



Theoretical Explanation and Institutional Innovation of Blockchain Enabled Intellectual Property Management

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Abstract. Blockchain is a new type of Internet infrastructure based on data and smart contract technology. The blockchain-based intellectual property management mechanism is a decentralised distributed system that contains four links: incentive for innovation, protection of rights and interests, open sharing and risk prevention and control. In this process, there is a high degree of coupling between blockchain and intellectual property management system, which provides new tools and means for intellectual property protection. Based on this, this paper proposes a three-level system innovation path from data to rights and interests to rules to risk prevention and control, with a view to providing new ideas for the management and protection of intellectual property rights in China.

Keywords: Blockchain; Intellectual Property Rights; Regulatory Mechanisms

1 INTRODUCTION

With the advent of the Internet era, the role of intellectual property rights in economic and social development has become increasingly prominent, and the legal protection of intellectual property rights has become a key factor in safeguarding innovation. The protection of intellectual property rights in China has special characteristics, which are mainly manifested in the following: (1) The strict protection of intellectual property rights is aimed at encouraging innovation; (2) The intellectual property rights system has a certain degree of social publicity, which requires the Government to provide certain public products; (3) Intellectual property protection is highly professional and technical, and needs to rely on special organizations for management; (4) Intellectual property protection is a dynamic development process, and needs to be continuously improved in practice. It can be seen that China's intellectual property management system is facing the problems of how to achieve a balance between intellectual property protection and innovation development, and the coordination between incentivizing innovation and protecting rights and interests in the context of the new era^[1]. And blockchain technology provides a new solution idea for this problem. The coupling between blockchain and IP management system is shown in Figure 1.

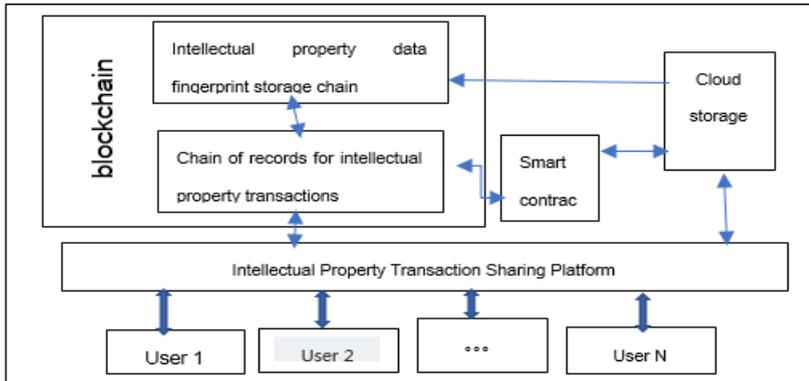


Fig. 1. The coupling of blockchain and intellectual property management systems

2 INCENTIVISING INNOVATION

In essence, intellectual property is a monopoly right, a property right protected by law, and the exclusivity of this property right means that non-rights holders have to go through legal channels in order to use the right. The core of the blockchain is distributed database technology, which can solve the problem of data authenticity and non-tamperability in the process of intellectual property management, and provide a mechanism for automatic execution of contracts through mathematical algorithm determination^[2].

2.1 Smart contract mechanism provides a mechanism for inventors or innovative companies to automatically enforce contracts

Smart contract refers to a contract with automatic execution function defined by computer code and running in blockchain. It takes blockchain as the underlying technology, which can ensure the execution of the contract and realize automatic liquidation and settlement. In smart contracts, the execution of a contract requires three links: first, each node in the blockchain jointly maintains a ledger, and each node saves a complete ledger on the execution of the contract; secondly, after the contract is written into code and encoded, it can be uploaded to the blockchain; finally, the smart contract can be automatically executed after being written into the blockchain. Therefore, in the process of intellectual property management, blockchain can realize the automatic execution mechanism of Smart contracts.

2.2 Consensus mechanism provides an incentive for innovative activity

The consensus mechanism refers to that all nodes in the blockchain participate in the generation, verification and transaction of the block, and determine the validity of the transaction through a series of algorithms to ensure the authenticity of the transaction

data. In the consensus mechanism, each node has its own ' private key ', and each ' private key ' contains different digital signatures. In order to prevent data from being tampered with, all participating nodes must have the same number of ' public keys '.

The blockchain is a decentralized system. There is no central authority to control all nodes in the network, and each node will participate in the entire network system. Even if a node is found to have maliciously tampered with the data, it cannot tamper with or delete the relevant data. Blockchain can also determine the value of intellectual property and its realization through mathematical algorithms, which can encourage inventors and innovative enterprises to carry out intellectual property creation activities.

3 PROTECTING RIGHTS AND INTERESTS

The traditional intellectual property protection mechanism is centred on the registration of intellectual property rights, which is undertaken by special copyright registration institutions, professional appraisal institutions are responsible for appraising the validity of intellectual property rights, and national judicial organs are responsible for judicial adjudication of intellectual property disputes, which are undertaken by these institutions in different aspects of the work, and realise the management of intellectual property rights throughout the whole process of "from creation to application".

3.1 Disclosure of information to reduce registration costs

Registration is an important part of intellectual property protection. The traditional registration process requires a lot of manpower and material resources due to the large number of registration subjects, the complicated registration process and the opaque registration information. Blockchain technology can solve the above problems to a certain extent^[3]. First of all, trading in the blockchain, only the relevant transaction information can be recorded, without manual identification and entry, which greatly improves the efficiency ; secondly, each node of the blockchain can record and save the information of the whole network, and can ensure the authenticity and reliability of the information by means of time stamp ; finally, blockchain technology can prevent data from being tampered with or destroyed by encrypting data information and transmitting it between nodes.

3.2 Decentralisation to reduce transaction costs

One of the major drawbacks of traditional intellectual property protection mechanisms is the high transaction costs and the high cost of establishing rights, which results in lost trading opportunities, and in steading of applying blockchain technology can significantly reduce transaction costs.

The blockchain system uploads data onto the chain, and all information cannot be tampered with, which fundamentally reduces the cost of intellectual property rights. At the same time, blockchain technology can also effectively reduce registration

costs. The traditional intellectual property registration system needs to entrust professional appraisal institutions for identification, which is costly. The blockchain technology can encrypt and verify the registration content and solidify the data, and can automatically generate an unchangeable electronic certificate, so it can effectively reduce the registration cost.

3.3 Technical support to improve the efficiency of rights protection

The two parties of the transaction establish a cooperative relationship through blockchain technology, and verify and record the intellectual property information in the blockchain system^[4]. The two parties of the transaction can encrypt the information through encryption algorithms to ensure that the data cannot be tampered with, and can also automatically execute the contract through smart contracts. This indirect process not only avoids the difficulty of transactions caused by differences between the two parties in the process of signing contracts, but also solves the transaction problems caused by lack of trust. On the other hand, blockchain technology can better solve the problem of proof in intellectual property disputes. Once an intellectual property dispute arises, the right holder can apply for evidence preservation through the smart contract to the relevant nodes on the blockchain to prove the existence of the infringement, so that the court and the arbitration organ can quickly understand the facts of the case and make corresponding rulings.

4 OPENING-UP AND SHARING

The opening-up and sharing of the blockchain system provides a new idea for intellectual property management, but the intellectual property management mechanism constructed on the basis of blockchain technology also faces risks in technology, law, market, ecology and other aspects. The corresponding three aspects of institutional innovation: the first level is the data rights and sharing mechanism; the second level is the legal governance mechanism; the third level is the policy system.

4.1 Data confirmation and sharing mechanism

In the current environment, due to the lack of unified standards, data on different platforms is difficult to manage uniformly. Therefore, in order to ensure the legitimacy of data sharing, the 'database' is transformed into 'blockchain' by redesigning the data structure in the blockchain system, so as to make the blockchain system more secure and reliable^[5]. The data confirmation and sharing mechanism is shown in Figure 2. In the management of intellectual property rights, data security and orderly sharing are guaranteed by setting up intellectual property committees, intellectual property arbitration and other institutions.

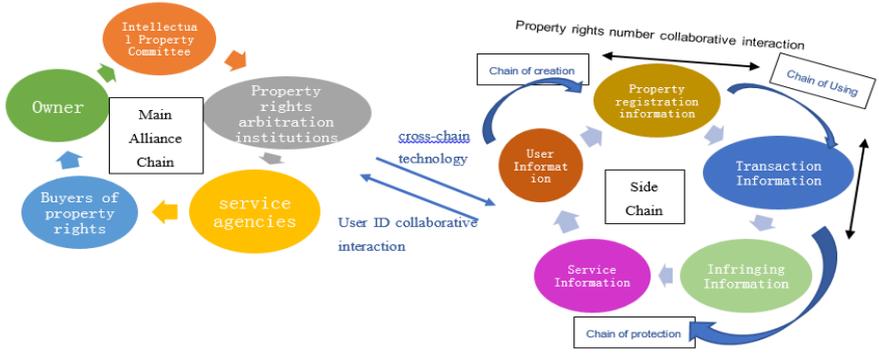


Fig. 2. Data confirmation and sharing mechanism

4.2 Legal governmental mechanism

The goal of the legal governance mechanism is to provide a code of conduct for the intellectual property management of blockchain technology through the construction of the legal system. The construction of legal governance mechanism can be carried out from the following two aspects: First, legal principles, that is, the basic norms of behavior of blockchain technology in intellectual property management are stipulated through legal principles. For example, the “Civil Code ” can be used as the basic code of conduct for the management of intellectual property rights in blockchain technology. The second is legal liability, that is, to regulate the illegal acts in the intellectual property management of blockchain technology through legal liability clauses.

4.3 Policy mechanism

Intellectual property protection and management is a complex system engineering, which needs the joint efforts of the whole society. As a social public service department, the government should focus on the protection and management of intellectual property rights, encourage social forces to participate in the research and application of blockchain technology through policy guidance, financial support, personnel training and other ways, and promote the improvement of intellectual property protection and management system.

5 RISK PREVENTION AND CONTROL

Blockchain technology will bring new risks while enabling intellectual property management and protection. These risks can be divided into technical risks and legal risks. The former refers to the defects of the blockchain technology itself, such as decentralization, non-tampering and other characteristics may bring data leakage, security risks and other issues^[6]. The latter refers to the defects of legal norms or social rules themselves, such as improper use of blockchain technology or abuse that may infringe on

the interests of others. The former will directly affect the application effect of blockchain in intellectual property protection, while the latter may lead to more legal risks. Therefore, risk prevention and control should be carried out from three aspects. First, formulate perfect blockchain legal norms; second, strengthen the risk prevention and control of blockchain technology itself; and adopt a reasonable blockchain legal governance approach.

In the process of blockchain technology-enabled intellectual property protection, it needs to be effectively regulated and a reasonable legal governance approach needs to be adopted. For example, China has established a number of national coordinating organizations for blockchain infrastructure construction, including the China Internet Finance Association, the China Payment and Settlement Association and the China Blockchain Application Alliance. These national coordinating organizations are mainly responsible for promoting the formulation of industry standards, infrastructure construction, business specifications and application scenarios of blockchain technology.

6 CONCLUSION

Blockchain provides a new management mechanism for the confirmation, use and maintenance of intellectual property rights. In the process of empowering intellectual property management, there are some problems, such as the imbalance between data and rights, the inconsistency between rules and risks. This paper takes ' data-rights-rules-risk ' as the path of institutional innovation, aiming to analyze the coupling mechanism between blockchain and intellectual property management system from three aspects of data, rights and rules, so as to provide new ideas for the management and protection of intellectual property in China.

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