Research on Innovation Path of Social Governance Based on Block Chain

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Abstract

The features of Block Chain, such as decentralization, non-tampering of data, and security of information transmission path, are highly consistent with the concept of social governance, which improves the technical framework of social governance innovation and realizes the creative exploration of Block Chain. From the perspective of innovation path, this paper analyzes that Block Chain shows great potential in promoting innovation of governance technology, optimization of governance structure, intellectualization of governance model and legalization of governance mechanism. However, in the process of combining, the challenges brought by Block Chain to the existing governance system and legal system should also be fully considered. Therefore, while carrying out social governance innovation, the government should play a guiding and supervising role to provide necessary guarantee for the improvement of social governance system.

Keywords: social governance, Block Chain, innovation path

1. Introduction

In recent years, blockchain technology has increasingly entered the public eye, offering solutions to problems such as data silos, information tamper-resistance, and the establishment of trusted mechanisms. With continued in-depth research, blockchain has advanced rapidly both in its core technologies and in its application domains. The technology is now widely applied across finance, agriculture, insurance, and other sectors, and the prospects for "Blockchain+" integration appear boundless (Yuan and Wang, 2016). China ranks among the world leaders in both the depth and breadth of blockchain deployment; however, as the technology's sphere of influence expands, associated market irregularities urgently require regulation and supervision. The governance framework that underpins blockchain must therefore adopt novel perspectives—transcending traditional regulatory mindsets—to realize governance of blockchain in fundamentally new dimensions (Shen et al., 2022).

The precise application of blockchain technology can deliver economic benefits and, importantly, serve as a governance instrument that participates in social governance, thereby improving governance systems, refining governance modalities, and producing technology tools with social significance (Han et al., 2019). In the era of the digital economy, social governance models should pursue a new round of integrative innovation aimed at improving efficiency and enhancing functionality. As early as the Third Plenary Session of the 18th Central Committee, innovation and improvement of the social governance system were proposed as overarching reform objectives; since then, China's social governance model has continued to move toward digitization with the support of technological means (Zhao and Meng, 2019). Digital technologies make each step of the governance process traceable; predictive analysis of existing data can minimize conflicts and contradictions in governance, and governance decision-making can shift from past, experience-driven and fragmented judgments to data-first, holistic decision-making—thereby substantially promoting efficiency and scientific rigor in social governance.

2. The Connotation of Blockchain Technology and Its Prospects

2.1 Connotation of Blockchain Technology

Blockchain integrates distributed networking, asymmetric encryption, smart contracts, and consensus mechanisms to persistently store newly generated data in cryptographically linked, timestamped blocks (Zhang et al., 2022). These blocks are distributed across a peer-to-peer network and cryptographically protected; nodes in the distributed system employ consensus algorithms to process data consistently and thereby ensure data synchronization.

However, these technical features are not the principal criterion that distinguishes the Internet from blockchain. Whereas the Internet primarily transmits information, blockchain transmits value—this is the essential differentiator.

Compared with the traditional Internet, blockchain is better positioned to break down data silos and to mitigate information monopolies. The Internet strives for openness, sharing, and speed, but in practice information is rapidly propagated and is often controlled by different platforms. Such data and information become assets of platforms and enterprises; data holders act independently and, from a profit perspective, are unlikely to share their resources freely with information seekers, which deepens the data-silo effect and exacerbates the Matthew effect— undermining the Internet's original intent (Gu, 2019). By contrast, the distributed ledger in blockchain connects information demanders, data monopolists, and data producers. Although a small number of parties may still control large datasets, data producers must obtain authorization from user nodes before using user-related data; data monopolists must, when using such user data, share a defined proportion of resultant benefits with users. Once data is recorded on the blockchain it is timestamped, conferring temporal distinctiveness. Furthermore, via the distributed ledger, data uploaded to the chain is collected and propagated under mutual checks and supervision among nodes, guaranteeing immutability while making access logs and operational histories transparent. Finally, smart contracts ensure that value generated during data circulation is distributed fairly—because ownership and the conditions for transfer are established at the point of on-chain entry. Only after on-chain data circulates and is processed through smart contracts can the full value-transfer process be completed.

2.2 Prospects for Blockchain in the Field of Social Governance

In a modern society driven by rapid digitalization, social actors are closely interconnected and information disseminates quickly and broadly. If the existing social governance system persists with traditional governance models and hierarchical structures, it will struggle to match the pace of contemporary socio-economic development, leading to low governance efficiency, high costs, and inferior outcomes. From the perspective of internal demand, social governance must adapt to multi-level and diversified socio-economic development, and rising public expectations impose higher demands on governance. Traditional government-led governance models are often unable to capture citizens' social needs in a timely and accurate manner; accordingly, innovation in social governance modernization is an inevitable pathwayv(Cai, 2020). From the perspective of external requirements, the moderni- zation of social governance depends on support from modern technological tools, and the realization of governance objectives presupposes the effective application of such tools. Thus, to achieve effective governance, modern scientific technologies—blockchain among them—can leverage their intrinsic characteristics to participate in governance systems, enabling automatic and intelligent completion of governance objectives and providing effective oversight across the governance lifecycle to help social governance systems adapt to the information age.

At present, commercial use cases for blockchain are already highly diversified, and its applications in social governance continue to expand. Governments in multiple countries have begun new rounds of blockchain experimentation within public services—for example, the United Kingdom and Sweden have applied blockchain for data recording and storage—and China has actively promoted the application of blockchain in poverty alleviation and social assistance (Tang, 2018). Although each country emphasizes different application priorities, this diversity also demonstrates the vast potential of blockchain in social governance: blockchain can evolve into different forms according to each nation's level of social development and provide tailored services for different governance domains. By re-empowering social governance models with blockchain technology, it is possible to achieve scientific decision-making, efficient collaboration, and fine-grained process control—an innovation of profound significance for all aspects of social development.

3. Analysis of Pathways by Which Blockchain Technology Promotes Innovation in Social Governance

3.1 Underlying Technological Support: Clarified Data and Information Sharing

China's social governance infrastructure has been in a state of continual reform and dynamic evolution. At present, social governance is steadily moving toward data governance; however, given the current level of information-processing capability, traditional governance models still suffer from numerous problems in the application of technology and the handling of information. First, the degree of data sharing during governance processes is insufficient. Currently, government remains the principal actor in social governance, with over 80% of data and information controlled by governmental bodies. Within government, information is collected by different departments according to their respective mandates, which results in data sources being fragmentedly distributed across departments. Second, information leakage occurs frequently and data security is at risk. In recent years, global incidents of data breaches have repeatedly emerged, affecting up to billions of users and encompassing not

only individual users but also enterprises and state institutions. Consequently, information security has become an urgent issue to address; ensuring that information is transmitted in accordance with law and not subject to misuse is a crucial task for effective social governance. In summary, weaknesses in past investments in governance infrastructure have given rise to data silos and security challenges, impeding the government's ability to realize coordinated governance. The advent of blockchain technology, however, may offer a tailored solution for strengthening the foundational infrastructure of social governance.

Application Layer	• Design and tailor different blockchain application scenarios and modalities according to distinct objectives. At the level of social governance, blockchain technology can provide superior technological solutions for social security, archival management, data protection, targeted poverty alleviation, electronic invoicing, and related domains.
Contract Layer	• Embed code onto the blockchain as required; once the algorithm executes and the contractual conditions are met, the contract is automatically triggered. This greatly strengthens trust and obviates the extra costs associated with third-party arbitration.
Consensus Layer	• Employ consensus mechanisms such as Proof-of-Work (PoW), Proof-of-Stake (PoS), or Delegated Proof-of-Stake (DPoS) so that, even on blockchains where decision-making authority is relatively decentralized, decisions can be reached efficiently and reliably.
Network Layer	• Realize peer-to-peer transmission within a P2P network; point-to-point transmission ensures the entire process is efficient, transparent, and tamper-resistant. • Distributed storage enhances the overall fault tolerance of the system. Because information is transmitted without passing through a central processor, the security of information transmission is substantially increased.
Data Layer	• Data blocks are linked via hash values to form a chained structure, and are accompanied by timestamps to complete data storage. • Techniques such as digital signatures and asymmetric encryption are adopted to provide a secure environment for data storage.

Figure 1. Basic layered design of blockchain

From the above discussion and the depiction in Figure 1, it is evident that blockchain technology, beyond functioning as a tool for data storage and information transmission, can also construct trust mechanisms among on-chain nodes and stakeholders. This enables all participating parties at each node to obtain information that is authentic, reliable, complete, and immutable, thereby furnishing the technical foundation for the digital transformation of social governance.

3.2 Continuous Optimization of Governance Structures and Shifts in Cognitive Paradigms

The application of blockchain technology renders multi-party participation in governance practicable. Traditional social governance is transitioning from a model in which the government bears sole responsibility toward a new configuration in which the government plays a leading—but not exclusive—role; this transformation inevitably exerts profound effects on governance structures and citizens' social cognition, and it injects novel dynamism into the modernization of social governance. Historically, the notion of an "omnipotent government" ensured a high degree of unity in decision-making but also predisposed systems to abuses of public power and inadequate regulatory implementation. Accordingly, accelerating the transformation of governmental functions and advancing the devolution of authority have become among the key objectives of governance reform. As the limitations of the traditional, top-down pyramidal governance architecture have become increasingly salient, administrative-centric modes of thinking have gradually been supplanted by integrative governance approaches (Yang et al., 2020). By incorporating more social organizations and community self-governance into the management of socio-economic and political affairs, and by adopting pluralistic co-governance models, governments can both share administrative burdens and mitigate internal conflicts within social groups—thereby achieving more collaborative and egalitarian governance outcomes.

To fully harness the governance capacity of social organizations and the public, channels for their participation must first be established. Blockchain constructs a decentralized organizational architecture for social governance: through administrative simplification and the devolution of authority, it facilitates a polycentric governance system that avoids concentrating all governance responsibilities within government agencies and instead transfers certain functions to civil organizations and citizens—thereby providing reliable channels for diversified participation. Moreover, blockchain offers an open and transparent platform to society at large, enabling citizens to engage in governance starting from their own needs and service requirements. Because every datum recorded on the

blockchain is traceable and auditable, individuals can accrue measurable contribution values through levels of participation, and these contribution metrics can be linked to incentive mechanisms—whereby contribution determines economic rewards—which in turn enhances public willingness to participate in social governance.
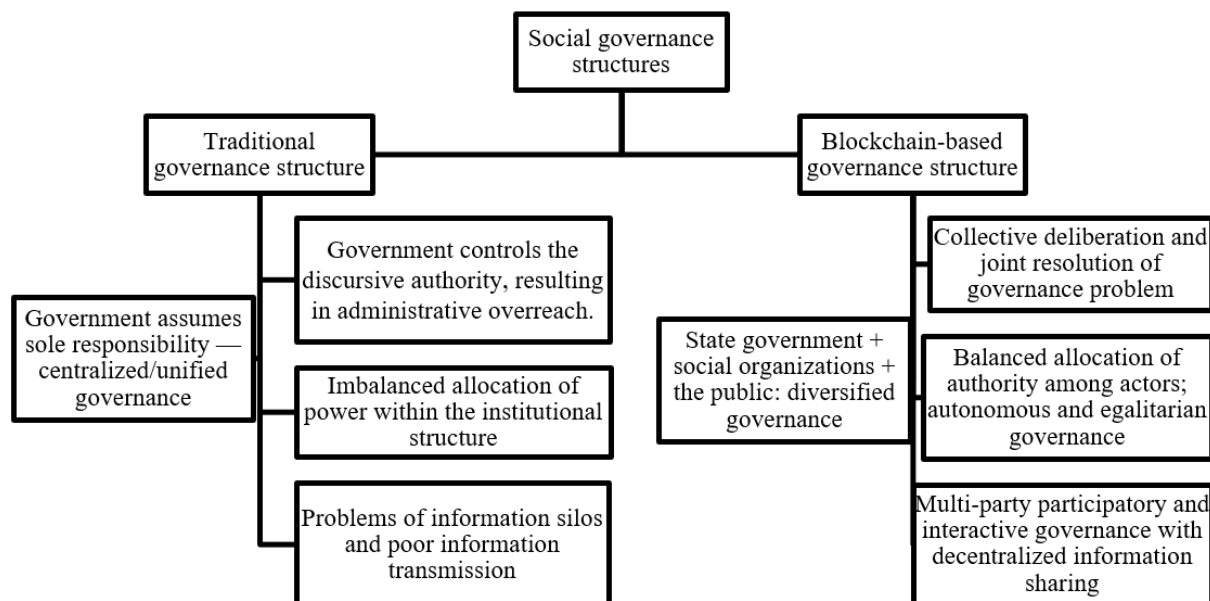
Figure 2. Comparison of Different Social Governance Structures

3.3 Intelligent Governance Models and Transparent Governance Practices

Blockchain can serve as an underlying technology that provides robust technical support for the digital development of social governance and can also help to remedy shortcomings in existing governance structures. However, the key to achieving effective governance lies in how governance is conducted and which governance models are adopted. The introduction of blockchain into the process of governance reform promotes innovation in governance models, rendering them more intelligent: governance can be both effective and capable of appropriately managing social conflicts, modulating responses as needed and combining firmness with flexibility, thereby placing the entire governance process in a state of dynamic adaptation. Historically, governance in China has often been experience-driven; although decisions were sometimes informed by logical reasoning or precedent cases, they frequently lacked empirical data support. In other words, decision-making tended to be more intuitive and susceptible to various subjective influences(Li et al., 2020). By leveraging blockchain-enabled collection and large-scale data interaction and analysis, it becomes possible to logically link matters across economic life, cultural life, and the ecological environment; this enables real-time monitoring while also supporting dynamic analysis and precision decision-making, thereby producing secure, efficient, and fine-grained governance.

Moreover, as the public's use of information intensifies, citizens demand greater breadth and depth of publicly disclosed information, and within reasonable bounds the disclosure of government information to the public is a duty of all levels of government. A governance process that does not leave traceable records will not only damage public trust in government, but will also undermine governmental credibility and make future governance efforts more difficult—creating a vicious cycle. Blockchain, by virtue of a distributed ledger and peer-to-peer transmission, makes on-chain data fully visible to participating actors and guarantees transparency. Transparent governance processes can also effectively prevent internal collusion and corruption, enabling supervisory organs such as disciplinary inspection commissions to trace the full lifecycle of government affairs and thereby improve governmental governance effectiveness.

3.4 Regulatory Constraints and the Advancement of Legal Frameworks in Social Governance

Rule-bound governance and legal constraints are indispensable to the social governance process. Rule-of-law construction not only clarifies governance boundaries with specific requirements but also enhances the authority and public credibility of government in governance activities. Blockchain provides solid technical assurance for diversified social governance and establishes a cooperative management platform for the joint participation of

government agencies, social organizations, and residents. In addition, the distributed ledger on blockchain can create secure channels for information sharing within government and among societal actors. Transparent operational procedures and immutable data support effective self-restraint and mutual supervision among actors, thereby substantially reinforcing the legitimacy of social governance.

There is considerable potential for deep integration between blockchain technology and legal governance. First, with respect to data mining and analytics, blockchain can assist regulatory authorities in obtaining timely, reliable, and end-to-end information, greatly reducing supervision costs and enabling rapid tracing of data fabrication or concealment. Second, in the domain of law enforcement and evidence collection, blockchain can integrate smart contracts into enforcement systems: where plaintiffs and defendants cannot furnish sufficient evidence, the system can automatically generate adjudicative reports and promptly notify responsible parties of the evidentiary basis and implementation plan. Moreover, blockchain-based electronic evidence storage can not only resolve difficulties associated with paper-archive preservation but also further improve law-enforcement efficiency and simplify procedures for proving and identifying facts. In summary, "blockchain + social governance" introduces practical innovations in data processing and governance modalities, optimizes governance effectiveness overall, and constructs e-government platforms that facilitate multi-stakeholder participation—thus enabling coordinated interaction between governmental functions and social engagement and ushering in a new paradigm of digitalized, intelligent, and law-based governance that significantly accelerates the modernization of social governance.

4. Policy Recommendations for Blockchain-Enabled Social Governance

4.1 Raise Awareness of Digital Governance and Promote Governmental Data Openness and Sharing

Although the profound impact of the big-data era on social governance is widely recognized and there is an urgent need for change and breakthroughs, many government bodies remain cautious. Advancing innovation in social governance requires enhancing the digital-governance awareness of both government and the public, and building a scientific governance system that is data-driven. Governments should intensify education and public outreach on blockchain technology—particularly with regard to the conveniences it affords in publishing public information and handling personal affairs—so that citizens clearly understand operational procedures and means of participation. Moreover, when deploying blockchain, governments should plan which categories of data may be shared among government departments and which may be disclosed to the broader public, and establish layered data-sharing platforms. Such measures would accelerate internal information flows among departments and provide opportunities for some social organizations and enterprises to integrate and make use of data, thereby enhancing the social value of government data. Abnormal data fluctuations can help governments identify emergent trends and developmental issues in society—for instance, for early warning and prediction of emergencies. Promoting internal data development capabilities and staff skills, and optimizing internal governance structures through a governance-awareness approach, can improve intra-governmental data circulation efficiency. By broadening the scope and types of data openness and advancing information sharing to foster collaborative governance, governments can accelerate governance efficiency and encourage multi-party participation—thus cultivating a new governance model for the digital era from the inside out.

4.2 Cultivate Modern Governance Talent; Prioritize Capacity Building and Resource Allocation

Although blockchain has been deeply integrated across many fields and industries, governments at various levels have not yet staffed specialized personnel to plan concrete blockchain deployments for social governance; talent shortages in both quantity and quality significantly constrain blockchain applications in governance. To harness blockchain for aligning social governance with broader socio-economic development, the challenge of talent structure and staffing must be addressed. Governments should adopt preferential policies to attract high-level blockchain professionals and strengthen regional talent pools. Cooperation with higher-education institutions can be used to cultivate interdisciplinary blockchain talent in a targeted manner. At the same time, governments should adopt an expansive perspective and an open attitude toward attracting outstanding domestic and international experts and scholars, thus ensuring an effective supply of high-caliber talent to support governance innovation. Internally, targeted training on blockchain applications and management should be provided: for leadership teams, the introduction of novel technologies poses new challenges, so theoretical instruction on blockchain and its mechanisms for integrating with governance should be offered first to build conceptual understanding. Subsequently, systematic professional training oriented toward governance officials should be provided to familiarize them with blockchain's development trajectory and to create a favorable environment for the dissemination of "blockchain + social governance" across government levels.

4.3 Clarify Rights and Responsibilities of Governance Actors and Leverage Multi-Stakeholder Governance Alliances

Diversifying governance actors can not only address governmental deficiencies but also, through the devolution of authority, stimulate governance awareness among social organizations and the public, enabling the governance process to coordinate multiple interests and preempt governance conflicts. From a data-resources perspective, much governance- and organization-related data remain under the control of a small number of Internet firms. Governments should devolve certain data-integration authorities to social organizations, actively expand cooperation channels between the public sector and social organizations, integrate governmental and commercial data, and then share these aggregated data with the public for wider use. Regarding blockchain applications, large-scale deployment depends on third-party technology firms' support. Firms, aiming to maximize profits, will employ privacy-protection measures based on underlying property-rights information, thereby protecting the lawful interests of information owners. In contrast, government pursuit of maximal public welfare under a blockchain-enabled, egalitarian, and transparent governance model may necessitate relinquishing some private interests—creating potential conflicts with firms' profit-maximization goals. Therefore, the government should play a guiding and normative role in governance: it should regulate blockchain application models across different scenarios, and—based on the degree of information openness—employ public chains, private chains, or consortium chains as appropriate. The roles and responsibilities of these chain types should be clearly delineated to fully leverage governance alliances and to form a stable and harmonious governance architecture that realizes the value objective of "power used for the people."

4.4 Address Shortcomings in Social Governance and Build Rigid Legal Safeguards

The law is the foundation for maintaining social order and ensuring stable social development. As social division of labor becomes more refined, social conflicts increase; rule-of-law construction provides mechanisms for resolving these tensions. Blockchain remains at the pilot and deployment stages, and current regulatory laws do not yet align well with practical application domains, leaving legal oversight of blockchain in a regulatory gap. Accordingly, on the legal front the government should promote healthy industrial development, encourage industry self-discipline, and establish normative rules to eliminate malpractices; concurrently, it should advance law-based governance so that mandatory legal constraints ensure orderly development. Given blockchain's dependence on the Internet environment, existing Internet-related laws can be adapted and extended—taking into account blockchain's decentralization—to prioritize the improvement of legal frameworks for cybersecurity and data governance and thereby ensure the lawfulness of technological deployment. Additionally, in specific application domains, norms and operational standards must be maintained consistently to avoid governance risks and social-security issues arising from information leakage. Finally, legal construction for social governance should receive increased policy support: by continually optimizing the rule-of-law system and strengthening multi-stakeholder "collaborative co-governance," a dual supervi- sory mechanism of internal reflection and external oversight can be established. This approach will prevent overly centralized or singular legal frameworks and enable more flexible regulatory mechanisms for the rule-of-law development of social governance.

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