A Proposed Framework for the Governance of Blockchain Technology

Justin Zhang
University of North Florida, justin.zhang@unf.edu

Wu He
Old Dominion University, whe@odu.edu

Sachin Shetty
Old dominion University, sshetty@odu.edu

Yuming He
Old Dominion University, yhe004@odu.edu

Xin Tian
Kennesaw State University, xtian2@kennesaw.edu

A Proposed Framework for the Governance of Blockchain Technology

Emergent Research Forum (ERF)

Justin Zhang
University of North Florida
justin.zhang@unf.edu

Wu He
Old Dominion University
whe@odu.edu

Sachin Shetty
Old Dominion University
sshetty@odu.edu

Yuming He
Old Dominion University
Yhe004@odu.edu

Xin Tian
Kennesaw State University
xtian2@kennesaw.edu

Abstract

Despite rapid growth in blockchains, there was limited discussion about non-technical and technical factors on the governance of blockchain in organizations. This paper contributes to the literature by proposing a framework of factors affecting the adoption, governance, and scale-up of blockchain technologies. The factors we identified can be either drivers or obstacles to further blockchain development, depending on the circumstances. Our proposed framework can help researchers identify potential research gaps or concerns on the adoption of blockchain technology as well as its implementation, governance, and assessment in organization.

Keywords

Blockchain Governance, adoption, regulation, governance framework.

Introduction

With the rapid growth of the Internet and information technology, blockchain as the technology behind bitcoins is increasingly adopted and discussed in recent years. Blockchain is defined as "a comprehensive information technology with tiered technical levels and multiple classes of applications" (Swan, 2015). Blockchain can be used to reduce the possibility of fake or false records and can secure the digital records on all the computers in the Blockchain network. Prior research concluded that blockchain technology has great potential to offer some significant advantages to the business (Lacity, 2018; Angelis and da Silva, 2019). However, research about its applications and governance is inadequate with limited use cases (Janssen et al., 2020). The integration of blockchain with business still faces some obstacles. The nascent technology may not bring business the best return of investment (ROI) in the short time since the governance mechanism, regulation and industry-standards were not readily available (Angelis and da Silva, 2019; Janssen et al., 2020). To successfully adopt an emerging technology in business sectors, businesses need to consider various factors such as corporate norms and culture, regulation and legislation, governance, market factors, and technical factors (Janssen et al., 2020). Since blockchains have received a lot of attention, many enterprises and organizations have a desire to develop business solutions through blockchain-based applications to gain competitive advantages in the market (Chong et al., 2019). As enterprises have different data-driven needs for their businesses, effective use of the blockchain technology needs to have adequate consideration regarding the feasibility and viability before any blockchain adoption (Angelis and da Silva, 2019). These considerations raise the IT governance issues concerning what decisions should be made in advance to assure effective management and application of blockchain technology, what roles different stakeholders play in decision-making, how rules and decisions will be made to resolve conflicts, increase trust, reach consensus and audited (Weill and Ross, 2004). It is noted that the governance mechanism, regulation, industrial standards, and legislations inevitably

influence blockchain adoption in organizations (Lacity, 2018; Janssen et al., 2020). Sedgwick (2018) further pointed out that governance is the greatest problem for blockchains to solve. Without an efficient governance mechanism of achieving consensus among participants in blockchains, blockchains are difficult to scale up or be expanded in the business process.

A Proposed blockchain governance framework

Currently, most blockchain research is centered on technology development, infrastructure, or adoption issues. We contacted a national blockchain consortium to conduct our case study research on the governance issue of blockchain. Two leading case organizations, one from the healthcare industry and another from the energy industry, were deliberately selected for our study for their active role and reputation in the consortium and practical experience in blockchain governance. Both organizations have been implementing blockchain-related projects over the past three years. After contacting the two organizations, their leaders agreed to allow us to interview their blockchain managers and developers who shared their blockchain development and governance experience with us. Semi-structured interviews were the primary method of gathering evidence since it provides rich detail and allows researchers to probe to identify new dimensions and follow new lines of inquiry for their research (Yin, 2017). An initial list of 19 interview questions was developed before the interviews. The interviews involved seven blockchain managers and developers. We limited the number of cases to two because it allows us to spend more time and effort in increasing the depth of analysis for each case. In this ERF paper, we will focus on introducing a proposed blockchain governance framework (see Figure 1), which was developed based on the elements and factors synthesized from the literature and our case studies, Blockchain itself can be used as a governance instrument, but it also needs to be governed (Ølnes, Ubachtand and Janssen, 2017). Blockchain governance can be classified into internal and external governance at different levels: protocol, blockchain, and organizational levels for internal governance and community, media, and social levels for external governance (Hsieh, Vergneand and Wang, 2017). Our blockchain governance framework focuses on the organizational level that includes three sets of factors corresponding to the three stages of blockchain implementation timeline: pre-adoption, implementation, and post-adoption. The post-adoption factors drive organizational blockchain governance to collaborate with partners to establish consortium (community) blockchain governance.
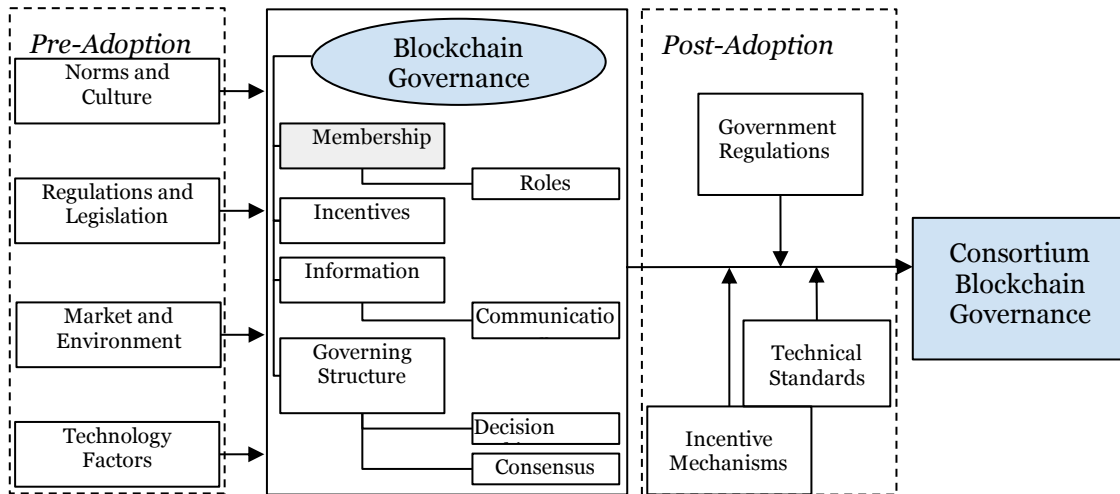

Figure 1: Blockchain governance framework

Pre-Adoption Factors

The primary factors influencing the governance of blockchain technology to be implemented in organizations include institutional norms and culture, regulations and legislation, market and environment, and technology factors.

Norms and culture

Norms and culture have been identified as one of the crucial factors influencing blockchain adoption in an organization (Janssen et al., 2020), which subsequently affects its blockchain governance. Existing organizational culture may resist the adoption of new technology as stakeholders, in general, do not understand the features and use cases of blockchain technology as well as the values and benefits that it can bring to organizations (Clohessy and Acton, 2019). In addition, the current organizational infrastructures may not be compatible with blockchain technology and support its governing mechanisms (Upadhyay, 2020). Therefore, blockchain technology should be integrated into the existing organizational ecosystem based on the business vision, mission, and strategic goals while taking into account corresponding employees' responses (Marsal-Llacuna, 2018).

Regulations and legislature

From the economic perspective, blockchain can be considered as a stronger competitor of other economic entities, including markets, networks, companies, and governments, due to its potential to be used as a new institutional technology of governance (Davidson, De Filippiand and Potts,2016). The governance mechanism of a blockchain ensures that its stakeholders can collaboratively engage in decision-making based on their mutual trust and the agreed rules, which helps reduce illegal activities and cybercrimes. To ensure the proper governance of blockchains, regulations, policies, guidelines, and the corresponding enforcement are necessary and indispensable (Yeoh, 2017) as regulations and legislation help monitor the status of blockchain implementation in different industries to assure their compliance (Crosby et al., 2016).

Market and environment

Organizations operate in specific markets, so their surrounding environments are the external factors critically affecting the adoption, management, and governance of new technologies (Awa, Ojiaboand and Orokor, 2017). The willingness to implement blockchain technology varies across various organizations, regions, and countries due to their differences in the perceived benefits (Yoo et al., 2019) and their levels of readiness (Chang, Chenand and Wu, 2019). Establishing and enforcing proper governance of blockchains will help reduce the uncertainties and mitigate the risks on the market that may result from market manipulation, unfair competition, and unethical practices (Janssen et al., 2020).

Technology factors

As blockchain is still in its infancy, it is susceptible to technical errors and unreliability. Other examples of the technical challenges of blockchain technology include data integrity and security, scalability, and transaction processing time. As a result, blockchain lacks universally accepted technical standards to ensure its interoperability and the data's consistent formats across different blockchain platforms (Lacity, 2018). The perceived immaturity of blockchain technology creates a barrier for companies to implement and govern blockchains (Deshpande et al., 2017).

Blockchain Governance Elements

The governance of blockchain technology in organizations has four major elements: membership, incentives, information, and governing structure.

Membership

The membership element specifies all the aspects related to members in blockchain governance, for instance, denying or approving the request to participate in a blockchain network (Ziolkowski et al., 2019), defining the roles and rights of participants (Ølnes, Ubachtand and Janssen, 2017), and developing rules and processes of managing participants (Reijers et al., 2018).

Incentives

This element captures the factors and ways to motivate the participants to involve in the activities based on the roles they have acquired or have been assigned. Different governance models will require different incentive mechanisms to be designed and offered to the stakeholders of a blockchain to achieve the technical consensus, to facilitate platform design, development, and maintenance, and to encourage the participation of users as well as token holders (Beck, Müller-Blochand and King, 2018).

Information

The information element defines the ways to streamline the data and information transmission among stakeholders of a blockchain. Emerging communication tools and protocols are increasingly applied in coordinating and tracking the data and information dissemination in blockchain systems to facilitate the open data and information exchange among members and their working.

Governing structures

The element of governing structures determines the collective decision-making mechanisms to reach consensus in blockchain governance (Beck, Müller-Blochand and King, 2018). Specifically, this element designates ways for decisions to be made, voted, agreed, and monitored among all stakeholders of a blockchain (Filippi and Loveluck, 2016). Correspondingly, the specific aspects of governing structures include establishing proposals, developing voting mechanisms, releasing decision results, solving potential conflicts (Hsieh, Vergneand and Wang, 2017).

Post-Adoption Factors

In the post-adoption stage, organizations are looking for ways to strengthen the performance of blockchain governance to further exploit the benefits and minimize the risks. The following factors affect the further development of blockchain governance in organizations: government regulations, technical standards, and incentive mechanisms, which determine how organizations collaborate with their business partners to establish consortium blockchain governance.

Government regulations

Governments are responsible for the continued innovation of blockchain technology. Accommodating a flexible yet orderly environment through developing and enforcing regulations can facilitate the adoption and development of blockchains in organizations. In particular, government regulations should improve legal certainty, encourage experimentations, increase data interoperability, and ensure regulatory consistency across sectors.

Technical standards

A blockchain consortium can be either business- or technology-focused. The former type tends to develop blockchain solutions for a specific business issue, whereas the latter focuses on developing and standardizing blockchain platforms to be used by members in the consortium. The platform standardization based on the accepted technical standards by consortium participants facilitates the integration of governance functions across different levels to promote market penetration (Zavolokina et al., 2020).

Incentive mechanisms

It is crucial to provide incentives for blockchain participants to maintain the short-term and long-term interests of those contributors. Based on the particular governing structure and the corresponding decision-making mechanisms adopted in a blockchain, it is a great challenge to ensure all stakeholders' interests are aligned in a blockchain consortium and motivate them to actively participate in the blockchain ecosystem to derive their values and benefits (Boudreau and Hagiu, 2009).

Conclusion

The governance of blockchain is still evolving along with the evolving use and development of blockchain technologies. Research into the development of appropriate governance frameworks for industries and community alliance requires a comprehensive interdisciplinary effort to address concerns including liability of the respective parties, rules to approve/reject authorized participants, correction mechanisms, applicable law in case of disputes, and so on (Janssen et al., 2020). The proposed framework is conceptual, and it has not been empirically tested. Future research needs to test the proposed framework and see how well it works in different contexts. This paper proposes some factors that are related to the governance of blockchain; future research is still needed to refine and test the impact of those factors on the governance of blockchain-based on empirical data and further expand the framework at scale.

REFERENCES

Angelis, J.and da Silva, E. R. (2019). "Blockchain adoption: A value driver perspective," *Business Horizons* (62:3), 307–314.

Awa, H. O., Ojiabo, O. U.and Orokor, L. E. (2017). "Integrated technology-organization-environment (TOE) taxonomies for technology adoption," *Journal of Enterprise Information Management*, (30:6), 893-921.

Beck, R., Müller-Bloch, C.and King, J. L. (2018). "Governance in the blockchain economy: A framework and research agenda," *Journal of the Association for Information Systems* (19:10), 1.

Boudreau, K. J.and Hagiu, A. (2009). "Platform rules: Multi-sided platforms as regulators," *Platforms, markets and innovation*, 1, 163-191.

Chong, A. Y. L., Lim, E. T., Hua, X., Zheng, S.and Tan, C. W. (2019). B "usiness on chain: A comparative case study of five blockchain-inspired business models," *Journal of the Association for Information Systems* (20:9), 9.

Clohessy, T.and Acton, T. (2019). "Investigating the influence of organizational factors on blockchain adoption," *Industrial Management and Data Systems*.

Crosby, M., Pattanayak, P., Verma, S.and Kalyanaraman, V. (2016). "Blockchain technology:Beyond bitcoin," *Applied Innovation*, 2, 6–10.

Davidson, S., De Filippi, P.and Potts, J. (2016). "Disrupting governance: The new institutional economics of distributed ledger technology, " *Available at SSRN 2811995*.

Deshpande, A., Stewart, K., Lepetit, L.and Gunashekar, S. (2017). "Distributed Ledger Technologies/Blockchain: Challenges, opportunities and the prospects for standards," *Overview report The British Standards Institution (BSI)*, *40*, 40.

Filippi, P. D.and Loveluck, B. (2016). "The invisible politics of Bitcoin: Governance crisis of a decentralised infrastructure," *Internet Policy Review* (5:3), 1–28.

Hsieh, Y. Y., Vergne, J. P. J.and Wang, S. (2017). "The internal and external governance of blockchain-based organizations: Evidence from cryptocurrencies," In *Bitcoin and Beyond (Open Access)* (pp. 48-68). Routledge.

Janssen, M., Weerakkody, V., Ismagilova, E., Sivarajah, U.and Irani, Z. (2020). "A framework for analysing blockchain technology adoption: Integrating institutional, market and technical factors," *International Journal of Information Management*, *50*, 302–309.

Lacity, M. C. (2018). "Addressing key challenges to making enterprise blockchain applications a reality," *MIS Quarterly Executive* (17:3), 201–222.

Marsal-Llacuna, M. L. (2018). "Future living framework: Is blockchain the next enablingnetwork?" *Technological Forecasting and Social Change*, *128*, 226–234.

Ølnes, S., Ubacht, J.and Janssen, M. (2017). "Blockchain in government: Benefits and implications of distributed ledger technology for information sharing," *Government Information Quarterly* (*34*:3), 355–364.

Reijers, W., Wuisman, I., Mannan, M., De Filippi, P., Wray, C., Rae-Looi, V., ... and Orgad, L. (2018). "Now the code runs itself: On-chain and off-chain governance of blockchain technologies," *Topoi*.

Sedgwick, K. (2018). *Why Governance is the Greatest Problem for Blockchains To Solve*. Available at https://news.bitcoin.com/why-governance-is-the-greatest-problem-that-blockchains-must-solve/

Swan, M. (2015). *Blockchain: Blueprint for a new economy*. O'Reilly Media, Inc.

Upadhyay, N. (2020). "Demystifying blockchain: A critical analysis of challenges, applications and opportunities," *International Journal of Information Management*, *54*, 102120.

Weill, P.and Ross, J. W. (2004). "IT governance: How top performers manage IT decision rights for superior results," *Harvard Business Press*.

Yeoh, P. (2017). "Regulatory issues in blockchain technology," *Journal of Financial Regulation and Compliance* (*25*:2), 196-208.

Yin, R. K. (2017). Case study research and applications: Design and methods. Sage publications.

Yoo, K., Bae, K., Park, E.and Yang, T. (2019). "Understanding the diffusion and adoption of Bitcoin transaction services: The integrated approach," *Telematics and Informatics*, 101302.

Zavolokina, L., Ziolkowski, R., Bauer, I.and Schwabe, G. (2020). "Management, Governance and Value Creation in a Blockchain Consortium," *MIS Quarterly Executive* (*19*:1), 1-17.

Zhou, Q., Huang, H., Zheng, Z.and Bian, J. (2020). "Solutions to scalability of blockchain: A survey," *IEEE Access*, *8*, 16440-16455.