Legal Creation of Smart Contracts and the Legal Effects

Yang Liu\textsuperscript{1*}, Jincheng Huang\textsuperscript{2}

\textsuperscript{1} Department of Information Science and Technology, East China of Political Science and Law, No.555 Longyuan Road, Songjiang District, Shanghai, 201620, China
\textsuperscript{2} Department of Information Engineering, Yancheng Institute of Technology, Hope Avenue Road 1, Yancheng City, Jiangsu Province, 224051, China
\textsuperscript{*}lyang@ecupl.edu.cn

Abstract. Smart contracts are software codes based on the Blockchain technology which are involved in the field of information technology. The Blockchain smart contract is still in the contractual scope in nature, although its origin and automatic performance functions are different from existing contracts, but it can be identified as a typical unnamed contract. Therefore, at the legal level, a smart contract is a new form of contract that can automatically and automatically perform all or part of the contract. While discussing the technical aspects of smart contracts, we cannot ignore the relevant issues at the legal level. Smart contracts are developments and innovations in the form of traditional contracts. Smart contracts exist in electronic form and automatically fulfill contracts through software that is accurately encoded on the Blockchain. How to create smart contracts according to law and evaluate the legal effect of smart contracts are the main research issue of this paper.

1. Introduction

Blockchain is a new application mode of computer technology such as distributed data storage, point-to-point transmission, consensus mechanism, and encryption algorithm. Blockchain is an important concept of Bitcoin. It is essentially a decentralized database. At the same time, as the underlying technology of Bitcoin, it is a string of data blocks generated by cryptography. The data block contains information about a batch of Bitcoin network transactions used to verify the validity of its information and generate the next block. The non-tamperable and traceable characteristics of Blockchain technology are of great significance for solving key problems in data circulation. On the one hand, the decentralized core advantage of the Blockchain can solve the problem of the divergence mode of the big data circulation from the center to the periphery \[1\]. On the other hand, the Blockchain uses data encryption, time stamping, distributed consensus and other means to ensure data circulation and security. Issues such as letters and ownership provide solutions. Smart contracts are the key technology for realizing data circulation in the upper layer of the Blockchain. They perform complex operations on various data on the chain and are automatically completed and executed according to the contract.

Smart contracts are one of the hottest areas in the current research on blockchain technology. At present, researchers focus on the technical aspects of smart contracts, such as the characteristics of smart contracts, how to automate them, and the corresponding carrier forms \[2\]. However, there are very few related studies on the legal issues of smart contracts. This paper analyzes the legal regulation of smart contracts, analyzes the legal issues involved in smart contracts from the legal level, and provides authors’ opinions on how to legally create them and their legal effects.
2. Blockchain and smart contracts
In 1994, Nick Szabo first proposed the concept of smart contract, which was only an idea. With the rise of blockchain technology and bitcoin research, smart contracts were realized. Smart contracts rely on blockchain technology to transform contract content into a series of binary code through a hash algorithm. Blockchain smart contracts are characterized by autonomy and enforceability.

The smart contract is essentially a computer program code. The trader can convert the content and execution conditions of the contract they have entered into identifiable program code through the computer. When the conditions set by the program are met [3], the system will trigger the automatic execution of the corresponding code. Contract terms to enable transactions in objects such as data. This shows that the conclusion of smart contracts is still inseparable from the control of human will. Because the establishment of a contract is the result of a combination of factors, it must be expressed by someone's will, in order to enter specific content and then set up a smart contract. Blockchain smart contract as a new thing, smart contract code can be used in the form of a Chinese contract The interpretation of "other forms" in the first paragraph of Article 10 of the Act means that the smart contract does not break through the modern contract form and can be classified into the scope of the contract. At the same time, the smart contract based on the use of Blockchain technology has the possibility of existence, and it has obvious differences with the existing contracts only need to deal with the expression of the party's meaning. In addition, the way in which smart contracts are executed is different from the usual way of performing contracts between existing contract parties. Smart contracts are presented in the form of computer code, with only yes or no judgment procedures [4].

3. Smart contract and legal regulation
Blockchain is a new technology that has emerged in recent years. It needs to be distinguished from Bitcoin and Litecoin. What this section needs to discuss: What combination of blockchain and smart contract can bring to traditional contracts? Improvements and innovations; how the problems brought about by the lag of new technologies and laws will be solved, how to promote smart contracts through legally created smart contract blockchain technology to better serve the interests of contractual parties and better performance.

3.1. Contractual attributes of smart contracts
The above analysis can be concluded that smart contracts are one of the forms of contract workers in modern contract law [5]. However, in order for smart contracts to enter the regulatory scope of modern contract law, a legal level analysis of smart contracts is required. From the legal level, it should be stipulated in the basic general problems that Blockchain smart contracts may face, such as how to supervise Blockchain smart contracts? What are the legal consequences of attacking and destroying Blockchain smart contracts? This involves the expression of the subjective consciousness of smart contracts and how to implement the implementation path including automatic execution to prevent default. How to construct a legal supervision system for smart contracts under the new technology of Blockchain, and to clarify the legal status and legal nature of smart contracts in the form of law is the main problem before us.

3.2. Challenges to traditional laws and regulations
Traditional contracts have a clear, transparent and enforceable legal basis in every important aspect of the activities under their jurisdiction. However, for smart contracts that are applicable to Blockchain technology, legal supervision is in a blank state. The legal basis of a smart contract should consist of framework legislation and specific legal, regulatory and system-level agreements. In addition to focusing on the system itself, both parties to the transaction need to pay attention to their respective contractual rights and obligations. Regardless of whether it is a transaction party or a third-party organization, because Blockchain technology is used as a data transaction platform, no single entity can change the agreement in the smart contract, so there is no centralized regulator that can force changes and processing of the agreement. Any other agency can suggest changes, but the proposal will
only be changed if most users accept a particular offer. In contrast, this is intrinsically different from the fact that in the traditional contract, the supervisory authority has the actual control and can control the contract rules. The agreement in a smart contract does not define any legal rights or obligations of its members. In a decentralized, distributed, intelligent contract system, the protocol replaces the existing legal framework and implementation process of the regulatory body, which is at the bottom of the payment ecosystem. Since the current regulatory agencies do not provide a legal framework for the use of smart contracts that are supported by Blockchain technology, these frameworks do not effectively address the risks involved in contract performance.

With the rapid development of Blockchain technology, some of the current laws in China cannot meet or fail to take into account the requirements of smart contracts: First, the smart contract differs from the contractual elements in the current contract system, which is contrary to the withdrawal and cancellation rules of the promise (the smart contract cannot be revoked); the second is that the judgment of the validity of the contract will become more complicated; third, the execution of the contract is changed from the performance of the two parties to the automatic execution of the platform; the fourth is that the contract change is more difficult; the fifth is that the liability for contract breach is difficult to pursue; and the sixth is that the formulation of the clause become more complicated and more restrictive. In the face of the impact and impact of smart contracts, we should not mechanically "defend" the current contract system, but must actively and objectively treat the particularity of Blockchain technology, and ensure that both parties are fully aware and willing to adopt intelligence. Blockchain smart contracts not only need to re-examine the relevant legal framework of domestic law, but also examine the corresponding international laws and treaties. This will require regulators to assess the complexities that arise from conflicts that may arise between relevant laws in different jurisdictions. In assessing whether there is a comprehensive legal framework for dealing with the risks inherent in the application of Blockchain technology to contract areas, regulators must be flexible in addressing these potential issues. With the decentralization of Blockchain smart contracts, the risks are extended to other jurisdictions, including jurisdictions with underdeveloped legal systems.

3.3. Legal creation of smart contracts
The application of Blockchain technology and smart contracts means public suspicion of centralized power and support for free markets. As the American scholar Lawrence Lessig mentioned, "code is the law". As a typical type of technology self-help, if it is completely out of the legal system and government policies, it may be used by some people to exploit the loopholes in the computer program to achieve illegal purposes, contrary to the purpose of the establishment of smart contracts, resulting chaos in public order. Therefore, the application of Blockchain technology and smart contracts still needs to resort to legal, public policy and related technologies, which means that smart contracts need to be created according to law with the protection of some related security technologies.

3.3.1. Regulating violations of smart contracts. Decentralization and auto-execution are the advantages of smart contracts, but it is precisely because of this feature that smart contracts may result in final execution due to inaccurate program settings or imperfect platforms and smart contract code writers themselves. The result is contrary to the original intention of the contract, which ultimately harms the interests of investors. A typical example is the event of hackers stealing funds from Distributed Autonomous organizations (DAOs) in 2016. The organization raised $150 million in July 2016 to fund the launch of the encryption mechanism. A hacker used the vulnerability in smart contract to transfer $50 million from the system. However, the hacker did not think that his actions were illegal. He believed that he only used the procedures in the smart contract to set "legitimately" to transfer funds. This shows that decentralization mechanisms such as Blockchain technology and smart contracts still need to protect the interests of right holders under the supervision of the legal framework and government agencies. That is to say, although the smart contract is set for legitimate
purposes, when the contract setting vulnerabilities cause the illegal purpose to be covered by the legal form, the smart contract should be considered invalid and there may be a legal withdrawal.

3.3.2. **Establish coordination mechanism.** The key to incorporating Blockchain technology and smart contracts into the scope of legal regulation is how to enable the judiciary to intervene in the application of Blockchain technology and smart contracts. For example, in a traditional contract transaction, if one party forces the other party to transfer the product to himself at a low price by coercion, the coerced party may request the court or arbitration institution to change or cancel the contract. However, in the case of smart contracts, if one party is coerced, since the smart contract procedure has been set, the smart contract will automatically execute the product transfer transaction when the low price that does not meet the fairness principle is paid to the coercive party. There is a conflict between the development of technology and the construction of laws. It is relatively difficult to solve the disorder of management through the revision of the law to solve the loopholes in the intelligent contract technology of Blockchain. The intelligent dispute resolution mechanism based on Blockchain-based contract disputes can be studied to solve the loophole problem of current smart contract technology through new technologies.

3.3.3. **Strengthen international cooperation and establish an international dispute organization.** Due to the decentralization of smart contracts, national borders have been weakened. Therefore, in addition to the need to adjust domestic laws and regulations, an international dispute resolution mechanism for smart contracts should also be established. For example, a special tangled solution mechanism can be set up under the corresponding international organization to undertake this responsibility, and a related set of dispute resolution mechanism can be established. In this set of resolution mechanism, the decentralization characteristics of the Blockchain technology are fully considered. Get rid of the traditional centralized regulatory thinking, and create a new set of regulatory mechanisms based on the applicable characteristics of the Blockchain. Countries can agree to the jurisdiction of the corresponding institutions by signing a treaty. Once a dispute arises, they can choose to be subject to the jurisdiction and handling of the agency.

3.4. **Legal effect of smart contracts**

Due to the use of Blockchain technology, the underlying architecture of decentralized distributed smart contracts has the potential to actually reduce many of the risks that current regulations are attempting to mitigate. For example, because Blockchain cross-border payment systems dramatically reduce settlement and transaction risk by processing atomic transactions in real time, who can use the system's detailed requirements will reduce many of the risks while increasing efficiency by reducing access to financial market utilities. By recognizing the ability of the system to mitigate counterparty and settlement risk, more market participants will be able to obtain real-time payment settlement. Therefore, the underlying agreement of a smart contract has better legal effect than the law of a traditional contract.

On the other hand, the existing legal provisions and traditional contracts are expressed in the form of words. In the absence of clear interpretation by the legislator or the lack of clarity of the parties, it is prone to conflicts of multiple meanings of words. Therefore, the legal provisions and transactions in general contracts There is room for interpretation before the content which is converted into code. If the smart contract cannot be fully explained, it is difficult to conclude and effectively implement it. Therefore, in order to ensure the enforceability of the contract content, it is required that the smart contract with the code as the expression form the consensus of all participants, so that the smart contract can be concluded with high legal effect.

Table 1 compares the requirements between the traditional contract and the smart contract. As far as the contract is expressed, the traditional contract is a natural language and can be read by both parties; the smart contract is represented by a programming language. The code, for ordinary traders, cannot be read. Moreover, the contractor and the contractor are not the same person, and there is an
understanding error in the conversion between them, so there is a certainty problem in the smart contract. On the surface of the smart contract, although it contains the word "contract", it still differs from the real contract. The author believes that the transaction on the blockchain still needs to comply with the prescribed "contract", and the smart contract is only It is the obligation of both parties to “automatically” execute when the contract between the two parties becomes effective, such as the transmission of data and the transaction of related funds. The so-called "intelligence" means that the obligations that both parties need to perform are automatically executed by the code. The "contract" refers to the "contract" under the guarantee of the transaction contract between the two parties, so the smart contract cannot completely replace the contract. But smart contracts guarantee the interests of both parties to the transaction and the security and effectiveness of the trading objects.

Table 1. Comparison of traditional contracts and smart contracts.

| Contract establishment requirements | Contract entry requirements | Smart contract |
|-------------------------------------|-----------------------------|----------------|
| Main body                           | Party                       | Party/third party, programmer |
| Content                             | Main clause                 | Terms, irrevocable, certainty issues, etc. |
| Form                                | Offer, promise              | Code, automatic execution |
|                                     |                             | Meanings means truth |

4. Conclusion
Through the combination of Blockchain and smart contract, this paper analyses the differences between traditional contracts and smart contracts in legal regulation, discusses how to create smart contracts according to law, puts forward the author’s proposals and ideas, and the legal effect of smart contracts.

Acknowledgments
This research was financially supported by the Ministry of Justice of China Research on the National Rule of Law and Legal Theory (Grant NO. 17SFB3001) and Ministry of Education of China "Clouds Integration Science and Education Innovation” Fund Project (Grant NO. 2017B06106)

References
[1] Henry R, Henry A and Kate A. (2018) Blockchain access privacy: challenges and directions. IEEE Security & Privacy 16, pp. 38-45
[2] Dinh T T A, Liu R, Zhang M, Chen G, Ooi B C and Wang J. (2018) Untangling Blockchain: a data processing view of Blockchain systems. IEEE Transactions on Knowledge and Data Engineering 30 pp. 1366-1385.
[3] Kshetri N and Voas J. (2018) Blockchain-enabled e-voting. IEEE Software 35 pp. 95-99
[4] Ma Z, Huang W, Bi W, Gao H and Wang Z. (2018) A master-slave blockchain paradigm and application in digital rights management. China Communications. 15 pp. 174-188
[5] Lu H, Huang K, Azimi M and Guo L. (2019) Blockchain Technology in the Oil and Gas Industry: A Review of Applications, Opportunities, Challenges, and Risks. IEEE Access. 7 pp. 41426-41444
[6] Orman H. (2018) Blockchain: the Emperors New PKI? IEEE Internet Computing. 22 pp. 23-28