

# A REVIEW ON BLOCKCHAIN GOVERNANCE

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## Abstract

Having both opportunities and threats, blockchain is inevitably a game-changer disruptive innovation in our time. It keeps penetrating a wide scope of areas including banking, insurance, supply chain, trade finance and many more. During this penetration, it both affects and is affected by traditional governance mechanisms. Like the evolution of traditional governance mechanisms from shareholder to stakeholder model, blockchain technology advances towards optimizing the reciprocal effects of on-chain and off-chain governance. Based on the sophisticated and technology-dominated papers in the literature, this study handles blockchain governance by focusing on both technical and economic aspects of the concept. By analyzing different features of blockchain governance, we come up with the view that technical and economic success seems to be the highest in a hybrid governance structure at this stage.

## 1. INTRODUCTION

Being the foundation of Bitcoin, blockchain can be regarded as a public ledger where all committed transactions are stored in a list of blocks.

Blockchain technology has key characteristics such as decentralization, immutability, better security, efficiency and anonymity (Atlam & Wills, 2019). With these properties, it can function as a cost-saving and efficiency-improving game-changer. There are different types of blockchains. Each blockchain is open-source software with a source code that determines the implementation of a protocol (Maddrey, 2018). The software protocol includes the details on how processes will be implemented, at what speed new blocks will be added, what will be the block size, difficulty, nonce, etc. (Hacker, 2019). There are several participants of a blockchain network that perform in different layers. Who are the participants of a blockchain network? What do we mean by governance of blockchain? Which type of blockchain can be an efficient one? These are the questions that this study tries to shed light on.

## 2. OVERVIEW OF BLOCKCHAIN SYSTEMS

Blockchain systems are categorized generally under three types: public blockchain, private blockchain and consortium blockchain. Public blockchain like Bitcoin and Ethereum have fully open and distributed networks. Here, anyone can be a participant in the network without permission and can join the consensus process anytime. Besides the advantages of security, openness and transparency, this type has some disadvantages such as high transaction cost, high energy consumption, low transaction speed and scalability (Cong & He, 2019). Private blockchain is suitable for closed systems where all nodes are fully trusted. In private blockchain, authorized nodes are responsible for the consensus process. Admin has the highest authority to control the system. Depending on the organizational structure of the company, reading transactions can be allowed by the admin. Multichain.com and Monax.io are examples that use private blockchain. Advantages of private blockchain can be stated as lower transaction cost, faster transaction speed and scalability. Major disadvantages are need for trust and centralized network structure (Khan et al., 2019). Consortium blockchains are almost a hybrid of public and private blockchains. In this type, a group of organizations or companies have control of the network. These organizations have complete authority to make necessary changes for the smoothness of the network (Sajana, Sindhu, & Sethumadhavan, 2018). The limited nodes in the consortium blockchain could validate the transactions so pre-selected nodes take control after consensus. By this means, the system does not allow a strange random entity to enter the chain. It has high scalability, more secrecy of transactions, medium transaction cost, medium transaction speed and partial decentralization. Consortium blockchains are broadly used in the banking sector (Viriyasitavat & Hoonsopon, 2019). R3 and Hyperledger Fabric are examples of this type.

### 3. BLOCKCHAIN GOVERNANCE

Innovation behind Bitcoin is extended by the launch of Ethereum in 2013. Ethereum is a blockchain technology for the execution of smart contracts which are small computer programs that contain business logic. In 2016, Ethereum blockchain was exposed to an attack when a hacker found vulnerability in the code of “The DAO” (Distributed Autonomous Organization) which was a smart contract built on top of the Ethereum blockchain. This attack led to the theft of Ether equivalent to \$50 million (Hacker, 2019). Core developers of Ethereum decided to proceed with a solution of returning the stolen Ether through a hard fork. Nevertheless, not all the participants of the network agree with this decision which led to the forking of Ethereum blockchain into two different versions. As codes are written by humans, several vulnerabilities may arise at any time. Besides, potential malicious codes might be embedded in the software that might be hidden from outside observers, as well (Werbach, 2018).

For improving efficiency in several business sectors, organisations develop their own applications on blockchain or join an existing blockchain network. To do this, they need to see trustworthy and realistic governance and maintenance where economic incentives between different stakeholders are aligned and changes to the blockchain are coordinated carefully (van Deventer, Brewster, & Everts, 2017). By reviewing thirty-seven studies, Liu et al. (2021) list a wide group of stakeholders that are involved in blockchain governance such as the project team, node operator, user, application provider, regulator, media, researcher and environmentalists. In such an environment, competing interests among stakeholders will not be surprising. For example, it is important to clarify whether voting on which transactions to include in a block is in line with democratic principles or whether this process inclines toward plutocracy when competitors acquire tokens to accumulate voting power as in the case of proof of stake (PoS) (De Filippi & McMullen, 2018). In brief, governance should be elaborated case by case where stakeholders are involved in differing networks.

### 4. LITERATURE REVIEW ON BLOCKCHAIN GOVERNANCE

Governance of blockchain differs from the existing governance mechanisms under Ce-Fi (Centralized Finance). As related concepts, “governance by blockchain” and “governance of blockchain” are clarified by Ølnes, Ubacht, and Janssen (2017). In the first, technology provides a supporting role to improve the existing governance process. In the latter, it identifies the development, adaptation and maintenance of the blockchain technology itself. De Filippi and McMullen (2018)

associate “governance by blockchain” with on-chain governance. Hereof, on-chain governance refers to a system of rules that are encoded directly into the underlying technological framework responsible for enforcing them. They link “governance of blockchain” to off-chain governance. It consists of all other types of rules that may affect the operation and future of these systems. On-chain governance rules are clearly codified and automatically enforced according to defined processes. But they are less adjustable to changing or unforeseen circumstances. Conversely, off-chain governance rules are more informal and enforced by the intervention of a third party. They are more unstructured and more complex to monitor. Off-chain governance comprises endogenous and exogenous rules (Reijers et al., 2018). Endogenous rules consist of rules coming from a reference community while exogenous rules originate from a third party (Colomo-Palacios, Sánchez-Gordón, & Arias-Aranda, 2020). Chao (2020) suggests a new type and summarized three methods of blockchain governance including on-chain, off-chain and hybrid governance. He proposes a centralized hybrid governance method of blockchain that brings the advantages of on-chain and off-chain governance to achieve efficient governance and to avoid other drawbacks of governance processes such as non-transparency, inefficiency and split-prone structure of blockchain. Li and Zhou (2021) attempt to find the interactions between on-chain and off-chain governance by employing the contingency theory. They emphasized that the advancement of technology and the occurrence of novel situations in governance requires a flexible and adaptable understanding of not only the infrastructure but also the social environment and its implications. They come up with consortium governance that combines both methods to create a reciprocal structure.

## 5. CASE STUDY: TRADEFINEX BY XDC NETWORK

XDC Network is a hybrid blockchain that has developed by XinFin, a Singaporean company. TradeFinex is a decentralized platform that runs on XDC Network operating in the global trade finance market. XDC Network aims to reduce friction among the complex group of actors in trade finance and expands access to trade financing for small and medium-sized enterprises (SMEs) and creates yield opportunities for investors (<https://www.blockdata.tech/>).

Standardized documents and agreements are moved to smart contracts so transactions are aimed to be settled faster. It takes advantage of private blockchain in terms of data privacy and public blockchain in the transaction verification on a shared public ledger (<https://xinfin.org/>). As of 2020, the global trade finance gap is estimated at around \$1.7 trillion which is 9.7 percent of global trade. Hybrid blockchain has the potential to fit this gap.

## 6. CONCLUDING REMARKS AND FUTURE WORK

In this paper, we review blockchain governance by exploring its types and its features. Each type of blockchain has its own advantages and disadvantages. Although blockchains have promising technical features they are not exempt from attacks. Besides, there are several stakeholders that pursue their own interests depending on the type of blockchain. In such environment governance of blockchain becomes crucial. In order to optimize benefits from this technology, on-chain and off-chain governance should be considered together. Also, exogenous and endogenous rules should be incorporated into a hybrid approach. The success of blockchain might create value both at the micro and macro levels. Finally, the success of blockchain might affect the market shares of De-Fi and Ce-Fi in the coming years. In our future work, we'll focus more on whitepapers and use cases from a governance perspective.

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