Application of the Blockchain Technology in Smart Contracts: Legal Analysis

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Abstract. Smart contracts have recently been considered one of the two columns of blockchain applications. The first column is the cryptocurrency funded by the decentralized system, and the second column is the smart contracts, which are an automatic self-execution contractual program. This article provides a legal analysis of smart contracts and concludes that the application of the blockchain technology in smart contracts should be considered a guarantee to the contractual performance. Furthermore, the regulations that apply to smart contracts should focus on the codes inserted in, rather than the performance.

Keywords: Smart contract · Blockchain · Self-execution contracts

1 Introduction

In 2009, Satoshi Nakamoto set the blockchain technology for the usage of Bitcoin. Bitcoin is another important work-based application from a blockchain, which allows for the agreement of the public on the sequence of blockchain transactions. Sequence issue is regarded as an essential obstacle in decentralizing an online environment. During simultaneous transactions, an entity should confirm which transaction came first. In a centralized online environment, the central authority recognizes a tiny gap in the order amount of simultaneous transactions. However, without the central authority, the blockchain technology provides an alternative solution for such an issue. Therefore, the blockchain technology can apply multiple work-based platforms in the decentralized online environment. In other words, how can the blockchain apply for more than digital currency?

Smart contracts are regarded as one of the most important "more-than-digital-currency" applications that allow digital properties to be moved via a user's instinctively prespecified rules. Moreover, on account of the term "contract," smart contracts are characterized as "decentralized legal systems." Such systems enable entities to develop more flexible transaction methods using only a few lines of code.

This article aims to analyze smart contracts through legal doctrines. Accordingly, the blockchain technology is highly capable of replacing the position of an intermediary that concerns the legal and economic means in the society. The subject of an intermediary

in smart contracts refers to self-enforcing digital contracts, which allows the transfer of digital properties and currencies to others through a few lines of code and conditions settled in the software. However, the role of an intermediary is only treated as a part of a contract in the contract law, and the part is legally considered records than rights. This will provide observations and issues that are concerned by smart contracts.

2 Smart Contracts and Contract Law

The term "smart contracts" has been presented for a long time before blockchain applications. Smart contracts are the consequences of human actions [1], where contracting parties are encouraged to lower costs regardless of the advice of specialists. The term was originally described by Nick Szabo, a lawyer and technologist, in 1997. He described smart contracts as "contractual clauses embedded into hardware and software in such a way that makes breach more expensive" [2]. Szabo gave two examples to illustrate the decreasing costs of mediation, self-enforcement, and arbitration: one is vending machines and the other is devices for repossessing automobile collateral. Szabo also stated that smart contracts represent an important shift in the world toward digital systems, which is different from traditional paper-based transactions.

For computer science purposes, smart contracts refer to automated execution agreements. However, legal purposes concern more about the execution of human control. Legal purposes refer to juristic acts, which aim to establish them between two parties, including a person and a legal person. Thus, the automated execution as a result of a computer code running is considered a legal prose execution. A smart contract concerns more about the performance of a contract rather than the state of enforcement. Accordingly, the court recourse does not highly involve the process of the contract performance.

A typical example of a smart contract is the vending machine. If the machine works properly when money is inserted, then the contract for sale would be executed automatically. The process of sale depends on the code settled to the machine's interpretation. Therefore, most of the juristic acts concern "how the code is settled," not the performance of the smart contract. As a result, the existing contract law has a very limited place in situating the legal discussions of smart contracts.

3 Automated Transactions and Smart Contracts

An automated execution is the key element of smart contracts, but not every automated transaction is included. For example, automated banking payment, online standing orders, and online transactions after payment confirmation are not considered smart contracts.

First, transactions involve interventions by third parties, which may preserve the control over the respective transaction. For example, in the case of a bank payment, a bank could interfere in the transaction procedure and withdraw or add money to the account. This case is different from smart contracts, which are not administered by third parties.

Then, under a decentralization system consisted by a blockchain, no third-party computers (also known as servers) are involved in the running of a program. Transactions

and records are interchanged between parties of the smart contract via the blockchain technology.

Thirdly, the blockchain technology provides an open and cryptographic nature that enables the development of trust in the decentralized system. Users are running the same codes, and the codes are kept with all users. This case is different from traditional automated contract executions, where the operation is governed by a server and is exclusively in the control of a third party.

Lastly, automated transactions in smart contracts are flexible. The developer may provide a set of ambiguous directions into the codes that enables the smart contract to be triggered and transformed. This case is different from traditional automated transactions that require ambiguous implementations for the triggers.

The aforementioned differences actually refer more about the performance than human control, and legal discussions are narrower in smart contracts. In other words, innovative technology does not equal to jurisprudence innovation, and traditional legal analyses are still the basis of rules for complex technologies [3].

4   Human Involvement

As the blockchain is capable of altering the way people manage their affairs, new software-based organizations, such as decentralized organizations and decentralized autonomous organizations, claim that the software may enable parties to get benefits without any human involvement. The blockchain technology can manage resources and interact with other humans or machines. As a result, issues regarding legal personalities, individual agencies, and their responsibilities have emerged [4]. However, the parts without human involvement, according to the blockchain technology, only refer to the performance of the contract. Such performance is still governed by the codes settled by human. Thus, the intention and activities settled in the codes are considered juristic acts and are ruled by the law of the contract.

Legal theory has principally managed a balance between individuals and states by promoting parties' autonomy and their fundamental rights. Although a smart contract and its decentralized applications have initiated several proposals of amendments for current Internet regulations, the amendments should focus on the codes inserted, rather than the performance. Therefore, once the blockchain technology is widely applied by centralized authorities, such as government agencies and large corporations, the regulation of codes inserted in smart contracts will require particular rules or principles. Otherwise, we may lose the ability to control and shape the authorities operated by decentralized systems.

5   Instantiations of Smart Contracts

Appropriately, the major benefits brought about by smart contracts is the capacities of eliminating the necessity to trust the other party by prohibiting the other part from breaching the contractual performance. The instantiations of contract terms onto machines are the key element to contract law applications. Users' instantiation inserted toward codes by either writing into the existing software or into the software connected to a machine that performs the contract. The performance of smart contracts is guaranteed,

and afterward, human interference is impossible. Thus, the codes inserted will be final and deterministic to the smart contracts with blockchain applications, and moreover, the codes inserted cannot be changed; in other words, users' instantiations will be entirely enforced [5].

Consequently, the instantiations of a user or coder concerns more about the term of offer and acceptance that was inserted into the smart contract system, and the terms regarding the offer and acceptance are referred to general legal regulations not within the contract law. Inquiring the legal implications about the enforceability of the smart contract is irrational because each smart contract is direct and drafted by different instantiations and has no consistency. Recently, legal scholars have struggled to institute an organized theory regarding distinguished smart contracts from other "digital," "electronic," or "online" agreements.

Although nothing prevents smart contracts to have legal effects, smart contracts still are not considered contracts in the legal sense. In law, "contract" refers to an agreement between mutual parties or to the embodiment of an agreement. Contrarily, certain technical writings allocate "smart contracts" as a particular form of technology or entities. However, the key element, in the narrative aspect, in the "smart contract" is "self-enforcement".

Purportedly, the self-enforcement of smart contracts is established upon the blockchain technology, not upon traditional legal institutions. Thus, promissory obligations of the contract law are strengthened spontaneously without state involvement [6]. The term "self-enforcement" is ambiguous and seems to present with a combination of two distinct stages of a contract: performance and adjudication. Therefore, the confusion between rights and records involves the legality issues of smart contracts.

6 Conclusion

As the blockchain supposedly executes the "smart contract" in a balanced and unstoppable manner, the performance of the smart contract will be guaranteed. Once the party inserted the codes, neither of them can change their mind nor refuse to fulfill obligations. Therefore, the execution of the codes is equal to the performance of the obligation embodied therein. In other words, the blockchain secures and guarantees the performance of the smart contract, and the issue of enforcement should not be addressed because enforcement refers to the ability to pursue judicial assistance in the occasions of breaches.

Performance and enforcement refer to different legal notions and are mutually exclusive. Court assistance to the parties should be required when something is wrong in the contract. The guaranteed performance of the smart contract is made to prevent this situation. The essence of a smart contract is a technological tool for the automatic performance of obligations, not a tool for seeking the source of obligations [7]. Therefore, smart contracts do not eliminate the demand for judicial enforcement, and the parties still have rights to acquire it.

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