

5 *Blockchain applications: A pathway to decentralised, autonomous, and transformative leadership*

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Overview

Blockchain applications, which are gaining traction, offer ways for people to interact without depending on intermediaries. This is beneficial, as the use of intermediaries contributed significantly to the global systemic failures of the 2008 global financial crisis. Secure blockchain systems, informed by principles of social justice, can prepare organisations and communities for meaningful and transformative change. Blockchains can promote citizen participation, solve development financial challenges, and help implement and systematise leaders' decisions. This chapter uses a systematic review of blockchain leadership literature to show how this technology can help implement fair and socially just policies. Blockchains could theoretically be used to manage the operations of an entire country. The Decentraland case study is an extraordinary experiment in how a blockchain can be used to manage the operations of an entire environment based on citizen consensus. Such ideas could be expanded to the real world in the future, with blockchain becoming a valuable tool for leaders who place the interests of communities above personal ambitions.

Introduction

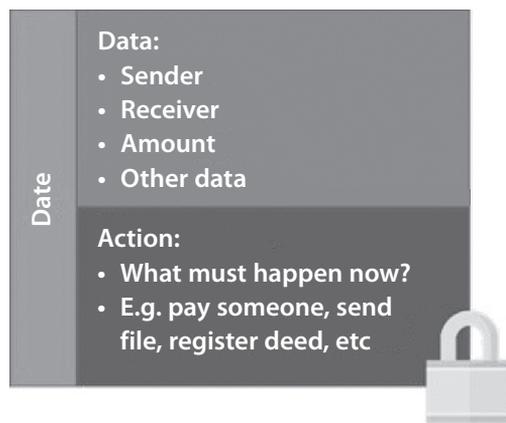
The blockchain, simply put, is a tool that can be used to replace systems of trust. Traditional governance and information systems are built upon placing trust in an organisation or an individual (De Filippi, Mannan, & Reijers, 2020). One trusts a bank to store money or manage transactions responsibly. One trusts an international rating agency to define a country's credit score fairly. However, placing trust in these intermediaries provides them with considerable power, which could be corrupted. The blockchain negates the need for power-broking intermediaries, and provides an opportunity for direct, people-to-people exchanges (Tapscott & Tapscott, 2016).

Blockchain systems are novel, and their developers have identified disruptive business models that could introduce social benefits. Potentially, these systems can revolutionise how organisations are governed, given that they can enable efficient and transparent business models while systematising fair participation

(Bagloee et al., 2021). Blockchain business models, to date, have concentrated on verifying identities, enabling efficient financial services, and monitoring supply chains. However, there is potential to expand these use cases to benefit the developing world, where institutional trust is traditionally low, and institutions and their systems are weak. Fortunately, these limitations make developing countries ideal early adopters of blockchain systems as they are ready to leapfrog their developed-world counterparts who are contending with outdated legacy systems (Niforos, 2017).

The blockchain is the technology behind digital currencies, and it can be used to redefine how traditional, centralised organisations operate by removing unnecessary intermediaries from work processes (Tapscott & Tapscott, 2016). The technology is at an early stage of development, and its full potential is still unknown (Niforos, 2017). It is often described as a distributed ledger, meaning that, like a ledger, it only allows transactions to be appended in a timestamped manner. Each block within the blockchain (Figure 5.1) represents a transaction, recording the affected parties, the transaction amount, and other relevant data. The block might also define an action that must be executed when the transaction is successfully completed. The blockchain’s ability to execute actions autonomously provides the foundation for ‘smart contracts’ and decentralised autonomous organisations (discussed further on) (Fenwick, Kaal, & Vermeulen, 2018).

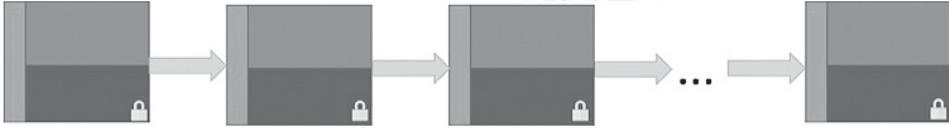
Figure 5.1 *The block within the blockchain*



Source: Author

These transactions are encrypted and appended together in the form of a chain. Appending blocks together in a linked fashion explains how the term blockchain arose (Figure 5.2).

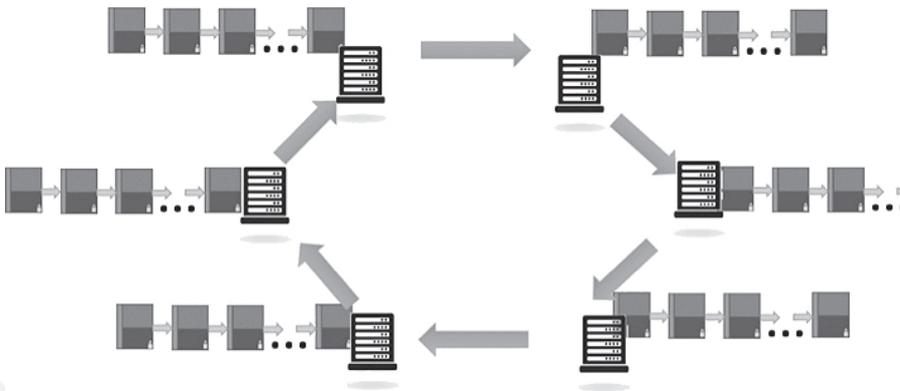
Figure 5.2 Representation of a single blockchain



Source: Author

However, a single transaction chain stored on a single computer can easily be corrupted. The power of the blockchain arises from its consensus mechanism. By distributing the chain across a network of computers (Figure 5.3), and constantly verifying the contents of the chain, the system can affirm the validity of each transaction. The term ‘distributed ledger’ is based on this design (Zachariadis, Hileman, & Scott, 2019). A block can only be appended to the blockchain if it is consistent with all other blocks shared with each computer on the network. Once consensus is determined, the block is appended, and the blockchain grows (Casino, Dasaklis, & Patsakis, 2019).

Figure 5.3 The distributed blockchain



Source: Author

These rules are used to detect fraud and are essential in developing trust among blockchain system users. Thus, the system helps individuals and institutions do business confidently, as they can trust the system’s processing and reporting (Manita, Elommal, Baudier, & Hikkerova, 2020). Critically, this trust does not arise from a relationship or from the credentials of the institution’s leadership.

Gaining and maintaining trust by ensuring data transparency and incorruptibility is crucial for the transformative leader (Hansen, Morrison, Zaman, & Liu, 2020; Tapus & Manolache, 2019). This technology can be the ideal tool for the transformative leader who needs to foster trust in their policies by highlighting

the robustness, fairness, and transparency of proposed systems that enact social, economic, and moral change. It is the leader's responsibility to introduce progressive and socially just systems within the country's political framework. Without such systems, their actions and policies might only be temporary. By adopting a blockchain system, the leader ensures the longevity of their policies and protects them from potentially corrupt power brokers. Such systems can prevent perpetuating inequities and unfair practices (Shields, 2010). These practices can stem systemic injustices and fraudulent behaviours which deplete a country's scarce resources (Bosu, Dare, Dachi, & Fertig, 2011). Therefore, the leader must identify methods that end unsustainable practices and disrupt positions that do not contribute to the leader's vision of a just future (Riedy, 2014).

Ultimately, blockchain technologies can provide a leader with a tool to promote socially just community development. They also offer the user community a mechanism to participate actively in decision-making (Tapus & Manolache, 2019). As blockchain applications evolve, a new form of organisational model has emerged, namely the decentralised autonomous organisation (DAO). These organisations are entirely dependent on the design and protocols of the blockchain system. Decentraland is one such organisation, based on a virtual reality platform and offering all users an opportunity to contribute to decision-making. The system is founded on 'smart-contract' technology that allows the autonomous execution of actions as transactions are completed (Decentraland, n.d.). In this instance, the organisation is not controlled by a single leader, and to be transformative, the system architects must develop it with socially just principles in mind. The question remains whether this evolution of leadership and governance protocols will uphold values of fairness and justice, or be subverted over time.

With these concepts and questions in mind, this chapter seeks to answer the following questions:

1. How might blockchain systems support leaders in enacting transformative policies?
2. How will DAOs change the traditional leadership and governance of institutions?
3. In what ways can developing countries benefit from blockchain technologies?

The chapter first describes the methods used for the literature review, and then explores how the transformative leader can benefit from blockchain systems, considering the transformative potential of the technology. Thereafter, the chapter reviews the Decentraland DAO, discussing how blockchain technology might disrupt the understanding of leadership itself. Lastly, the chapter provides a concluding synopsis, outlining how the blockchain may benefit the developing world.

The parameters of the literature review

In preparing a reproducible and transparent scientific literature review, the following steps were undertaken by emulating Briner and Denyer's (2012) adapted features from the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement described by Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group (2009). Therefore, this chapter follows a structured method of searching, screening, and selecting an appropriate literature set. This information was identified by scanning the ScienceDirect academic database for peer-reviewed literature and following a structured approach when identifying pertinent grey literature.

A broad search was conducted across ScienceDirect to address the primary research question, which links disparate ideas of blockchain systems to transformative leadership principles. The following combinations of keywords were used: 'Blockchain' + 'Leadership', 'Blockchain' + 'Governance', 'Smart Contracts' + 'Governance', and 'Smart Contracts' + 'Leadership'. An additional search was performed for the keyword 'Decentraland' to gather information supporting the specific Decentraland case study. This search identified all available journal articles and book chapters related to this topic. As these are novel concepts, no time filters were introduced. By following the PRISMA screening process, 64 papers were eligible after reviewing their respective abstracts.

Grey literature was gathered to supplement the peer-reviewed literature, using three different Google searches, based on the following keywords: 'blockchain impact on leadership and management' + 'pdf', 'Decentraland Governance' + 'pdf', and 'Decentraland social impact'. The 'pdf' keyword was used to help identify published papers, but was abandoned in the third search, as it hindered the identification of appropriate content. The first 20 results for each keyword were scanned, from which 48 papers were identified, and 38 papers were selected for review. These papers were used to prepare the case study of the Decentraland system.

Important traits of transformative leaders were identified using the transformative leadership literature review by De Kock and Swartz (Chapter 2, this volume). The themes covered relate to transforming organisations; promoting social, moral, and economic impacts; encouraging social justice; and furthering the ideals of equality. This chapter, therefore, identifies how a blockchain system may aid these goals and how it might support the transformative leader interested in pursuing these objectives.

This chapter triangulates these issues of transformative leadership against findings sourced from the systematic scan of transformative blockchain use cases and the Decentraland case study. The convergence of these discussions helps to identify strategies for the transformative leader, and describes potential pathways for implementing a socially just and decentralised organisation.

Blockchain's transformative potential

The blockchain is a foundational technology providing a platform for transformed economic and social systems (Iansiti & Lakhani, 2017; Schmidt & Wagner, 2019). The technology offers multiple institutions and stakeholders a means to do business in a trusted manner, allowing complex networks to benefit from collective knowledge and resources (Omar, Minoufekar, & Plapper, 2019). With greater blockchain adoption, Berger (2019) believes the ability to work together collectively may improve by orders of magnitude, allowing new methods of working together that were never possible before. These are compelling prospects for the transformative leader who understands society's complex nature and its interconnected challenges.

A primary transformative benefit of the blockchain system is that it limits opportunistic behaviour and promotes fair business practices and equal opportunities. Furthermore, such systems can prevent unfair pricing and gatekeeping, which enables monopolies. Providing fair trading opportunities on a blockchain platform allows small businesses to interact with customers on equal terms compared with their corporate counterparts (Schmidt & Wagner, 2019). By systematising trust, the blockchain reduces uncertainties and costs, potentially making such systems more attractive to investors (Schmidt & Wagner, 2019). Several use cases have already been identified in the identity management, security, supply chain logistics, and 'Internet of Things' discourses. More experimental implementations are underway in the health sector, election management, social media, and energy management (Sandner & Bekemeier, 2019).

Moreover, blockchain systems could potentially transition large portions of the informal sector to formality by enabling fair business practices. Informal traders own assets, transact, and possess knowledge about the economy, but usually have no opportunity to contribute to the formal economy. Eighty to ninety per cent of workers in Africa are excluded from the formal economy and financial or trade services (Dube & Katende, 2020) because most corporate services are priced out of their reach. Their businesses can be recognised and contribute to formal economic growth by integrating them into formal platforms.

Solving the funding challenge is another crucial concern for the transformative leader. Given limited funds, leaders are forced to make difficult choices, balancing development priorities. The current development finance discourse appears to be failing the developing world. There is no systematic approach to financing, with a series of disjointed interventions provided by various institutions. According to Sagasti et al. (2004), the allocated funds are often insufficient and have made little improvement to the lives of poor people. At a recent development finance conference, Castell (2020) highlighted a trend in which only 6 per cent of funds from the private sector, through blended finance

initiatives, reach the world's lowest-income countries. Ninety-four per cent of these funds are channelled back to the financing intermediaries, propping up the system. The key message expressed during this conference was that development finance institutions need systems that can better coordinate finance distribution, and inculcate trust where trust is typically deficient. Blockchain-based financing, if configured appropriately, offers a solution for international bodies to coordinate funding arrangements. The system reduces the need for intermediaries in a funding supply chain and helps direct funding to the areas of greatest need (Tapscott & Tapscott, 2016). Such initiatives are transformative game-changers in the development finance arena, ensuring development funds reach their intended beneficiaries.

Another transformative application of blockchain technologies is its ability to redefine governance and citizen participation processes. De Filippi (2018) argues that blockchain systems allow countries to experiment with new governance models and alternative political systems. Blockchain-based e-governance systems can revolutionise the administrative machinery of government. Through decentralised identities captured on the blockchain, voting can be conducted securely and fairly (Dursun & Üstündağ, 2021).

By integrating social networks and open data principles, Bindu, Sankar, and Kumar (2019) believe the idea of participatory governance can be redefined. Through e-voting and e-campaigning processes embedded into the blockchain platform, the system offers a means for candidates to communicate directly with all citizens. However, this assumes that all citizens are connected to the platform, experience equal opportunities for usage, and support the digital governance processes. The counterargument against blockchain systems exists when all citizens do not have equitable access to or use of the system, thereby being disenfranchised from the democratic process (Palumbo, Manesh, Pellegrini, Caputo, & Flamini, 2021).

A transformative leader needs to problematise and overcome structures of power and privilege (Weiner, 2003). The blockchain system can be configured to overcome such structures by adopting socially just governance protocols. As the blockchain system works on consensus, if all system users agree to these protocols, each participant understands that all system features are available equitably (Hardjono, n.d.; Janssen, Brous, Estevez, Barbosa, & Janowski, 2020). For example, in Ethiopia, leaders in the Ministry of Education interested in transforming the country's education system have embraced blockchain-based technologies, believing the technology provides the key to improving the education system's quality, while introducing five million Ethiopian students to a new form of technology. The students will receive a blockchain-based identity, allowing the government to monitor their academic performance, and access to future government e-services. The system also enables teachers, principals, and

department officials to monitor student progress (Paliwal, Chandra, & Sharma, 2020). Through the system's logic, each student is treated equitably, and the information produced is trustworthy, based on an agreed set of protocols.

Future smart cities will rely on the datafication of society. By leveraging data, a smart city can implement appropriate policies that improve society. Blockchain systems provide the means to manage data, allowing the city to leverage the collective insight of its citizens (Palumbo et al., 2021). Project #Blockchain4EU allows policy-makers to link the industry and non-financial sectors together on a blockchain platform in the European Union. The platform supports prototype development that benefits policy-making, the economy, society, the legal system, and the environment (Pólvora & Nascimento, 2021). This highlights how blockchain solutions enable collaborative exchange and are of immense value to society. Proponents of sustainable smart cities supporting these principles of transparent governance and decentralised decision-making are among the early adopters who have implemented several applications. For example, smart city dashboards have become important monitoring and evaluation toolkits for local authorities, providing an opportunity to develop safe and secure people-centric measurement tools (Marsal-Llacuna, 2020; Ullah, Qayyum, Thaheem, Al-Turjman, & Sepasgozar, 2021).

Each of these features is of interest to a transformative leader. Once supported by a well-functioning system, the leader can harness the potential of a trusted platform that equalises opportunities for engagement, citizen participation, and access to development finance. In addition, the system's efficiency reduces costs and promotes the attractiveness of affiliated institutions to prospective investors. Furthermore, the leader can develop processes that last, entrenching their transformative policies.

Decentraland – a decentralised autonomous organisation

Recognising the transformative potential of blockchain systems, the following section examines the Decentraland DAO and discusses how blockchain technology might disrupt the understanding of leadership itself. The Decentraland platform embodies principles of consensus-based governance, which decentralises the leadership function.

Functionality

Blockchain systems can be configured to allow organisations to be governed through consensus algorithms by integrating collaborative decision-making and social governance into their architecture (Cerf, Matz, & Berg, 2020; Sai, Fitzgerald, Buckley, & Le Gear, 2020). The system can be set up to self-enforce the rules, incorporate autonomous automation procedures, and introduce a

mechanism for the community to vote on policy changes (Rozas, Tenorio-Fornés, Díaz-Molina, & Hassan, 2021). Thus, the technology provides a platform for the ownership of projects to be transferred to the system users themselves (Sandner & Bekemeier, 2019).

Decentraland is such a platform. It endeavours to be governed by a consensus algorithm, allowing its users to purchase, build, and monetise virtual reality applications. All interaction among the Decentraland users is coordinated through the blockchain, with each user controlling the environment and managing their 'land' (Decentraland, n.d.). As a virtual reality arena, it is supported by its own currency, called MANA. The arena allows visitors to explore virtual plots of land; each 'parcel' of land is 16 m² and can be purchased using MANA. The parcel is represented as a single pixel in Figure 5.4 (dark grey plots are recently purchased parcels¹ from the platform's marketplace, striped plots are communal plazas, large white areas are privately owned², themed communities that are not for sale, straight white lines are roads, and darker grey plots are unsold) (NFTPlazas, n.d.).

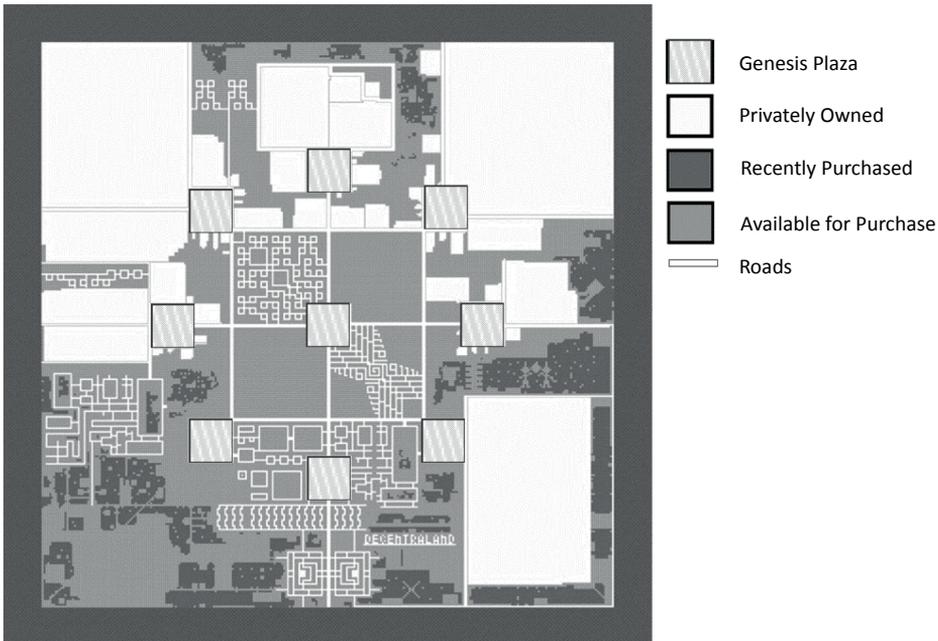
The parcel is a non-fungible token (NFT) as it is a unique space that cannot be replaced or reproduced. There are 90 000 parcels in Decentraland, with the developers owning common spaces such as plazas and roads (Republic Compound, 2021). As a virtual reality arena, Decentraland allows users to meet virtually, play games, collect art, and explore galleries, virtual nightclubs, and conference areas (Digital, 2021). The user enters the environment in a plaza (striped squares in Figure 5.4), which acts as a station platform. Parcels closer to Genesis Plaza (the central striped square) and other common areas have higher real estate value due to the higher traffic frequency (Republic Compound, 2021).

On entry into Decentraland, a user is represented by an avatar, which can be customised with wearables purchased in the Decentraland Marketplace. With users wishing to exhibit their unique identity within the space, the wearables market has grown substantially, increasing the price of such items. Like each parcel, a wearable (and every other item within the Decentraland arena) is an NFT. It is unique and can be purchased with MANA (Republic Compound, 2021).

¹ Privately owned plots: These are parcels of land that are already owned by individuals or entities. They can be used for various purposes, including building experiences, games, applications, or even dynamic 3D scenes. Owners have complete control over their parcel's appearance, and can create content using the Decentraland Builder or SDK. These plots are not available for sale via the platform's marketplace.

² Purchased plots: These refer to land parcels that were recently purchased on the marketplace. Once purchased, these plots become privately owned, and the new owners gain the same rights and abilities as those who already own land in Decentraland. The distinction lies mainly in the change of ownership from one party to another.

Figure 5.4 Decentraland map as of December 2020



With global travel restrictions in 2020, virtual socialising contributed to the rapid growth of Decentraland. Following MANA's launch on the CoinMarketCap digital currency exchange platform in 2017, it entered at a low price of US\$0.026. On 3 March 2021, the MANA token rose to US\$1.06, representing a 4,076 per cent increase in value (Maouchi, Charfeddine, & El Montasser, 2022).

Decentraland is used to interact with people worldwide, and is regularly used to host virtual events such as concerts and conferences, providing a new paradigm for collaboration and cooperation (Decentraland Conference Center, n.d.). The gaming industry is among the early adopters that have taken advantage of this platform to engage existing and potential customers, recognising the potential to inhabit virtual spaces and earn from virtual reality assets and services. It is ideal for marketing or for organisations to simulate real-life events on the virtual platform (Roy, 2021). Decentraland hosts several events daily, and in an advert for a charity auction available on their website in October 2021, the platform was used to raise awareness about racism concerns and to raise funds.

Artists and collectors have shown great interest in Decentraland's marketplace. The blockchain's smart contract allows product creators to earn royalties on all future sales of an NFT, resulting in rapid adoption in 2021 (Kay, 2021). The NFT is a tokenised asset that can be traded easily. It inspires innovative economic use cases which revolutionise the rules of ownership. Content creators can sell

directly to a market without the need for intermediaries like agents or lawyers (Bowden & Jones, 2021). The business model used to manage virtual land as an NFT could be adapted and applied in the physical world by mapping the boundaries of plots and integrating property title deeds into an NFT system (Kimani et al., 2020). Such processes could assist with land management and potentially dispense with paper-based operations. An initiative like this one would work well in developing countries that do not contend with existing legacy systems, and generally have poor record-keeping systems (Scher, 2018).

Decentralised good governance

As a DAO, collectively, Decentraland's users will need to determine how to resolve complex policy conflicts. At present, the platform has not ruled on issues of free speech, racism, or abuse, but the platform's designers believe the parcel owners will make such decisions by voting (Wilser, 2020). Currently, the Decentraland Foundation governs Decentraland, but it is expected that the foundation will eventually relinquish control to the users and allow the platform to form its own democratically elected government (Scher, 2018).

Decentraland perhaps represents an extraordinary experiment in microeconomic theory, the management of contracts, and the influence of innovation on an organisation. Blockchain smart contracts provide the basis for managing the administrative functions of entire organisations. A key question is whether token-holders will collectively pay due diligence to the intricacies of the policies they propose, and whether they will vote responsibly. Likewise, will their financial stake in the organisation ensure due diligence, or could their interests be swayed by a crowd mentality (Rennie & Potts, 2016)?

Furthermore, DAOs are potentially at risk of subversion by malicious interests who may collect tokens intending to overwhelm the voting system. While the system is founded on democratic ideals, the system is vulnerable to influence by purchased voting blocks, potentially making the system a plutocracy – in other words, a state governed by the wealthy (Nielsen, 2020; O'Leary, 2018). These are the concerns shared by investors and social scientists alike. There is a need for further research into coercion and vote-buying to mitigate these threats. Clearly, no organisation can be seen to have met its transformative potential until it can be fully democratised, including through decentralising the decision-making process.

Decentralised leadership

The disruptive effects of the blockchain and DAOs require leaders to be aware of these technologies and how they may affect their settings. However, a fully functioning DAO may dispense with a leadership position altogether (Fenwick

et al., 2018; Hsieh, 2018). This role may be replaced by a leadership council that conducts regular electronic referenda to collate the views of system users. This leadership model can be more inclusive, allowing organisations to abandon excessive hierarchies. Fenwick et al. (2018) argue that firms that abandon these hierarchies are more efficient and better positioned to leverage the collective skills of their employees.

In the organisational context, inclusivity may have a broader definition than simply referring to gender, ethnic, or racial diversity. In this context, it means leveraging the talents and perspectives of all employees by providing each with an equal voice when raising views and contributing to the decision-making process (Janakiraman, n.d.). These attributes are defining characteristics of the DAO's decentralised decision-making process. Although the DAO may promote democratic decision-making, future DAO rules may need to be constrained based on socially just principles, guarding against wealthy voting blocks that could redefine the identity and objectives of the DAO.

Offering marginalised communities a say in the decision-making process cultivates lasting and progressive social change and is a goal of the transformative leader (Shields, 2010). The DAO system provides the transformative leader with a mechanism to achieve such change, assuming that the leadership council, elected by the system users, represents the users' views. Ultimately, leaders committed to social change and uninterested in political power will work towards adopting processes that make their position redundant.

Conclusion

Blockchain systems are tools to achieve an expected goal. The system is no more transformative than electricity. Still, providing electricity to the disconnected is exceptionally empowering and transformative. When wielded by a leader with a vision of a socially just future, this technology has transformative potential. Blockchain systems can therefore be considered a catalytic agent of change. With increased adoption, blockchain systems will snowball, encouraging more investments and user confidence. Governments in Ethiopia, Switzerland, Lichtenstein, Estonia, Qatar, South Korea, and Singapore, to name a few, have identified use cases and are implementing blockchain-based solutions (Bagloe et al., 2021; Heo & Seo, 2021; Hochstein & Baydakova, 2021; Sandner & Bekemeier, 2019; Tok, Koç, & D'Alessandro, 2020).

Beyond the efficiencies and opportunities to decentralise the decision-making process referred to in this chapter, it is difficult to predict more elaborate use cases in the future. However, with state support, blockchain applications will become more mainstream. As a result, every sector may potentially be disrupted as people see the value of systematising their participation in the industry's business model or protecting their data (Tapscott, 2016).

There is a need for inspired leaders, across all sectors, who recognise the weaknesses of the current systems and the influence of power brokers to work towards developing inclusive and socially just systems. The failed development finance infrastructure calls for disruption, which can be initiated by transformative leaders interested in achieving sustainable social change. However, these leaders should not aspire to retain power, but instead develop mature systems that make the leadership role redundant. Ultimately, a transformative leader's policies are only temporary unless transformative systems support them. The ultimate expression of mature systems exists in the implementation of a DAO. At present, these systems are in their infancy, and the coordination of these systems may be vulnerable to coercion. Still, time and experience may allow the blockchain community to find solutions to these complex problems.

Blockchain systems may be ideal agents of socially just change, allowing complex networks to interact and exchange information. Such change requires vision and leaders capable of managing change. These leaders will need to advance digitisation within the developing world, overcome a hesitancy to tackle failing processes, and inspire their community to act (Bruce, 2020). Beyond simply empowering people, blockchain applications also provide the opportunity to formalise untapped informal sectors, something that is sorely needed in Africa. Blockchain systems dispel the risks of transacting with such communities, and could effectively strengthen global economies. However, such change requires visionary, transformative leadership, with a will to act.

#BlockchainTransformation

To be truly transformative, a leader must systematise transformative and socially just policies. The blockchain can be a transformative tool that systematises today's transformative policy for a secure and ethical tomorrow.

Questions for discussion

1. How could blockchain be used to ensure ethical practice?
2. What possibilities does blockchain have in your areas of involvement?
3. How could you make a start in using (or understanding) blockchain technologies?

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