

PROBLEMS OF DEFINING THE CONCEPT AND LEGAL NATURE OF CONTRACT IN THE DIGITAL ERA: FEATURES OF BLOCKCHAIN-BASED AGREEMENTS

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<https://doi.org/10.5281/zenodo.15694633>

Abstract: This paper explores how the traditional concept and legal nature of contracts are being transformed in the digital era, particularly under the influence of blockchain technologies. Special attention is given to the distinctive features, enforceability, and legal challenges posed by blockchain-based contracts.

Keywords: contract law, digitalization, blockchain, smart contracts, legal certainty, automation, private law.

The rapid development of digital technologies has triggered a profound transformation of private law institutions, particularly the concept and structure of contracts. Historically, a contract has been defined as a legally binding agreement between two or more parties, concluded through offer and acceptance, and enforceable by law. With the transition to coded formats, the legal system is increasingly confronted with the question of whether algorithmic declarations of will can be treated as equivalent to traditional expressions of consent. This development necessitates an analysis of how digital tools alter the conventional understanding of legal intent.

In the digital era, consent may no longer be expressed through handwritten signatures or oral declarations, but instead through clicks, electronic signatures, or even lines of computer code. This shift necessitates a legal reassessment of what constitutes mutual assent, especially when algorithms autonomously execute obligations without further human input. In this context, smart contracts, self-executing agreements with terms directly written into code, represent a new paradigm in contractual relations.

Smart contracts operate within blockchain systems, such as Ethereum, and ensure automated execution of contractual terms once pre-set conditions are met. These agreements are immutable, transparent, and decentralized, meaning they do not rely on a central authority or intermediary. According to a 2024 report by Statista, which provides statistical data on global technology trends, the global market for blockchain-based smart contracts is projected to reach over \$500 billion by 2030[1]. Moreover, the number of smart contract transactions surpassed 1.5 billion in 2023, reflecting exponential growth in sectors such as finance, logistics, and e-commerce. In Uzbekistan, the number of fintech startups utilizing blockchain technology has grown more than fivefold since 2020, reflecting a rising demand for legally reliable digital solutions. This growth raises practical concerns for legislators and legal practitioners, as traditional frameworks may no longer suffice to ensure legal certainty and enforceability in automated transactional environments.

In Uzbekistan, the current Civil Code of the Republic of Uzbekistan defines a contract in traditional terms (Articles 151–166) requiring mutual consent and written or oral expression [2]. Although flexible in interpreting form, the legislation does not yet recognize code-based or automated contractual mechanisms. The Law of the Republic of Uzbekistan “On Electronic

Document and Digital Signature” [3] allows legal recognition of electronic contracts and digital signatures but does not extend this recognition to smart contracts or blockchain-based enforcement.

From a comparative perspective, certain jurisdictions have already incorporated blockchain concepts into their legal frameworks. The State of Arizona (USA), for example, passed legislation in 2017 affirming that smart contracts and blockchain signatures are legally enforceable [4]. This statutory recognition provides legal certainty to blockchain transactions by acknowledging that code-based agreements can represent valid legal obligations.

Some jurisdictions, such as Malta and Liechtenstein, have adopted comprehensive frameworks, such as the Maltese Innovative Technology Arrangements and Services Act [5], and the Liechtenstein Blockchain Act [6], which explicitly define legal aspects of smart contracts and digital tokens, offering robust regulatory models.

In this context, it becomes vital to redefine the legal nature of contracts in a manner that accommodates technical developments while preserving the rule of law. A contract that performs automatically may indeed fulfill its economic function, but from a legal perspective, it remains essential to assess whether such execution aligns with doctrinal requirements of intention, mutual assent, and fairness. These foundational concepts of contract law must continue to inform how we assess the legitimacy of new digital mechanisms.

As discussed by Werbach K. and Cornell N. [7], smart contracts require a legal framework that supports interpretation, dispute resolution, and mechanisms for redress. Otherwise, errors in smart contracts could go uncorrected, and parties might be bound to consequences they did not foresee or intend.

This debate is further complicated by the multiplicity of integration models. According to legal studies, smart contracts may exist in three forms: code-only, dual-language (code and natural language), and hybrid models. The hybrid approach, where performance logic is in code, but legal definitions and dispute mechanisms remain in traditional text is widely accepted as the most practical and enforceable.

De Filippi P. and Wright A. [8], emphasize that code-based governance may bypass traditional legal institutions and undermine key principles such as fairness, accountability, and transparency, eroding core values of private law such as good faith, fairness, and balance of interests. In Uzbekistan, in article 354 of the Civil Code where the legal principle of “freedom of contract” is a cornerstone of private law, smart contracts challenge not only form, but also substance. A self-executing contract cannot adapt to changes in circumstances, renegotiation, or equity-based defenses, which are essential features in human-driven contracts.

Modernizing legal provisions related to contract form and interpretation may offer a pathway toward integrating self-executing technologies. This does not require a wholesale replacement of civil code norms, but rather a contextual updating of existing doctrines. Recognizing code-based declarations of will, for example, may be a first step in acknowledging smart contracts as part of the broader category of enforceable agreements.

Summarizing the above, it can be concluded that the transformation of contractual relations in the digital environment requires legal systems to be guided by the principles of legal certainty and functional adaptability. These principles should form the basis for interpreting and applying contract law in the context of new technological instruments such

as blockchain-based smart contracts. However, the absence of clear legal provisions on the status and enforceability of self-executing agreements may limit the practical implementation of digital tools and create uncertainty in cross-border transactions. Since a contract in its essence reflects mutual will and legal balance, it is important to ensure that new formats of agreement maintain this balance and are integrated into legal practice in a way that respects core values of private law.

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