Administration, Prince Sattam bin Abdulaziz University, Al Kharj, Saudi Arabia

Accounting Department, Administrative Science College, Albaydha University, Al-Bayda, Yemen

I. A. Khan (✉)
Consultant, Pacelile Corporate Consulting, Aligarh, India

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management of the so-called remittances, concretized in the sending of economic resources to the part of the family that remains in the country of origin, and with which a percentage of the economic resources obtained in the new destination is shared.

In this same area, the financial one, and direct and transversal relation with migrations or depopulation in the rural world, there is an additional problem. This is none other than the financial exclusion that has occurred in India, mainly due to the merger process, for subsequent bankarization, of a large part of the savings banks, and the resulting resizing of the sector. This has implied a process of closure of numerous bank branches considered to be less profitable, although mainly located in small municipalities, where traditional banks had not been present. The direct impact on the welfare of society has been more than evident. Thus, the difficult access to financial services in rural areas or disadvantaged urban spaces has been producing very negative economic effects, directly affecting minority groups living in these areas and suffering situations of social exclusion.

Frey and Osborne (2017) conducted a rigorous analysis of the professions likely to disappear due to the computerization of the economy, concluding that, in the US labor market, there is a risk of 47% of jobs disappearing in the next 15 to 20 years. Similarly, the final report of the 2016 World Economic Forum in Davos predicts the disappearance of 7.1 million jobs in the 15 most industrialized countries in the world, and the creation of 2.1 million new jobs by 2020, mostly related to new digital skills and abilities. The conclusion of all of these is clear: the current economic model will be unable to provide enough jobs to allow large segments of the population to obtain sufficient resources to cover their basic subsistence needs.

One of the solutions that technology itself has offered in the field of financing social entities, and therefore related projects or undertakings, has been the use of crowdfunding, which allows the collection of financial resources from small donations from a large number of donors. However, this type of financing requires the use of platforms offering crowdfunding services that require a percentage of donations for their maintenance, as well as online payment services offered by financial institutions, giving the paradox that, sometimes, the collection of resources by social entities generates a flow of commissions whose beneficiaries may be part of the problem being addressed.

All of the above is leading to a crisis of confidence that calls into question the current social, political, and economic systems, which are witnessing the emergence and expansion of social groups of different kinds that are suspicious of the functioning and results derived from the market economy. For this part of the citizenry, globalization is seen as a threat and a challenge that demands greater control and stricter regulation from governments in all industrial sectors (Roth, 2009).

Following the distrust generated in the financial system after the collapse of Lehman Brothers in 2008, the technological guru Satoshi Nakamoto presents a tool that will allow online peer-to-peer payments to be sent from one party to another without the intervention of any financial institution (Nakamoto, 2008) This system

is none other than Bitcoin, the first cryptocurrency that, using different already existing techniques such as software that supports P2P applications and cryptography among others, can create an environment of trust in which transfers of value occur between peers without the need for the involvement of a third party, which is usually a financial institution. The technology on which Bitcoin has been built, and which is being used to develop new applications in very diverse fields of life, is known as blockchain technology, more commonly referred to as the blockchain.

Bitcoin has been the first digital asset that has no intrinsic value, is backed by a third party, and at the same time does not require a centralized issuing entity (Buterin, 2013). It has also been the first proposal to emerge under the shelter of blockchain technology.

Subsequently, given the potential applications offered by Bitcoin, not only as a financial tool but software, developers were also faced with a dilemma, having to decide between building these applications on Bitcoin itself and doing so from a new blockchain. That is why at the end of 2013, a Bitcoin enthusiast software developer named Vitalik Buterin launches a white paper in which he presents the idea of Ethereum, a blockchain with a general purpose that adds the possibility of code fragment execution (Antonopoulos & Wood, 2018). The so-called world computer is thus built, a virtual machine that runs on multiple computers connected to the Ethereum blockchain and provides it with the ability to execute computer code in the form of small programs that are called smart contracts. This code contains the conditions that must be met for the execution of a transfer, whether economic or data.

Blockchain technology is categorized by Iansiti and Lakhani (2017) as a fundamental technology that has the potential to create new foundations for our economic and social system. It thus endows the concept of the crypto economy with new content. The set of characteristics on which this technology is based means that, as underlined by the European Economic and Social Committee (2019), blockchain technology has a suitable fit for the social economy, stating that "some characteristics of these technologies make blockchain a digital infrastructure that could be used to advantage by Social Economy organizations to improve the fulfillment of their purposes, increasing their capacity to generate positive social impact and promote social innovation."

On this basis, the objective of this paper is to analyze how blockchain technology is being used de facto for the creation of decentralized applications (DApps) that support projects with a relevant social and environmental impact, assessing its potential for social economy entities, through case studies. To this end, and beyond a broad presentation of blockchain technology in its conception and operation, a synthesis of its main features is necessary to facilitate the understanding of what this technology brings to each of the cases to be analyzed, and which form the core of this analysis. A section dedicated to the methodology followed precedes the results of the work, which concludes with a section containing its main contributions.

2 The Blockchain Technology: Structure and Operation

As already indicated, one of the main consequences of the international economic crisis that followed the collapse in September 2008 of the Lehman Brothers bank has been the emergence of a crisis of confidence on the part of the public both in the banks and in the global stability of the financial system, as well as in the institutions and their underlying values (Roth, 2009).

At the same time, and within the aforementioned framework of weak international trust, a group of computer developers grouped under the pseudonym of Satoshi Nakamoto presented a paper published in the Cryptography Mailing List, an electronic peer-to-peer value transfer system that did not require intermediate agents to endow it with trust, as this was implicit in the system itself (Nakamoto, 2008). This system was based on the assignment of value to a digital asset, which could subsequently be used to transfer its implicit value between peers irreversibly, being recorded in a decentralized and immutable database, thanks to the use of various computer control technologies. Bitcoin, which is the name given to this digital asset, burst onto the technological-financial scene as the first cryptocurrency with no intrinsic value and without any institution to back it up (Buterin, 2013).

This entire system was based on the technology known as the blockchain. Blockchain consists of a decentralized database in which all securities or data transactions occurring between the parties participating in the system are recorded. Each transaction is verified and recorded in this database after the consensus of the majority of the participants in the system. Transfers are grouped into blocks for verification, blocks that are placed on a chain. That is, each block is linked to both the preceding and subsequent block, hence the name of the technology blockchain.

A concept of particular importance in this environment is that of the digital token, which is conceived as the digital representation of any value, created by a specific entity and which can be used in various ways thanks to the large amount of information it can contain. Thus, it can be used for the representation of a cryptocurrency, to grant a right, or to represent a physical good (Rohr & Wright, 2017).

The operating steps of a blockchain that has "n" nodes, understanding by node each of the computers that are part of the network, can be schematized as follows:

1. Two nodes in the network decide to perform an exchange of value or data through the blockchain system to which they are connected. For its effective realization, they disseminate the data of the same to the rest of the nodes that are connected.
2. The connected nodes receive this transaction and include it, together with others that have been received and are pending, in a block. This block is then transmitted to the rest of the network.
3. The nodes evaluate the transactions included in the block, and once validated, the connected nodes use consensus mechanisms based on a set of agreed rules. When consensus is reached, which requires the agreement of more than 51% of the connected nodes, the transactions included in the block are verified.
4. Once the block has been validated, a one-way cryptographic function is applied to it, returning a value (called a hash) that can be used to detect any subsequent

alteration of the block's contents. Each block contains a link to the hash of the previous block, thus creating an unalterable blockchain thanks to the properties of the hash function(x).

In this way, a system is obtained that provides security, anonymity, and integrity in the data it uses and independently, i.e., without the need for third parties to control and certify them. This eliminates, in a parallel way, the concentration of analytical and decision-making power.

The management of digital assets, which are key pieces of the blockchain's operation, is done through the use of digital wallets, usually referred to as wallets, by the users. These wallets are pieces of software that allow blockchain users to monitor transfers and store and manage digital assets related to the blockchain. They can also be continuously connected to the Internet (hot wallets) or remain offline, in isolation from the blockchain (cold wallet) storing assets on paper, a piece of hardware, or an external USB storage drive (Antonopoulos & Wood, 2018).

In 2013, the computer developer Vitalik Buterin proposed to the Bitcoin development community the introduction of modifications to the Bitcoin scripting system that would provide the ability to execute complex computer programs, thus appears the Ethereum platform which, using blockchain technology, creates a decentralized open-source space with the ability to execute code fragments with which smart contracts are implemented. These smart contracts consist of code fragments built following the conditions set out in a contract between parties and which are automatically executed when these conditions are met.

The Ethereum blockchain supports two types of transactions, those that transfer value through the use of a cryptocurrency and additionally others that perform data transfers. The latter are those used for the execution of smart contracts, which are performed in the virtual machine that Ethereum (EVM) builds with the connected nodes (Antonopoulos & Wood, 2018). EVM is a sort of global computer containing millions of fragments of executable objects, each of which has its permanent data store.

An additional element contributing to the potential use of blockchain technology is decentralized applications (DApps). DApps are the basis of Web3, a decentralized application environment that endows it with resilience, transparency, and resistance to censorship. These are applications that run on the Internet in a decentralized way, without the presence of a central agent (middlemen) that oversees their operation or manages information related to users.

Another important concept, which emerges with the application of the tools that blockchain technology provides, is decentralized autonomous organization (DAO). A DAO is an organization that, under a set of predetermined rules, runs a business or social activity (both online and offline) in a completely autonomous way in an open-source environment that is decentralized (distributed among stakeholders' computers), transparent, secure, and auditable. It is a group of smart contracts and/or autonomous agents linked together and endowed with initial capital.

On this basis, numerous cryptocurrencies have been built mainly to obtain the financial resources necessary for the implementation of business projects, mainly

based on the development of applications in the Internet environment, and to be used as the means of payment used in them. The blockchain thus introduces tools and procedures that change the way people organize their economic activities and social environments, allowing the development of new governance schemes based on more democratic and participatory decision-making.

Each of these proposals is based on the drafting of a document that includes the technical characteristics and business model proposed for each project. For this purpose, the expression white paper is used, which is usually the initial basis for raising the resources that make the development of the proposal possible, usually through an initial coin offering (ICO). This is a cryptocurrency issue that goes on sale to raise funding for the implementation of projects based on blockchain technology.

3 Research Methodology

The recent irruption of blockchain technology on the technological scene has opened the door to the emergence of new applications capable of providing a trusted environment to processes that until now have depended on third-party actors that endorsed and generated, in one way or another, the aforementioned reliable space for action. Despite the rapid dynamics of development of this technology, it is still short history makes it necessary to use an exploratory approach of a qualitative and quantitative nature simultaneously as a methodological approach to research.

On this basis, this work has focused on the case study of different proposals for the use of blockchain technology, from a socio-technological perspective, through which to assess the possibilities that the use of this technology opens to the social and solidarity economy sector in the generation and development of projects with positive social and environmental impact.

Yin (2018), Dźwigoł and Dźwigoł-Barosz (2018), and Rashid et al. (2019) support the use of this methodology by allowing the analysis of the phenomenon under study through different sources of evidence, quantitative and/or qualitative simultaneously. The construction of a theory is thus made possible through the analysis of a theoretical sample made up of one or more cases, rather than through the extraction of a representative sample, which is necessary for a quantitative study (Dźwigoł & Dźwigoł-Barosz, 2018). In this sense, Yin (2018) considers the case study as a valuable research tool, as it is the way used to assess and record behaviors of the actors present in the phenomenon under study, as opposed to quantitative methods focused on verbal information obtained through questionnaire surveys.

Thus, the empirical work of this study starts with a process of identification, observation, and interaction of the set of initiatives that use blockchain technology in social and environmental sectors with potential positive impact. After that, a small number of initiatives, or cases, are selected for further exploration and analysis with rigor and depth. The cases have been selected for their representativeness, both in terms of pioneering, and their quantitative significance, or for their qualitative potential in the context of action in which they have arisen and developed.

The variables used for the selection of the cases under analysis were based on three main factors:

1. The scope of action deployed to address the problems they address, giving priority to those that do not develop in a specific geographic area, but deploy their actions globally. Although the cases studied are not the only ones that meet this requirement, their dynamics have already been studied in other works by the authors of this article, which is why the starting point of knowledge is higher.
2. The existence of pre-eminent performance spaces with the presence of developers of decentralized applications using blockchain technology.
3. Their innovative or pioneering nature in the use of blockchain technology in their field of activity and outside traditional financial applications. This becomes of utmost importance to assess in what way they contribute a vision that questions the dominant socioeconomic system within which they have appeared, thus fulfilling one of the main functions of the social economy, as is its political vector of pioneering in the generation of nonexistent social initiatives.

In procedural terms, the information-gathering work has been carried out in three stages. The first stage involved the review and analysis of the white papers that each of the selected initiatives or cases presented on their web pages. A second stage was dedicated to the interaction with these tools through their use as active technological users. Finally, a series of contacts were made with those responsible for the target cases, through open conversations via e-mail, Twitter, instant messaging, and videoconferences.

The cases selected for study and analysis were the following. In the field of energy, the proposal presented by the Pylon Network platform was chosen because it is a tool for use by consumers and user cooperatives working in the production and commercialization of renewable energies. At the same time, it acts as an enabler for the development of collective self-consumption initiatives, one of the keys to the construction of a new energy model that is presented as an alternative, under market conditions in line with the competition and against the oligopoly of large energy companies that dominate the market in India in this second decade of the twenty-first century.

Secondly, the Arcadia platform, aimed at providing financial services to refugees, won first place in the Startup Days Bern 2019 Pitching Battle. This award gave visibility to its proposal and it was one of the eight startups selected to participate in the Fintech Solutions for Refugees Summit. Although there are other proposals in this field that could have been selected for analysis, the Arcadia platform has been chosen for its accessibility and willingness to share information.

Additionally, Binance Charity has been selected as a crowdfunding platform proposed by binance.com, one of the main cryptocurrency exchanges that proposes and creates the Blockchain Charity Foundation with the aim of improving transparency in philanthropic donations, expanding the use of cryptocurrencies, and accelerating sustainable global development. Its choice is motivated by its pioneering nature in this area of activity.

Finally, the evolution and operation of two of the three proposals that have been working since 2018 in the field of universal basic income (UBI) generation, UBU, and Mannabase have been analyzed. Through their study, it has been possible to capture and analyze the changes that have occurred in their mission from a "constructive perspective" typical of the multistage and cyclical nature that occurs in innovation processes and more specifically in social innovation. Processes built on evidence of trial and error introduce different perspectives to achieve the final objective that does not vary.

In this context, all the information provided by the GoodDollar initiative (also known as the GoodDollar experiment), which began its implementation at the end of the same year to assess the feasibility of using blockchain technology to reduce economic inequality in twenty-first-century society, was collected and analyzed. The method of collecting information was based on periodic tests and questionnaires addressed to people who voluntarily made their mobile devices available to the project by installing a Beta version (or test version of the programmed material), as well as their commitment to interact periodically, thus ensuring their traffic and the verification of its operation.

4 Empirical Analysis: Case Studies

4.1 Democratization of Energy Production

In the energy sector, the case of the Pylon Network has been selected and analyzed. This project is defined in its white paper as "an energy-neutral database, using Open-Source blockchain technology, specially designed to meet the needs of the energy sector. It is a blockchain code that is fast, scalable, and with minimal energy requirements, designed to play the role of digital communication infrastructure for greater participation of distributed assets in energy markets, as well as the provision of digital energy services in the future of our energy systems."

The Pylon Network is thus presented as a decentralized platform, in which the different stakeholders of the energy sector (i.e., consumers, traders, distributors, energy producers) can "dump" information on their trading history and will also be able to access it on an open-source basis, with greater security and transparency. At all times the project is conceived as an improvement solution oriented to the end customer, to enable a more transparent, open, and competitive energy market for the end user.

The ultimate objective of this project is to enable companies offering energy services to analyze them and, based on the results obtained, to build a set of services that will enable them to use energy more efficiently. The aim is to generate efficient energy use, which will determine a saving in economic costs for the energy consumed.

For this purpose, the Pylon Network provides users with an app that allows them to access their energy data and share it with energy service providers. This tool is part of the wide range of instruments through which an alternative ecosystem is being built, formed by consumer and user cooperatives with proposals, all grouped under the second-degree cooperative, which works for a new energy model in India.

The blockchain algorithm used in the Pylon Network, Pylon Coin CORE, has been specifically designed for the energy sector and aims to meet the needs of scalability, security, and privacy, as well as sustainability based on minimum energy costs.

The technical characteristics of Pylon Coin Core are accessible through the Github platform, being relevant to highlight the critical aspects that have been taken into account in the design of this algorithm, such as the carbon footprint involved in its operation and the scalability of the system. The coherence with the aforementioned critical aspects underpins a proposal with a cooperative and noncompetitive vision in the block mining process, which is decisive in achieving a much lower energy consumption per transaction than those existing in other consensus protocols.

While the tool is accessible to any operator in the energy sector, regardless of its legal form, the Pylon Network aspires to the democratization of information and the consequent construction of a cooperative ecosystem that allows a real decentralization of the sector. In fact, and coherence with this, a pilot test was carried out in March 2018 within the cooperative. For this purpose, smart metering devices were installed that made it possible to acquire consumption data in real time, to trace the origin of the energy consumed, and thus to be able to pay for energy exchanges between users participating in this decentralized network.

4.2 Crowdfunding

In the late 1990s of the last century, the tools of information and communication technologies were introduced in various types of crowdfunding proposals. This funding modality, commonly known as crowdfunding, consolidates small contributions, about the overall amount pursued, from multiple donors to cover the economic-financial needs of certain projects proposed by specific individuals or entities.

Among them, an endless number of projects aimed at social action have been generated, which sometimes face a double problem: technical and ideological. On the technical side, the use of platforms that provide crowdfunding services implies the payment to them of a percentage of the funds raised for their maintenance, which usually ranges between 4% and 8% of the total amount raised, and on the other hand, the use of payment gateways that introduce an additional cost to the amount donated by the people participating in the project. In most cases, this type of financing requires a factor of trust in the entity or its managers, to which resources are contributed, since this type of operation does not make it feasible to track the final destination of the funds applied.

From an ideological perspective, and taking into account these collateral payments that arise from the mere fact of participating in a traditional crowdfunding

campaign, sometimes there is the paradox that the bank fees paid go to the coffers of financial institutions that play a role in this scheme of operation that also determines the problem to be addressed. For example, think of projects that try to help people who are victims of war conflicts, and that with the creation and management of a crowdfunding campaign for this purpose, generate a flow of commissions to financial institutions that are possibly using these same funds to finance companies producing the weapons that are used in this same conflict.

However, the emergence of blockchain technology and its use in crowdfunding schemes for social action projects solves most of these problems. The use of cryptocurrencies can minimize the amount of possible payments to third parties and adds a trust factor regarding the final destination of the donation since it enables the traceability of the donation. This trust factor is provided by the very nature of blockchain technology, which enables a traceability system that allows knowing in which expenditure each of the units of value that have been donated has been applied.

The possibility of dividing each cryptocurrency unit into values that occupy decimal positions very far from the unit, as shown by the Bitcoin (BTC) and a Satoshi or minimum unit of measurement of value that is equivalent to 10–9 BTC, giving them a negligible value if they are observed in isolation, opens the door to the emergence of nano-donations. However, if this type of donation is observed in a massive environment, with a sufficient critical mass of contributors, it adds value to the concept of crowdfunding and the construction of large collectives around specific projects.

An example of the use of blockchain technology for these applications is the Binance Charity platform offered by the Binance Charity Foundation (BCF). This platform presents different projects with positive social impact that have passed due diligence carried out by the foundation's technical team, which guarantees the appropriateness of the project to be financed on it, always seeking to optimize the social impact of each monetary unit used. The donor or entity has the possibility of choosing among the set of projects presented, and to which of them he/she wants to make his/her donation. If the donation is not directed to any specific project, it is managed through the Binance Charity Wallet, which unilaterally distributes the funds received.

The operating costs involved in the donations received through this platform are assumed by Binance (www.binance.com), a proposed financial ecosystem around blockchain technology, thus maximizing the percentage of donations that reach the final beneficiaries.

Donations can be made through the use of different cryptocurrencies, which allows the implementation of mechanisms to track donations by anyone, as the Binance blockchain is a public blockchain.

BCF is just one example of the potential that blockchain brings to the field of donations. Other examples that can be taken into account in this context are BitGive, BitHope, Helderbit, and GiveTrack. There are also proposals for the creation of digital currencies for social purposes to support specific programs, such as Clean Water Coin, PinkCoin, or AidCoin.

4.2.1 Financial Inclusion

In 2018, the number of refugees fleeing war conflicts in their countries of origin, including due to situations of climate change that made it enormously difficult to access a dignified life, reached 70.8 million forcibly displaced persons, twice as many as 20 years ago (UNHCR, 2020). The dimension of this reality has placed it in the focus of attention of global civil society constituting a problem of political and humanitarian urgency.

Among these problems is the inability to access banking and financial services, either due to the lack of proof of identity and/or roots in the destination country or due to the host country's policies. According to the World Bank's Identification for Development (ID4D) initiative, around one billion people around the world lack official proof of identification, making it difficult for them to access multiple services, including banking services. This situation undermines the potential integration of refugees, their access to work and finance, and undoubtedly their ability to pursue entrepreneurship as an economic outlet (UNHCR, 2020).

Faced with this situation, the Arcadia Blockchain for Refugees Association has built the Arcadia platform through which resources are offered to nongovernmental organizations (NGOs) working in the field of refugees, to provide cash transfer services to this group that lives in a situation of financial exclusion. This group is quantitatively very significant, as evidenced by a recent study conducted by Arcadia according to which, as an example, 80% of Myanmar refugees had no access to financial services. This exclusion arises mainly due to the refusal of financial institutions to open bank accounts. Blockchain technology offers these people the possibility of having an account where they can receive and manage their money, under the supervision of the NGO that offers these services through the Arcadia platform.

According to the Ethereum community's website (https://ethereum.org/), this is "the world's largest and most active blockchain community. It includes core protocol developers, crypto-economic researchers, cypherpunks, mining organizations, ETH holders, application developers, ordinary users, anarchists, Fortune 500 companies…." The size of this community makes it possible to guarantee that, if the NGO through which you are managing your account with Arcadia should stop offering the service for any reason, it will continue to be available to users without the need for intervention from the former.

This blockchain has a cryptocurrency, the Ether (ETH), which is the element that will be used to transfer, to the users of this system, the value with which to make payments. Likewise, the choice of Ethereum guarantees the existence of a large community among developers and users that constitutes a mainstream ecosystem that has been operating since 2015.

The objective of this entity is to enable the inclusion of these groups in the local economy of the place where they establish their residence, either temporarily or permanently, under equal conditions. To this end, Arcadia has created tools that are easy to understand and use, even for people unfamiliar with cryptocurrencies and their operations, to simplify the entire process of receiving funds from refugees,

who are currently its main target users, and their use in their real economic transactions.

This operation begins with the registration of the person who is going to use this form of payment on the Arcadia platform. All that is required is an email account and a postal address to which the Arcadia application management entity will send a physical card containing the public key of the ETH wallet, which is issued at the same time, and the private key of the same account in another complementary card. The aforementioned public key is valid for accessing the platform and performing all the necessary operations, such as checking the balance of the wallet through which the user receives the funds, obtaining those funds, and even sharing them with other people who may need them. The private key is necessary to perform transactions and pay for products and services and is used together with a pass-phrase that protects it from misuse in case of loss.

Likewise, and for the approach of charging for products and services, ETH is used as a unit of value. For this purpose, Arcadia provides a platform that makes it understandable to merchants, without technical knowledge about blockchain, the use of ETH as a means of payment. To this end, they simply need to register their business in this application, associating an ETH wallet in which to receive payments, and indicate the fiat currency, which can be in euros, dollars, or other currencies, in which the prices to be used in transactions are marked.

This operating scheme, as is to be expected since it is based on a technology that is still at an incipient stage of development, has certain drawbacks that must be taken into consideration when it is used.

Cryptocurrencies in general, except those known as stablecoins that have been designed to maintain a stable value against fiat currencies, such as the DAI or the USDT, present a certain component of volatility that introduces a certain factor of uncertainty in this scheme. To minimize these effects, Arcadia proposes to the different users to convert ETH to fiat currency in a reasonably short time and thus obtain an exchange rate close to that existing at the time of the transaction. Arcadia's future action plan contemplates obtaining the necessary license to directly exchange cryptocurrencies to fiat currencies, to subsequently launch its token, designed with the stablecoin vision, referenced to various fiat currencies. All this is possible thanks to the possibilities that the Ethereum blockchain offers for the creation of proprietary tokens in a standard format (ERC20), which enables them to be used in the construction of new applications using smart contracts.

4.2.2 Universal Basic Income

Universal basic income (UBI) consists of the periodic and unconditional transfer of income to all people in a society who find themselves in conditions of poverty and exclusion, and this is in terms of an established right. It is beyond the scope of this paper to analyze its relevance or the possibility of its implementation in the twenty-first century, as there is a large number of works on this subject to which the reader is referred. However, the concept of UBI has been considered in this study since

blockchain technology enables a corpus of tools that will make it possible, together with the will of the members of society, to build alternative social and economic ecosystems where the concept of UBI is contemplated.

At the very core of these new ecosystems is the possibility of introducing alternative operating dynamics that give a different meaning to the concept of the value of tangible goods and to that of human relations. These dynamics are based on the establishment of automatic and decentralized systems for the creation and distribution of cryptocurrencies that guarantee equality among the different participants.

Such proposals can indeed be seen as an attempt to question the current status quo, however, and regardless of this, what is relevant is that within them are different proposals that are born under the shelter of cryptocurrencies created ad hoc, as well as a set of smart contracts based on which the rules for their distribution and use are defined.

In the blockchain technology space, there are different proposals revolving around the concept of the UBI and its implementation that use this technology as a way to solve people's income inequality and as a tool to fight extreme poverty.

One example, which has a relevant track record, is the UBU project (www.projectubu.com). This is an initiative developed by a DAO (decentralized autonomous organization) that distributes 100 UBU tokens daily, through a specific digital wallet for this value, among all the people who have registered as a citizen in the application created for this purpose. In parallel, the UBU project builds a network of vendors (merchants) that use this platform as a tool to promote their brands and products, establishing different pricing strategies such as the introduction of part of them in UBUs. As stated on its website "The UBU project is an ambitious effort to monetize the waste and inefficiencies present in all economic ecosystems, and redistribute that value to all participants in the UBU world."

A UBU is a free token that is distributed daily among all citizens registered on the platform, forming the central part of an autonomous and decentralized UBI ecosystem. This token can be used to make value transfers between citizens and make payments at participating merchants as an alternative to traditional means (cash, credit, and debit cards). One of the main features of this proposal is the process by which the balance of each citizen's wallet is reduced daily by 1% of its volume, which returns to the system to be distributed again among citizens following the usual scheme. This fact can be understood as part of an oxidation process that encourages the use of this token as an instrument of measurement and value transfer and penalizes its accumulation. This process arises from the concept created by Silvio Gesell (1862–1930) which refers to the expiration or loss of value of money with time to avoid its speculative accumulation.

The UBU project in its early stages was presented as a tool to fight extreme poverty based on the creation of a new ecosystem of citizens and suppliers. The same was provided with a set of actors with tools that make it possible to extract value from dying assets (products not accepted by the traditional market either by the proximity of its expiration, its design out of current trends, being items already used, etc.), and inject them back into the ecosystem itself creating a network of equitable distribution of wealth. Currently, the project's operating fundamentals

maintain the automatic and decentralized distribution of UBUs with an objective focused on establishing relationships with commercial brands that introduce their use in their marketing strategies.

Another example of the use of blockchain technology in this field is presented under the name Mannabase. This proposal carries out the distribution of a UBI among all the people registered on its platform and whose identity has been verified. A specific cryptocurrency created for this purpose, manna, is used for this purpose. This cryptocurrency is the basis of value distribution proposed by the People's Currency Foundation as part of a set of tools built using blockchain technology, which under the common denominator of Hedge for Humanity (www.hedgeforhumanity.org) covers the spaces of generation (humanity fund) and distribution (manna) of wealth, as well as the identification of the people receiving the transfers (www.brightid.org) as unique human beings.

Similar to what happened with the UBU project proposal, a strategic and sustainability reflection has been carried out around the whole project itself. These reflections have had a lot to do with the scalability of the project and its sustainability based on the costs that the use of the technology itself implies. In this last sense, the inherent cost of maintaining the servers that host the hot wallets used for the distribution of assets, and the lack of profitability for Mannabase block miners in an exclusive blockchain, forcing migration to another more robust and scalable blockchain, should be identified. The project remains a pilot project that has been financed with funds provided by its founders and through the dedication of volunteers and supporters. From a future perspective, this group of actors is focused on the search for more funding that will allow the project to be scaled up to a level where it can have a significant impact on people's lives.

Finally, a third example that deserves consideration along the same lines is the GoodDollar. This proposal is presented as a research program focused on reducing inequality based on the appropriate use of blockchain technology. To this end, thanks to the participation of volunteers as users of the service, a distribution test of its cryptocurrency is carried out. As detailed on its website, its mission is "…to build a new open-source global cryptocurrency, called GoodDollar, that serves to distribute money using the principles of the UBI."

This is a nonprofit project that, like the projects considered previously in this section, aims to promote the creation of an alternative ecosystem aimed at reducing inequality among people from an economic perspective.

The research areas of the GoodDollar project are aimed at finding solutions to the challenges that condition the operation of a UBI on a global scale. These areas are:

1. Social identity, guaranteeing the unique identity of the user in the blockchain technology paradigm
2. Social interest, implementing a system in which the participation and commitment of the community are capable of creating added value
3. Social governance, seeking a governance model that allows communities, regardless of their size, to self-manage their economy

5 Conclusions

Blockchain technology is still at a very early stage of development and requires improvements in the areas of standardization of developments, security, and regulation. There is a significant disparity between the different blockchains in cyberspace, so standardization will facilitate the interaction between different blockchains, making these interactions and the development of applications created on the same blockchain more efficient. Likewise, the lack of a legal framework around it creates a situation of legal uncertainty, similar to what happened in the early stages of the development of crowdfunding platforms, which is a conditioning factor for its development. The creation of this regulatory framework will be decisive for the more agile deployment of this technology in an atmosphere of security, generating confidence for the different interest groups that arise around each of the proposals that appear.

Glimpsing the future of blockchain technology is complicated beyond the conviction, evidenced throughout this work, of its implementation in many of the exchange processes, both of value through the different fungible tokens that currently exist and the continuous appearance of new tokens over time, and of physical assets through the use of non-fungible tokens. However, the number of applications of this technology outside the purely financial sphere is increasing, and, thanks to its characteristics, it offers distributed, transparent, and secure solutions to a wide variety of economic, social, and environmental problems.

The vision behind this technology bets on a perspective of values that go beyond the concentration of economic power that occurs in the dominant capitalist system, opening the door to the construction of a new paradigm that references the value of things, behaviors, and the exchange itself built on different bases than the traditional ones, and with transaction instruments that do not necessarily have to have a direct reference to those existing today.

While the advantages of new technologies usually favor consumers who have a personal situation of wealth and connection, blockchain technology can be directed towards the creation of opportunities for the weakest and/or most marginalized part of the citizenry. In this sense, the elements that form part of the framework of the cryptographic community that creates these new opportunities will play a relevant role. Thus, there are more and more initiatives for the use of this technology in areas of social impact sponsored by relevant actors in this sphere, such as UNICEF. Similarly, these impact applications can pave the way for the achievement of the Sustainable Development Goals (SDGs) of the 2030 Agenda, by placing decentralized tools in the hands of civil society that enable it to meet the demands for action that this entails.

Blockchain technology is at an early stage, but is developing rapidly, and is being used in a wide range of fields. The speed of growth of this transformative tool will depend on how the deficit of developers and programmers with sufficient knowledge of it in the market is solved, on the regulatory framework that is established around it, and, of course, on the vision that entrepreneurs have of social and environmental problems and their willingness to face them since blockchain is just the tool.

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