# Research on the Improvement of Village Governance Efficiency Based on Blockchain Technology

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**Abstract**

It is known that China is in the critical "triple overlap" period of the history of social transformation, the fourth industrial revolution, and new globalization. As a disruptive technology, blockchain has solved the "trust construction" and causing a revolution in the social governance model. The article uses blockchain technology as a means to solve the problems of the existing rural governance structure and governance capability system, analyzes the mechanism and implementation bottleneck of blockchain technology, and proposes countermeasures and policy suggestions to improve the effectiveness of village governance, such as the distributed characteristics and the traceable characteristics of the blockchain can be used to build a multi-level response and personalized service integration and a self-organized operation mechanism in rural areas to promote governance responsibility mechanisms and reduce the risk of information fragmentation, data uncertainty, and governance control risks, etc. These policies and suggestions provide a good theoretical basis and method guidance for China's rural revitalization strategy.

**Keywords:** blockchain technology, village governance efficiency, self-organized operation mechanism, China's rural revitalization strategy

## 1. Introduction

China is in a critical "triple overlap" period of the history of social transformation, the fourth industrial revolution, and new globalization. The report of the "19th National Congress" puts forward a new development concept of "implementing the strategy of rural revitalization". It is a major strategic change in development (Yang, 2020). Judging from the current status of rural development in China, on the one hand, the development of rural areas in China has achieved extraordinary achievements. However, for a considerable period, the 230 million small farmers who are mainly family-run businesses will still be an important force in China's agricultural production. The strategy about rural revitalization is not a strategy that can be realized in one or two five-year plans, but a long-term strategy and a comprehensive grand strategy.

On the other hand, there are still "the lack of enthusiasm for villagers to participate in rural governance", "the structural form of village public power presents problems such as the tendency of centralization and administration" and "the scientific and effectiveness of rural governance decision-making needs to be improved". In the era of big data, there are also "insufficient deep mining of big data" and "data cannot be shared and Problems such as lack of basic data", "fragmented data and insufficient precision" and so on. As a disruptive technology, blockchain solves the problems of "trust construction", "data silos" and "data confirmation" faced by traditional Internet technologies from the bottom of the technology, thus reshaping the social governance structure in the era of big data, causing a revolution of the social governance model. This article will take the national rural revitalization strategy as a guide and use blockchain technology as a means to study the improvement of the effectiveness of my country's existing rural governance structure and governance capacity system.

## 2. Research Overview

New technologies trigger new business formats and then raise new governance needs, which has been the focus and difficulty of academics in recent years. We know that traditional solutions use third-party guarantees to solve

the distrust problem caused by information asymmetry among rational individuals. However, third-party guarantees will not only generate transaction costs but also bring privacy and security issues. To make up for this deficiency, in 2008, Satoshi Nakamoto (2015) proposed to use the "distributed ledger" based blockchain to solve the trust problem on the Internet. Since then, the theoretical and practical industries have ignited the spark of studying blockchain applications, and the blockchain has become a new hotspot after the Internet, big data, cloud computing, artificial intelligence. Alvin (2016) believes that blockchain is a combination of technologies, which includes at least: TCP/IP model (Internet model) point-to-point transmission protocol, decentralized data storage, distributed ledger, and smart contracts. Bacher and Schüritz (2020) believe that blockchain technology has the two most important characteristics of trust and decentralization. At the same time, the transparent nature of blockchain technology can also ensure that data cannot be modified. Thereby creating a trusted working ecology, protecting the privacy of all parties from being infringed, and providing reliable settings that satisfy multiple functions, blockchain is a trust machine, because the effective operation of its technical framework only depends on the joint operation of the nodes on the network, without the need to resort to various centralized organizations or institutions. In terms of the application of blockchain, Melanie (2016) believes that the "decentralized" feature of blockchain makes the credit consensus of the participating groups based on technical algorithms so that its effectiveness in social governance is obvious. Lawrence (2009) believes that the existing operating modes in the fields of currency, medical, financial, education, and social governance have begun to undergo significant changes with the increasing maturity of blockchain technology and the expansion of its use. Kishigami (2015) and others designed the electronic content distribution system based on the blockchain and demonstrated the concept prototype. Azaria et al. (2016) built a decentralized electronic medical record management system based on blockchain technology and designed the system to improve its adaptability and effectiveness. Zyskind and Nathan (2015) used the protocol of the blockchain to convert into an automatic access control manager and constructed a set of the privacy-protected decentralized personal data management system, which enables individual users to own and control the data. Swan (2015) believes that blockchain technology can make government services more personalized and make public records permanently stored in a more efficient, such as various passports, land transaction information, contracts, and other government files,the blockchain itself is commercial, and may also bring behind-the-scenes transactions and damage the public interest, blockchain is not only a new information and communication technology, but also a new governance model, which competes with companies, markets, networks, relationship contracts, and governments. Swan (2015) believes that from the perspective of the development of blockchain, it can be divided into three stages: digital currency, smart contract, and social governance. Atzorim (2017) believe that in the open-source platforms and services of blockchain decentralization, the distributed consensus mechanism replaces centralization, compulsion, and hierarchy, blockchain technology may weaken the ability to exist centralized institutions to shape and control the activities of different groups, and at the same time strengthen the development of decentralized autonomous organizations, which is conducive to promoting more democracy. Kiviat (2015) believes that the blockchain is huge, but the realization of the huge potential must be based on the implementation of differential supervision of blockchain participants and formulators.

In China, the China Blockchain Technology and Industry Development Forum defines blockchain technology as a brand-new distributed infrastructure and computing paradigm and believes that blockchain is a new technology that enhances the efficiency of collaboration between organizations. Its development will comprehensively improve the efficiency of national governance and comprehensively innovate public service and government governance models. Chao (2020) believes that the blockchain continues and innovates the Internet disintermediation, decentralization, and affirmative communication design concepts. At the same time, it is likely to redefine the rules of many industries such as healthcare and finance and create new value in the industry. Yin (2018) believes that blockchain is a digital technology with the main technical characteristics of "high autonomy", "sharing and opening" and "trust self-establishment" under the traction of the need to build a digital society and improve the efficiency of collaboration between organizations. Hou and Li (2019) believe that the use of blockchain is no longer limited to the fields of finance and currency, and has so far expanded to the field of social governance, such as the current legal order and technology supervision. Luo and Cai (2019) believe that the decentralized and distrusted features of blockchain technology will change the subject relationship of network social governance and reshape a more democratic network society, and further evolve the Internet of Information into a value-creating Internet, shaping a more valuable network society, and its open and transparent features can curb online anomie behavior and shape a more orderly network society. Zeng and Wan (2019) built a resource management system based on the sovereign blockchain network and realized the effective management of public safety data by using the characteristics of public chain transparency, the efficient response of the alliance chain, and privacy security protection of private chain. Tu et al. (2019) constructed a predictive

model based on the idea of a private blockchain, and proposed a guarantee mechanism to solve the problem of interoperability and security of predictive modeling information. According to the risk and growth characteristics of blockchain technology, Fan (2019) proposed two protocol paths (linear and non-linear) and believed that the combined protocol path is conducive to the development and innovation of blockchain technology. Jiang and Jia (2019) believe that a multi-layered collaboration and multi-headed public responsibility mechanism can be formed through the blockchain technology. Yin (2020) believes that existing studies have noted the hierarchy of blockchain governance, but in-depth analysis of its technical principles and mechanism design is not comprehensive enough. Despite the many challenges facing the underlying blockchain technology, blockchain industry applications, and organizational governance innovation, the current research on the blockchain does provide a new perspective for the study of rural governance.

## 3 Research Objects and Research Methods

### 3.1 Research Objects and Samples

At the level of rural development strategy, the country divides villages into agglomeration and upgrading villages, relocation and relocation villages, special protection villages, and suburban integration villages according to the development status, resource endowment, location conditions, development rules, and evolution trends of different villages. This paper mainly studies the agglomeration and promotion of villages. These villages belong to the larger central villages under the urban-rural dual system, accounting for most of the rural types. They are the focus of rural revitalization and have a greater value for promotion. In the research sample, this article surveyed 135 agglomerated villages in Hunan's Xiangnan region (Hengyang, Chenzhou, and Shaoyang).

### 3.2 Research Methods

In the selection of research methods, this article mainly uses the following two research methods:

3.2.1 Combination of Qualitative Research and New Technology Research

There is a strong theoretical fit between the practice of rural social governance and this combination method. The research team can better understand and explain the improvement of village governance throughinteractive research with the management department, villagers, and other stakeholders of village promotion and village gathering; and through the application of blockchain technology in rural governance, the scientific nature of rural governance can be improved.

3.2.2 The Combination of Main Structure Modeling and Social Network Embedding Analysis

In the "Rural Governance Blockchain" structural model, this paper uses the main structure modeling method and social network embedding analysis method. Social network embedding analysis is one of the core issues of social computing. Its basic idea is to embed a blockchain in the existing social network, redesign the rural governance network according to the blockchain technology, and improve the efficiency of rural governance.

## 4. Governance Mechanism of Aggregation-Based Villages Based on Blockchain

From the analysis of the model mechanism, the "three-layer structure" is relatively independent and interrelated. First, due to the existence of "data silos", especially due to the existence of competition and interests among stakeholders such as bureaucracy, it is difficult to achieve data integration at the overall level. The emergence of blockchain technology has solved the problem of "data silos" and triggered the transformation of internal government processes from "strongly centralized" to "decentralized or weakly centralized"; Second, the distributed network structure of the blockchain, On the one hand, by empowering society, it encourages diversified subjects such as informal organizations, netizens, and various virtual communities to change from passive and bystanders in public affairs and policy agendas to active agents and participants. By empowering the government with the blockchain, the decision-making and behavior of government departments can be more effectively supervised and restricted; Third, the blockchain participates in each has designed the smart contract, the computer program will automatically execute the contract, forming a new rule of "code is law", and its "no-repentance, non-tampering" feature has innovated social governance supervision tools and enhanced social governance supervision capabilities.

## 5. "Bottleneck" of Aggregation and Promotion Rural Governance Based on Blockchain

The agglomeration and promotion villages are relatively relocated and merged, characteristic protection villages, and suburban integration villages.

The moral qualities of blockchain organizers and participants and their technical defects determine the risks of blockchain in five aspects: First, the relative lack of responsibility: Due to the asymmetric encryption technology

of the blockchain, the definition of power and responsibility between the stakeholders of the blockchain behavior (government, non-profit organizations, enterprises, village committees, villagers, etc.) is ambiguous, which can easily lead to the "tragedy of the commons"; Second, the fault tolerance algorithm: Because data collection is not based on its correctness, but data collection is performed in the game of computing power and number of people, this leads to an inaccurate distinction between "should" and "reasonable", "right" and "wrong" in data processing; Third, privacy protection is incomplete: The continuous display and dissemination of blockchain accounting rights information across the entire rural network can easily lead to privacy leakage, thereby providing targets and opportunities for lawbreakers to disrupt rural governance; Fourth, non-transparency leads to standards that may be out of standard: In the rural governance blockchain, the intrinsic motivation of the participants has the characteristics of ignorance and ambiguity. These characteristics cause the blockchain to be out of standard with the consensus mechanism and the standards of credit establishment; Fifth, non-permeability: All data in the blockchain is unmodifiable, non-negotiable, and irreversible. In addition, the current development of blockchain technology itself is immature, and its ecological problems such as free-riding, confidentiality, low efficiency, and high energy consumption are more challenging, and the soil with mature technology (risk investment, community network construction, application Drive, etc.) are still immature.

At the same time, under the blockchain technology system, it is easy to cause rural villages to take economic interests as the only goal in distribution, it is still facing challenges to prevent the occurrence of "reward sharing induction" and "vote indifference" in rural governance.

## 6. Suggestions for Improving the Efficiency of Rural Governance Based on Blockchain Technology

*6.1 Transforming the Concept of Rural Governance, Shaping the Governance Ecology of the Rural Blockchain, and Improving the Effectiveness of Rural Governance*

Blockchain technology has produced three changes in rural governance:

6.1.1 The Transformation of Governance Means from Control to Autonomy

Because of the distributed nature of the blockchain, it will weaken the authoritative values such as hierarchy, control, and closure in the existing rural society, and strengthen the autonomy values such as equality, collaboration, openness, and sharing.

6.1.2 The Transformation of Governance Goals from Efficiency to Fairness

The traditional Internet achieves its fundamental goals through the high efficiency of information intermediaries to achieve social and economic benefits, while the blockchain is to create value, protect transactions, and ensure the legitimacy, fairness, privacy, and security of transactions. Ultimately;

6.1.3 The Transformation of Governance Path from Material to Relationship

Blockchain technology allows the openness of rural organizations to replace the channels, products, and other elements of rural organizations, causing a further change in the value sequence of organizational success, and the source of value is transformed from "possessed" and "closed", "Structure" to "link" and "network relationship". The changes in the above three aspects require that the governance of social organizations must simultaneously change the governance concept.

In terms of blockchain governance ecology, China currently lacks an ecological environment for the growth of blockchain core technologies. For example, the blockchain talent training mechanism is not perfect, the blockchain governance legislation is also relatively lacking. Therefore, shaping the "growth structure and adaptive evolution" of the blockchain governance ecological environment is of great significance for improving the effectiveness of blockchain governance.

*6.2 Use the Decentralized Features of Blockchain to Build a New Government-Led Multi-agent Participation Governance Model to Improve the Efficiency of Rural Governance Modernization*

The first, Use the "Internet + rural governance blockchain" to implement the "cadre + rural residents" "one-to-many" management service plan: "cadre representatives" enter Rural residents' virtual community (QQ group, etc.), to understand everyone's ideological status and demand status;

The second, Use the "Internet + political blockchain" to vote on important matters in the community through online deliberations to attract diverse social entities Participate in community governance and promote the establishment of social democratic consultation mechanisms;

The third , Use the "Internet + Community Public Welfare Blockchain" to publish information on community public welfare undertakings, and use incentives to attract widespread public participation to form a sustainable community public welfare activity Mode;

Fourth, Use "Internet + Community Cultural Blockchain" to activate the community cultural atmosphere, increase community cohesion, etc.

*6.3 Use the Traceability Features of the Blockchain to Build a Self-Organizing Operation Mechanism for Rural Governance to Improve the Effectiveness of Rural Governance*

Rural government departments, non-profit organizations, enterprises, and village committees and individuals, through the construction of rural blockchain big data platforms, and with the help of third-party specialized technical institutions, record and verify their respective data in the blockchain to get through "Data silos", straighten out "data rights". Compared with the past, these data that cannot be deleted or changed are not only safe (because anyone who accesses or adds information can be seen by everyone), but also can protect privacy (personal marking can be eliminated by using a unified information algorithm), and It can facilitate the tracking and blame of data use violations by various subjects because the administrative and judicial can trace the traces of perfect data records on the blockchain and make a ruling. In this way, without the implementation of centralized, top-down monitoring, rural governance can use blockchain technology to combine with blockchain data service platforms and formeffective rural governance self-organized operating mechanism.

*6.4 Use the Distributed Characteristics of the Blockchain to Build a Rural Multi-level Response and Personalized Service Integration to Promote Governance Responsibility Mechanisms and Improve Rural Governance Efficiency*

The distributed characteristics of the blockchain have increasingly transformed the "centralized social structure" (strong structure, strong standards, and strong control) into a "multi-central social structure" (weak control, flattening, and network), and promoted a social governance structure to change more equalization, diversification, and transparency, and to achieve the purpose of public services to meet the personalized needs of the public, promote the transformation of public service models from "government supply-centric" to "public demand-centric". With the point-to-point panoramic features realized by blockchain technology, when we design a rural blockchain governance framework, a layered design model can be formed between planned public decision-making in rural areas and specific public service measures for different groups of villages. The overall level is divided into sub-chain systems of rural politics, economy, science and technology, ecology, etc., we can build a rural multi-level response and personalized service integration to promote governance responsibility mechanisms, and to ensure that the multi-level response system of government policy design is macro and personalized service micro. The current public service mode is the "preset standard-application-approval" mode, which requires a large amount of material to review. For this problem, blockchain technology can be used to trace data information characteristics and true openness, on the one hand, it can realize the customization of public services, reduce government supervision investment, and improve the quality and efficiency of rural public services. On the other hand, blockchain can reduce the intermediate level of administrative agencies from the vertical hierarchical relationship. In addition, it is also conducive to achieving organizational transparency, flexibility, and flattening, and it has also greatly contributed to improving the government's operational performance and ability to respond to public demands.

## 7. Conclusion

We know that China is in the critical "triple overlap" period of the history of social transformation, the fourth industrial revolution, and new globalization. As a disruptive technology, blockchain has solved the "trust construction" and causing a revolution in the social governance model. Transforming the concept of rural governance, we can use the distributed characteristics of the blockchain and build a multi-level response and personalized service integration in rural areas to promote governance responsibility mechanisms and promote all major rural decisions to be in government departments, villagers, villager groups and other social circles under the panoramic supervision, a brand-new multi-layer interactive cooperation rural governance system was formed. We can use the traceable characteristics of blockchain to build a self-organized operation mechanism for rural governance and reduce the risk of information fragmentation, data uncertainty, and governance control risks brought by the rise of big data to rural governance, and effectively protect the large-scale based on comprehensive openness and transparency.

**Acknowledgements**

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