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RECEIVED 02 May 2024

ACCEPTED 12 June 2024

PUBLISHED 11 July 2024

## CITATION

Domenicale I, Viano C and Schifanella C (2024),  
Blockchain for local communities: an  
exploratory review of token economy aspects.  
*Front. Blockchain* 7:1426802.  
doi: 10.3389/fbloc.2024.1426802

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# Blockchain for local communities: an exploratory review of token economy aspects

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Blockchain for local communities are blockchain-based applications that support the participation of people in the social and economic life of their local community. These applications leverage tokenization to enable socio-economic processes involving transactions of values where community members take part actively and intentionally. In this field, mechanisms that regulate the functioning of blockchains need to be redirected towards collaborative and social purposes that often differ from the logics on which mainstream cryptocurrencies are based. In order to redesign these mechanisms, sound examination of their system of tokenization and of dynamics of their token economy is required. This paper provides an exploratory review of token economy elements found within cases of blockchain for local community economies, which is an under-explored domain in the relevant literature. The analysis considers 9 projects for systems that incentivize or reward participation, or implement community currency schemes. The dimensions analyzed encompass the type of goals and communities, the blockchains adopted, and token economy design aspects such as: token types, their distribution and incentive mechanisms, the associated platform/wallet functionalities, and the project governance models. We have observed a variety of combinations of these elements being used to facilitate new forms of value circulation. However, there is a tension between the aspiration to introduce transformative systems and the need to ensure the stability of the economic framework. The highly experimental nature of these initiatives requires continuous monitoring of their emergence and development.

## KEYWORDS

blockchain, token economy, local communities, social economies, incentive mechanisms, governance mechanisms

## 1 Introduction

### 1.1 Blockchains for local communities

Recent years have seen a rise in experimentations with blockchain-enabled systems defined as blockchain for sustainable development, for (social) good, and for social impact.

There are a few literature reviews and surveys that study these initiatives (for instance Adams et al., 2018; Bartoletti et al., 2018; Cunha, 2021), their potential positive impacts and their constraints (Tomlinson et al., 2020; Diniz et al., 2021).

TABLE 1 Short description of the selected projects.

Project	Objectives	Strategy	Website and documentation
Cambiatus	To enable communities/groups to pursue environmental and social objectives through customized social currencies	Communities create their own social currencies for the exchange of products and services, and for incentivizing actions such as small entrepreneurship, recycling, cultural production and environmental regeneration	<a href="https://www.cambiatus.com/">https://www.cambiatus.com/</a> <a href="https://cambiatus.github.io/">https://cambiatus.github.io/</a>
Circles	To foster equalization of wealth and fair distribution of money at the local community level; to decentralize economic and political power	Universal Basic Income scheme based on individualized/personal cryptocurrencies that circulate based on reciprocal trust among participants. CRC tokens are accessible through the Circle.Garden wallet.	<a href="https://joincircles.net/">https://joincircles.net/</a> <a href="https://handbook.joincircles.net/docs/developers/whitepaper/">https://handbook.joincircles.net/docs/developers/whitepaper/</a>
Colu	To foster citizens' engagement toward city (social, economic, environmental) goals	City coins reward residents for actions that promote the city's goals such as local shopping, healthy lifestyles, green mobility. City coins are accessible through a city-branded app and complemented by gamification techniques	<a href="https://colu.com/">https://colu.com/</a> <a href="https://www.allcryptowhitepapers.com/colu-local-network-whitepaper/">https://www.allcryptowhitepapers.com/colu-local-network-whitepaper/</a>
Commons_Hood	To support and enable social, collaborative, inclusive economies in local communities To make blockchain and tokenization accessible and customizable for the wider public	Users/communities create their own token-based economic models leveraging on customized tokens, and implementing schemes such as rewards for civic engagement, community currencies, time banks and library of things, welfare subsidies, fidelity tools for local commerce	<a href="https://www.commonshood.eu/">https://www.commonshood.eu/</a> <a href="https://ieeexplore.ieee.org/document/9126008">https://ieeexplore.ieee.org/document/9126008</a>
Empower	To support the circular economy and promote equal opportunities for stakeholders in the waste management ecosystem	Waste tracking; plastic credits and customizable deposit schemes as monetary or gamified incentives to plastic waste collection and recycling	<a href="https://www.empowerchain.io/">https://www.empowerchain.io/</a> <a href="https://github.com/EmpowerPlastic/empowerchain/blob/main/Whitepaper.pdf">https://github.com/EmpowerPlastic/empowerchain/blob/main/Whitepaper.pdf</a> <a href="https://docs.empowerchain.io/">https://docs.empowerchain.io/</a>
Good Dollar	To provide accessible and inclusive financial solutions to support people empowerment, not for profit and for profit activities in communities	Universal Basic Income schemes based on GoodDollars (cryptocurrency), to be spent for online or inperson purchases, donations or entrepreneurship. Accessible via the GoodWallet.	<a href="https://www.gooddollar.org/">https://www.gooddollar.org/</a> <a href="https://whitepaper.gooddollar.org/">https://whitepaper.gooddollar.org/</a>
ImpactMar_ket	To provide accessible and inclusive financial solution to underbanked people	Microcredit and Universal Basic Income schemes based on Celo Dollars (cryptocurrency) are accessible via the Libera cryptowallet, and complemented by financial education opportunities	<a href="https://www.impactmarket.com/">https://www.impactmarket.com/</a> <a href="https://docs.impactmarket.com/">https://docs.impactmarket.com/</a>
Sarafu	To provide communities with liquidity vs. volatile or scarce national currencies. To foster local production and consumption of goods and services	Communities create their own Community Inclusion Currencies and credits backed by the local productive capacity and seeded by the local government and aid industry	<a href="https://sarafu.network/">https://sarafu.network/</a> <a href="https://github.com/grassrootseconomics">https://github.com/grassrootseconomics</a>
UrbanCha_nge	To stimulate positive (social, health, environment) behavioural change in local communities (cities, organizations, companies)	Communities create their own local coins (for everyday transactions) and impact tokens (for community governance), to launch initiatives with specific social goals and incentivized engagement mechanisms	<a href="https://www.urbanchange.com/">https://www.urbanchange.com/</a> <a href="https://urbanchange.com/whitepaper/Urban-Change-Protocol.pdf">https://urbanchange.com/whitepaper/Urban-Change-Protocol.pdf</a>

There are databases and reports that map such projects at the global or regional level (Galen et al., 2018; Voshmgir et al., 2019; Pólvara, 2020; Fines Schlumberger, 2022), and categorize them according to: socio-economic sectors of application (such as health, education, agriculture, e-government), use cases and functions (e.g., tracking, payments, identity management), the sustainable development goal (SDG) they address.

Within this broad domain, whose boundaries are not clearly defined (see for instance Tomlinson et al. (2020) on the reference to “sustainability” and to “social good”) we focus on experimentations with blockchains for local community economies. In the aforementioned studies, this has not yet been given attention as a specific domain of application due to its cross-sector character and its recent development.

However, blockchain technology has attracted the interest of actors engaged with community-oriented and participatory

economies, mainly in two fields. Firstly, digital commons and commons-based peer production and consumption (Pazaitis et al., 2017; Manski and Bauwens, 2020; Fritsch et al., 2021; Rozas et al., 2021; Long, 2023). Research in this field is mostly speculative, focused on potential application scenarios. Secondly, digital community or complementary currencies (see for instance Blanc, 2011; Diniz et al., 2018). In this field, concrete experimentations are more prevalent.

In this paper, we refer to “blockchains for local communities” as blockchain-based applications that support or enable people participation in the social and economic life of their local community. These applications leverage tokenization to enable the circulation and (re)allocation of various kinds of assets relevant for the social, economic and environmental sustainability of the local community. Our focus is on socio-economic processes involving transactions of

values where community members take part actively and intentionally. For this reason, we do not address here the use of blockchains within e-democracy, voting and deliberative procedures (Cagigas et al., 2021; Imperial, 2021) or blockchains designed for energy communities, donation systems, and DAOs (decentralized autonomous organizations). These categories have more specific purposes that deviate from our current focus.

## 1.2 Design of tokenized systems for community-based and social economies

We are particularly interested in blockchain applications that address social needs by not simply applying mainstream solutions towards social ends (e.g., platforms that rely on established cryptocurrencies for decentralized donations, money transfer, and crowdfunding services). Herein lies the difference with speculative or profit-oriented global cryptocurrencies, DeFi platforms and non-fungible token (NFT) marketplaces. Blockchains for local communities also differ from systems that leverage blockchain for supply chain traceability, logistics and smart city infrastructure, which are marked by a higher degree of automation, reliance on IoT systems, and integration with cyber-physical layers.

Note that there are critical positions on the very notion of social good adopted in the blockchain domain (Sotoudehnia, 2021; Semenzin, 2023), on the actual effectiveness of blockchain-based platforms for achieving social impact goals, and on the risk of techno-solutionist approaches to sustainability and social issues which simply reaffirm the *status quo* and a market path of development (Tomlinson et al., 2020).

This raises the question of how to rethink the mechanisms that regulate the functioning of blockchains, so that they are redirected towards collaborative and social purposes.

The cases under consideration are tokenized systems<sup>1</sup>: they focus on processes of value creation, resource exchange and interactions among participants. Therefore, tokenization (the conversion of the rights and values of an asset into a digital token on a blockchain) and the design of tokenization processes are central dimensions to be addressed. Our perspective is that examining the design of the tokenized system and the token economy brings opportunities to reassess the foundational principles and mechanisms driving the utilization of blockchain technology.

There is a limited literature analyzing and modeling tokenized systems generally in the area of applications to social good, and specifically regarding community-level

applications of blockchain technology. For this reason, we provide an exploratory review and analysis of token economy elements found within 9 cases of blockchain for local community economies.

## 2 Methodology and analytical framework

The main sources for our work are databases and reports that map projects on blockchain for social good, for social impact, and for SDG-related actions (see Section 1.1). We focused on the PositiveBlockchain<sup>2</sup> open repository, which we consider to be the most comprehensive and up to date at present. We then added some initiatives that were already known to the authors, or referenced in the websites of the projects first mapped in the reports.

According to the definition of blockchain for local communities provided in Section 1.2, a first list of 40 projects was compiled. Then, the following selection criteria was used: the project provides evidence of actual use of a blockchain, and technical documentations such as white papers and open repositories; the project status has entered the testing/experimental phases, with the concept/design phases completed; the project was active in the period January 2023 - February 2024, when the review was conducted<sup>3</sup>.

This resulted in a final list of 9 projects that we analyzed based on the projects' websites, technical documents, and (when available) empirical articles (Balbo et al., 2020; Avanzo et al., 2023; Mattsson et al., 2023).

The analytical dimensions used concerns *sustainability and community goals, technology and token economy design aspects* (see Table 2).

The methodology adopted presents some limitations. Relevant projects not included in the main sources could have been left out. Data mainly consist of documents published by the project's developers, which may overemphasize achievements. Our goal is not to provide a systematic or exhaustive review, but rather an exploratory study of an evolving domain.

## 3 Token economy aspects in blockchain for local communities

In this section, we present our results and briefly discuss core aspects in the design of tokenized economies. Table 1 summarizes the projects' objectives and strategy. Table 2 provides an overview of the analysis done according to the dimensions mentioned above.

1 Tokenized systems, or crypto economic systems (CES), are complex systems comprising several interconnected networks: the computation and communication network, the financial network, and the off-chain socioeconomic network composed of the people and organizations participating in the system (Voshmgir and Zargham, 2019).

2 <https://positiveblockchain.io/>

3 The Circles project was suspended at the end of 2023. It has been retained in our study because it satisfies all other criteria and provides recent and relevant evidence of feasible design and usage of tokenized systems for local communities.

TABLE 2 Overview of the project analysis.

Project	SDG Primary and (secondary)	Scale/ Community	Docs type			Blockchain type	Co-design Level	Value proposition
			White paper	Github	Other			
Cambiatus	11, 1, (8), (13)	Neighbourhood Municipality District (Non-territorial/online)		x	x	EOSIO, Celo	Create community-specific token Customize features Design off-chain system of exchanges	Supporting collaborative, cooperative, circular economies, and local payment systems Providing incentives for participation and engagement by stakeholders and community members
Circles	1, 10, 12, (8)	Neighbourhood Municipality	x	x		Gnosis	Design off-chain system of exchanges	Distributing universal basic income Offering a tool for communities to organize themselves in a decentralized manner
Colu	11, 12, (3), (13)	Municipality	x	x		Ethereum	Create community-specific token Design off-chain system of exchanges	Supporting collaborative, cooperative, circular economies, and local payment systems Providing incentives for participation and engagement by stakeholders and community members
CommonsHood	11, 12, (10), (13)	Neighbourhood Municipality District (Non-territorial/online)	x	x	x	Ethereum	Create community-specific token Customize features Design off-chain system of exchanges	Supporting collaborative, cooperative, circular economies, and local payment systems Providing incentives for participation and engagement by stakeholders and community members Offering a tool for communities to organize themselves in a decentralized manner
Empower	12	Not specified	x	x	x	Cosmos	Design off-chain system of exchanges	Tracking Providing incentives for participation and engagement by stakeholders and community members
Good Dollar	1, 10, 12, (8)	Neighbourhood Municipality District (National communities)	x	x	x	Ethereum	Design off-chain system of exchanges	Distributing universal basic income Facilitating donations Offering a tool for communities to organize themselves in a decentralized manner
ImpactMarket	1, 4, 10	Neighbourhood Municipality District (National communities)	x	x		Celo	Design off-chain system of exchanges	Distributing universal basic income Providing incentives for participation and engagement by stakeholders and community members Offering a tool for communities to organize themselves in a decentralized manner
Sarafu	1, 10, 12 (8)	Neighbourhood Municipality District (National/Regional interoperability)	x	x	x	Celo	Design off-chain system of exchanges	Enabling micro-credit systems Supporting collaborative, cooperative, circular economies, and local payment systems
UrbanChange	11, 12, (3), (13)	Neighbourhood Municipality (Non-territorial/ organizations)	x		x	Algorand	Design off-chain system of exchanges	Supporting collaborative, cooperative, circular economies, and local payment systems Providing incentives for participation and engagement by stakeholders and community members

(Continued on following page)

TABLE 2 (Continued) Overview of the project analysis.

Project	Type of token		Token issuance		Associated functionalities	Incentive mechanisms		Governance mechanisms	
	Utility token	Store of value Token	Inflationary model	Deflationary model		Monetary	Non-monetary	On-chain process	Project including a DAO
Cambiatius	Payment token Governance token		Depending on the community	Depending on the community	Medium of exchange Cryptocollectible Digital certificates	Token reward	Access to products or services Gamification		
Circles	Payment token		x		Medium of exchange	Payment token			x
Colu	Payment token	Colu Local Network CLN	x		Medium of exchange	Token reward			
CommonsHood	Payment token Governance token		Depending on the community	Depending on the community	Medium of exchange Vote Access to services Cryptocollectible Digital certificates	Token reward	Access to products or services		x
Empower	Payment token Governance token			x	Network security Votes Medium of exchange Cryptocollectible	Token reward	Participate in governance	x	
Good Dollar	Payment token reserve-backed			x	Medium of exchange donation	Payment token		x	x
ImpactMarket	Governance token	Celo Dollar cUSD	x (cUSD)	x (\$PACT)	Medium of exchange votes	Token reward	Participate in governance	x	x
Sarafu	Payment token pegged to cUSD		x		Medium of exchange	Payment token			
UrbanChange	Payment token backed by USDC Governance token		x (Local coin)	x (Impact coin)	Medium of exchange Votes	Token reward	Participate in governance		

## 3.1 Sustainability and community objectives

### 3.1.1 Project objectives and SDGs

As regards the project objectives, we identified two main categories, although not sharply distinguishable. The first set of projects (Cambiatus, CommonsHood, Colu, Urban Change) are aimed at fostering people's participation in the socio-economic life of their communities, either by incentivizing actions deemed positive, or fostering local production and trade of goods and services. As such, we relate these projects primarily to SDG 1 (Sustainable Cities and Communities) and SDG 12 (Responsible Production and Consumption), and secondarily to the SDGs addressed by the specific civic actions that are incentivized, such as health (SDG 3) or climate action (SDG 13). The second set of projects are aimed at providing accessible and inclusive financial solutions, to foster either individual empowerment and local micro-entrepreneurship (i.e., ImpactMarket, GoodDollar, Sarafu) or community-based, decentralized economic systems (i.e., Circles). We relate these projects primarily to SDG 1 (No Poverty) and SDG 10 (Reduce Inequality), and to SDG8 (Decent Work and Economic Growth). Objectives related to social inclusion and solidarity within the local community (SDG 11) are often present. Moreover, Empower is an example of project targeting environmental goals (SDG 13), through monetary or gamified incentives to plastic waste recycling, while also fostering cooperation between organizations.

### 3.1.2 Geographical scale and/or community

In most cases, the "communities" addressed are groups of people and public or private organizations that live and work in the same geographical area: a neighborhood, town, city (or an equivalent non-urban areas in terms of scale), or district. However, some platforms (e.g., CommonsHood, Cambiatus) do not in principle exclude being used by non-territorial, online communities. In some cases, the urban domain and cities are explicitly mentioned (UrbanChange, Colu). Some do not exclude other possible communities such as companies or other organizations (e.g., UrbanChange, Empower). Sarafu declares a more complex strategy in terms of geographical scale that envisages the interoperability of different community currencies at the regional level.

## 3.2 Technology

### 3.2.1 Type of blockchain

All the case studies analyzed in our research employ public blockchains as their underlying infrastructure: Ethereum, Celo and EOS. IO, which are built upon Ethereum's technology stack, Algorand, Gnosis, Cardano and Cosmos platform. These blockchains enable the use of smart contracts, which play a crucial role in automating<sup>4</sup> and enforcing agreements.

<sup>4</sup> This automation is expected to ensure that transactions within the community are conducted with transparency, security, and efficiency, reducing reliance on intermediaries.

### 3.2.1.1 Co-design level

The term "co-design level" refers to the extent to which the community can customize the technology tool. In our assessment, we considered:

- the option to create a community-specific token. This feature is available in four projects. CommonsHood and Cambiatus offer the creation of only custom tokens, while Sarafu and Colu allow the creation of a community-specific utility token in addition to the existing store of value token (see below).
- the flexibility to choose which features of the tool to use. Only CommonsHood and Cambiatus empower users to select desired tool features.
- the possibility to design the system for exchanges among actors and participants in the off-chain dimension. While the majority of projects (Empower, ImpactMarket, GoodDollar, UrbanChange, Circles, Sarafu, Colu) rely on non-customizable tools, communities still possess the capability to design tailored systems for off-chain interaction.

## 3.3 Token economy design elements

### 3.3.1 Value proposition

The term "value proposition" here refers to the benefit that the token economy seeks to provide (Barrera and Hurder, 2022). In our analysis, the following value propositions are expected: distributing universal basic income (ImpactMarket, Circles, GoodDollar), enabling micro-credit systems (Sarafu), facilitating donations (GoodDollar), supporting collaborative, cooperative, circular economies, and local payment systems (Cambiatus, CommonsHood, Colu, UrbanChange, Sarafu), tracking (Empower), providing incentives for participation and engagement by stakeholders and community members (Cambiatus, CommonsHood, Colu, UrbanChange, Empower, ImpactMarket), offering a tool for communities to organize themselves in a decentralized manner (Circles, CommonsHood, GoodDollar, ImpactMarket).

The above value propositions differ in their implementation across the use cases. However, a common tendency is the dual nature of the value propositions: creating assets to transfer value, and facilitating processes for participation, self-organization, and decision-making within the community.

### 3.3.1.1 Token type

We consider the distinction between:

- *Store of value (SoV) tokens*, including cryptocurrencies, stablecoins, and collectables. Of particular interest to this review are stablecoins. Stablecoins aim to maintain a stable value relative to fiat currencies by pegging their price to one or more underlying assets (Khamisa, 2021)
- *Utility tokens*, originally designed to support a community, can be used to access services and resources. Their value lies in the right they confer on the holder (Kivilo, 2023).

All the projects we analyzed incorporate utility tokens for various functions including payment, governance participation, and access to services. In four instances (ImpactMarket, GoodDollar, UrbanChange, Colu), an additional token is integrated—a cryptocurrency or stablecoin SoV token, or a utility token backed by a stablecoin token. In addition, in the case of Sarafu, the CAV utility token is pegged to the stablecoin cUSD, aiming to also facilitate support by external donors.

Case studies implementing SoV tokens adopt a dual-token model: the utility token facilitates specific activities within the blockchain network such as governance rights and participation in the ecosystem, while the other token functions as a security instrument to protect project funding (its issuance also aligns with regulatory requirements). We highlight the significance of adopting a dual-token model, especially in projects for social good, as they frequently rely heavily on donations and funding.

### 3.3.1.2 Associated functionalities

Our analysis indicates that the medium of exchange functionality is common to all the cases analyzed. Moreover, the second most prevalent functionality is that associated with voting, as observed in CommonsHood, Empower, ImpactMarket, and UrbanChange. This observation corresponds with the value propositions asserted by the token economies of these projects. Specifically, this kind of projects aim to facilitate value creation and transfer processes while also fostering community empowerment.

### 3.3.1.3 Issuance mechanism of the token

We have taken into consideration the fundamental dichotomy between.

- *Inflationary token models*, which mirrors the functioning of fiat currencies. The total supply of tokens is not fixed but rather involves a gradual minting process over time. This configuration offers greater flexibility and better alignment with the dynamics of the relevant market (Kaal, 2018; Kivilo, 2023).
- *Deflationary token model*, where a cap is typically imposed on the total number of issued tokens, fostering scarcity and positively impacting the token's value. (Kaal, 2018; Kivilo, 2023).

Among the cases reviewed, four tokens adopt a deflationary model (Empower, \$PACT token of ImpactMarket, GoodDollar, *Impact Coin* of UrbanChange) while five employ an inflationary model (*CeloDollar* adopted by ImpactMarket, *Local Coin* of UrbanChange, Circles, Colu, Sarafu). Cambiatius and CommonsHood offer the flexibility of deciding which model to adopt during token creation. A deflationary model is advantageous when the token is to be used to achieve a long-term store of value purposes, whereas tokens following an inflationary model are predominantly utilized as currency or payment token.

### 3.3.1.4 Incentive mechanisms

The incentive mechanisms are aimed at promoting behaviors that contribute to achieving the goal of the token economy. The design process of the incentive mechanisms must consider « all the many environmental factors [that] come together to shape the economic decision-making of users» ((Barrera and Hurder, 2022)). The cases considered use public blockchains, they can therefore rely on the security guarantees provided by the underlying blockchain network. However, when they use their unique native token, the incentive mechanism driving the token economies of these systems are likely to be different to those of the underlying blockchain network (Khamisa, 2021). In our analysis, we outlined the fundamental distinction between monetary and non-monetary incentives. All the instances analyzed incorporate monetary incentives in the form of token rewards. five of these cases (Cambiatius, CommonsHood, Empower, ImpactMarket, UrbanChange) also incorporate non-monetary incentives: participation in governance procedures, access to products and services, and gamification mechanisms.

Incentives can manifest themselves in other different forms, beyond the monetary/non-monetary ones. They can take a purely materialistic form, namely, that of instrumental rewards that promote extrinsic motivation. Alternatively, incentives may include social recognition and possess a symbolic dimension (Bruni et al., 2020), fueling intrinsic motivation. Depending on whether participant motivation is intrinsic or extrinsic, incentives can reinforce or undermine a given behavior (Benabou and Tirole, 2003; Yoo, 2021).

### 3.3.1.5 Governance mechanisms

In this context, governance refers to managing decision-making processes relating to different areas of the tokenized system: resource management, protocol adjustments, community proposals, community objectives, and token economy mechanisms. They may be carried out through a combination of on-chain and off-chain methods (Schubert et al., 2021). Four systems (Sarafu, Empower, ImpactMarket, and GoodDollar) explicitly incorporate on-chain governance processes.

Another important aspect is the role of different actors within the systems under consideration. In a fully decentralized model, all decision-making processes—from design to system implementation—are managed by community members. However, this setup requires a high level of financial and digital literacy on their part (Gericke et al., 2019). In (ImpactMarket, UrbanChange, CommonsHood, Sarafu, Colu, Cambiatius, certain actors (typically local nonprofit associations) fulfill facilitative roles and undertake management functions concerning technical and economic aspects.

Governance is complex, particularly when blockchain is involved as it brings into question the issue of DAOs. Although we will not get into DAOs in this discussion, it would be interesting to explore when a DAO is deemed necessary and when it is not in systems such as those under consideration. In our analysis, four of these systems (GoodDollar, ImpactMarket, CommonsHood, and Circles) implement or plan to implement a DAO.

## 4 Conclusion

In this paper, we have provided an exploratory analysis of token economy elements in current experimentations with blockchains for local community economies. Our review is based on the assumption that it is necessary to redesign the tokenized systems to redirect blockchain technology towards social goals, going beyond the *status quo* towards reformist or transformative socio-economic models (Tomlinson et al., 2020; Certomà, 2021).

The analysis covered three dimensions: overall goals, technology, and token economy. Regarding sustainability goals, a first group of cases focuses on promoting community participation in local socio-economic activities. The second group aims to provide inclusive financial solutions to promote individual empowerment, micro-entrepreneurship, or decentralized community-based economic systems.

Regarding the technological dimension, all cases utilize public blockchains. Non-customizable tools are predominant. Although projects allowing the local communities to create community tokens and customize functionalities are in the minority, they serve as significant examples of community empowerment.

Concerning the token economy, various types of tokens are utilized. Utility tokens are commonly used for governance rights and participation within the ecosystem. There is also a trend toward adopting a dual-token model to enhance system stability and anchor it to the real economy. All projects offer monetary incentives through token rewards, while also incorporating non-monetary incentives. However, there is a lack of clear distinction between material and non-material incentives, raising questions about intrinsic and extrinsic motivations for participants' engagement. Finally, most projects rely on mixed or off-chain methods for decision-making.

In light of the aforementioned points, we observe a tension between introducing transformative systems with alternative currency functionalities and keeping a link to the current economic systems through stability-oriented mechanisms. By investigating both the study of token economy models and the technical characteristics of adopted blockchains, we can better understand what is needed to foster transformative models.

Blockchain offers added value in terms of security, transparency and automation, especially when building a complex system with various layers to manage. Therefore, it is also important the scale and nature of the community in which blockchain technology is proposed. Exploring this issue is critical to avoid two potential opposing problems: on the one hand, having a tool that is out of proportion to the needs of a small and cohesive community, and on the other hand, maintaining an overly simplistic view of the community as an ecosystem devoid of conflict and complexity.

The number of projects included in this review are few when compared to those listed in existing reports. The field addressed is highly experimental and marked by a high turnover of initiatives. In many cases, the use of blockchain is only at a conceptual phase, or is no longer active. Therefore, many reports and analyses quickly become out of date, which requires continuous monitoring. This

paper is also intended to make a contribution on that front. Nevertheless, analyzing terminated or suspended projects is also important, not least so that we can learn from their weaknesses or failures. Examples in this direction are Circles (Papadimitropoulos and Perperidis, 2024) and FairCoin<sup>5</sup> (Balaguer Rasillo, 2021; Balaguer Rasillo, 2023).

Analyzing blockchains for local communities overlaps with existing research lines that need to be connected. We recall in particular: blockchain-based management of commons and commons-based peer production (see section 1.1); financial inclusion and development economics (Scott, 2016; Pisa and Juden, 2017; Pisa, 2018; Cunha et al., 2021); and DAOs (Santana and Albareda, 2022). Such an interdisciplinary approach allows researchers to take into account the complexity of these sociotechnical systems in terms of their system design and socio-political implications.

## Author contributions

ID: Writing—original draft, Writing—review and editing. CV: Writing—original draft, Writing—review and editing. CS: Writing—original draft, Writing—review and editing.

## Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. This research was funded by: Italian Ministry of University and Research - MUR ("Borse di Dottorato" - Dottorato di Ricerca di Interesse Nazionale in "Blockchain & Distributed Ledger Technology", under the National Recovery and Resilience Plan (NRRP). European Union—NextGenerationEU (ICSC—Centro Nazionale di Ricerca in High Performance Computing, Big Data and Quantum Computing). European Union and Italian Ministry of University and Research (Co.R.Pu.S project - DUT Partnership Call 2022).

## Conflict of interest

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<sup>5</sup> Not included in this review since it terminated before 2020.



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