E-ISSN: 2997-9382
American Journal of Technology Advancement
https://semantjournals.org/index.php/AJTA

| Research Article

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Regulation of Contractual Relations Based on Blockchain: A Legal Analysis

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Annotation
This article analyzes the regulation of contractual relations based on modern blockchain technologies. It discusses the legal essence of blockchain and smart contracts, their reflection in the legislation of the Republic of Uzbekistan and foreign countries, and their practical applications. Specifically, the article presents analytical insights based on the Civil Code of the Republic of Uzbekistan, the Law on "Electronic Commerce," the Law on "Electronic Digital Signature," and decrees and decisions by the President on the development of digital technologies.

Keywords: Blockchain, smart contracts, digital law, electronic commerce, digital signature, judicial practice, freedom of contract, legal innovationss.

Introduction

The rapid development of digital technologies, especially blockchain and its application in practice, is presenting new challenges and tasks for modern legal systems. The main advantages of blockchain technology—transparency, immutability of data, and the ability to create automated processes—are enabling its widespread use in various sectors, particularly in contractual relationships. Specifically, the opportunity to automate contractual relations through "smart contracts" and minimize human involvement is bringing contract formation, execution, and control processes to a new level.

In the Republic of Uzbekistan, several important legal documents have been adopted regarding the development of the digital economy and digital legal relations. Among them are the "Law on Electronic Commerce" (April 29, 2014), the "Law on Electronic Digital Signature" (December 11, 2003), Presidential Decree PQ-3832 (July 3, 2018) "On Measures to Support the Development of the Digital Economy," and other normative acts that create a legal foundation for the formation of

blockchain-based legal relations. However, these legal bases do not yet contain clear and comprehensive provisions regarding the legal status of smart contracts based on blockchain, their role in contractual law, and mechanisms for their regulation.

Looking at global experience, countries such as Estonia, Singapore, and the United States have legally recognized blockchain and smart contracts and developed specific mechanisms for regulating the contractual relations conducted through them. For example, Singapore's "Electronic Transactions Act" and Estonia's "Electronic Identification and Trust Services for Electronic Transactions Act" define the legal force of smart contracts and the procedure for their validation.

This article discusses the legal essence of blockchain technology and smart contracts, their place in the legislation of the Republic of Uzbekistan, and compares them with international practices. Additionally, the article analyzes the key legal issues arising in this field and proposes practical recommendations for improving national legislation.

Materials and Methods

In preparing this scientific article, modern legal analysis and comparative law methodologies were applied. The main objective of the research was to determine the legal status of contractual relations based on blockchain technology and to study national and international legal experiences in regulating these relations.

The object of the study was contractual relations formed through blockchain technology and smart contracts. The subject of the study was the normative-legal documents regulating these relations, international treaties, and judicial practice.

The following main scientific methods were used in preparing the article:

Comparative Legal Analysis: The legal regulation of blockchain and smart contracts in the legislation of Uzbekistan and foreign countries, specifically in Singapore, Estonia, the United States, and European Union member states, was studied. Normative documents were compared to analyze their similarities and differences.

1. Analytical and Statistical Methods: Information and statistical data on the practical application of smart contracts and blockchain technology were analyzed, particularly from international organizations (OECD, World Economic Forum) and reports from advanced countries in the digital economy.

2. Normative Legal Analysis: The analysis of Uzbekistan's existing laws, including:

- Civil Code of the Republic of Uzbekistan (August 29, 1996, No. 257-I)
- Law on "Electronic Digital Signature" (December 11, 2003, No. 560-II)
- Law on "Electronic Commerce" (April 29, 2014, No. 370)
- Presidential Decree PQ-3832 (July 3, 2018)
- Presidential Decree PQ-223 (April 14, 2022) "On Measures to Regulate the Circulation of Crypto-assets"

3. Doctrinal Analysis: Works by legal scholars, monographs, and articles on blockchain and smart contracts were reviewed. The scientific papers published by leading global legal universities and research centers (Oxford, Harvard Law Review) were analyzed.

4. Empirical Approach: Practical cases of contractual disputes and court rulings were studied to derive legal conclusions and recommendations based on the issues and contradictions identified in practice.

The analyses conducted based on these methodologies contributed to the formation of the article's main conclusions and recommendations.

Results

Several significant findings were made during the study of the legal regulation of blockchain-based contractual relations. First, the legal essence of blockchain technology and its role in contract law were clarified. Unlike traditional contractual relations, smart contracts created through blockchain technology are executed automatically, excluding human intervention. This ensures reliability and transparency in the performance of contractual obligations. However, this process also raises some legal issues.

It was found that Uzbekistan's legislation does not yet have a comprehensive legal framework to regulate smart contracts and blockchain-based transactions. The Civil Code and other existing normative legal acts do not clearly define the legal status of contracts formed through digital technologies, particularly smart contracts. This results in various interpretations and approaches to resolving disputes arising from such transactions, thereby increasing legal uncertainty and risks.

While the Republic of Uzbekistan has introduced electronic digital signatures and digital identification systems, their full integration with blockchain-based platforms has not yet been ensured. This creates additional risks in ensuring the authentication of contractual parties and the legal reliability of transactions. Specifically, there may be issues with defining and enforcing rights and obligations among participants in such transactions.

International experience reveals that countries like Singapore, Estonia, and some

U.S. states have clearly defined the legal status of contracts created through blockchain and recognized them as legally binding documents. This has fostered the development of digital economies and crypto-assets circulation in these countries.

The Presidential Decree PQ-223 of April 14, 2022, aimed at regulating the circulation of crypto-assets, is an important document for regulating blockchain technology in Uzbekistan. However, it does not provide specific provisions on the legal status of smart contracts, the procedures for their creation, execution, and dispute resolution.

The study indicates that blockchain-based contracts do not yet define legal responsibilities, obligations, or procedures for dispute resolution. This requires additional measures to ensure the legal protection of digital transactions in line with the principle of freedom of contract.

Discussion

The research shows that blockchain technology and smart contracts are becoming an innovative form of modern contractual relations. These technologies are widely applied in the development of the digital economy, particularly in finance, trade, and services. However, the insufficient legal regulation of blockchain and smart contracts in Uzbekistan hinders the full and effective application of these innovative technologies.

Currently, the Civil Code of the Republic of Uzbekistan sets general principles for the formation and execution of contracts. However, the Code does not provide a specific legal status for smart contracts and contracts based on blockchain technology. The "Law on Electronic Commerce" (2004) and "Law on Electronic Digital Signature" (2003, with amendments in 2021) recognize electronic contracts, but they do not specifically regulate contracts executed automatically via blockchain technology.

Thus, analyzing foreign practices is crucial. For example, Singapore's "Electronic Transactions Act" (2010 revision) fully recognizes digital and blockchain-based smart contracts as legally binding. Similarly, some U.S. states, such as Arizona and Tennessee, have strengthened the legal

status of smart contracts. Estonia has a comprehensive legal framework governing the use of blockchain across all sectors of its digital economy, where smart contracts are widely used by state bodies and business entities.

In Uzbekistan, the Presidential Decree PQ-223 signed on April 14, 2022, provides a legal foundation for the circulation of crypto-assets and related activities but does not define the legal status of smart contracts in detail. Key issues remain open, such as the legal nature of contractual obligations, claims, and liabilities.

The discussion process highlighted that the primary focus in blockchain-based contracts should be on ensuring the reliability and security of digital identification and authentication processes. According to Uzbekistan's "Law on Electronic Digital Signature," an electronic signature is a crucial tool for validating the authenticity of transactions. However, the lack of integration with blockchain- based smart contracts leads to legal ambiguities.

Additionally, as smart contracts are executed automatically based on algorithmic code, interpreting these contracts and addressing disputes, if they arise, differs from traditional contracts, complicating legal proceedings in Uzbekistan. There are no developed legal mechanisms for adjudicating such disputes, which lowers the legal confidence of investors and contracting parties.

Conclusion

The findings of this study confirm the growing significance of blockchain technology and smart contracts in modern contractual relations. However, it has been found that the existing legal framework in Uzbekistan is insufficient to regulate contracts based on these technologies. The current legislation lacks clear provisions regarding the legal status of blockchain and smart contracts, their formation, execution, and dispute resolution.

International experience, particularly from Singapore, Estonia, and U.S. states, shows that legally recognizing and regulating contracts based on blockchain is essential for fostering digital economy growth. Uzbekistan must improve its legislation in this area, including amendments to the Civil Code, the Law on Electronic Commerce, and the Law on Electronic Digital Signature.

Additionally, it is critical to clearly define the rights and obligations of the parties involved in blockchain-based contracts and establish procedures for dispute resolution. The development of technical and legal standards, along with the integration of digital identification and authentication systems with blockchain platforms, is an urgent need.

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