




# A Polyparadigmatic Approach to Understanding the Legal Nature of a Smart-Contract

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Abstract : The modern development of decentralized ledger and blockchain technologies has led to the emergence of smart contracts, which are becoming an important tool in the digital economy, transforming existing understandings of the conclusion and fulfillment of obligations in the digital environment. The authors believe that recognizing the objective multi-paradigmatic nature of this phenomenon will not only facilitate the integration of modern technological advances into the legal system but also stimulate the growth of an innovative economy, increase trust in digital platforms, and ensure their adaptation to the rapidly changing conditions of the digital market. The conclusions include proposals for legislative development based on a multi-paradigmatic approach, which assumes a comprehensive understanding of the legal status of smart contracts, taking into account technological, legal, and socioeconomic aspects. This, according to the authors, will help identify the most promising ways to integrate digital contractual instruments into the modern legal system.


## 1 INTRODUCTION


Literally translated from English, "smart contract" means "intelligent contract." A formal understanding of a smart contract, based on a literal interpretation of this term, can lead to a misunderstanding of the legal nature of this technology. Therefore, both the concept itself and its legal regulation, as well as the potential for application in the field of intellectual property, today give rise to a plurality of doctrinal and practical approaches.

In Russia, the legislative consolidation of smart contracts is gradually taking place in line with the overall digitalization of civil transactions. Thus, in 2019, fundamental changes were introduced to the Civil Code of the Russian Federation through Federal Law No. 34-FZ of March 18, 2019, "On Amendments to Parts One, Two, and Article 1124 of Part Three of the Civil Code of the Russian Federation," which established the concept of digital law and allowed for

transactions to be carried out electronically, including the automation of the fulfillment of obligations through software algorithms. This process paved the way for the emergence of new legal constructs that require consideration, as the review is being carried out. From the perspective of several disciplines, revealing the complex nature of the phenomenon, smart contracts in Russian legislation are therefore considered not only as independent results of intellectual activity protected by copyright in accordance with Part Four of the Civil Code of the Russian Federation, but also as instruments of execution or even elements of a transaction concluded electronically. This duality determines both the protection of software code (copyright holder, exclusive rights, terms of use) and the regulation of contractual relations arising from the practical application of smart contracts ( Digital Future ).

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## 2 MATERIALS AND METHODS

In the context of rapid digitalization and the growth of automated transactions, the analysis of the legal status of smart contracts is becoming a key focus of legal doctrine and practice, reflecting the need to adapt legislation to new realities.

The article's information base consists of: the Federal Law "On Amendments to Parts One, Two, and Article 1124 of Part Three of the Civil Code of the Russian Federation"; the Federal Law "On Digital Financial Assets, Digital Currency, and Amendments to Certain Legislative Acts of the Russian Federation"; materials from the Bank of Russia, articles from specialized media and scientific journals; and Internet resources .

The methodological basis of the study is a systematic and comprehensive approach to the legal qualification of smart contracts, since this phenomenon does not fit neatly into traditional institutions of the law of obligations, as well as a comparative analysis of domestic and international experience in studying the legal nature of smart contracts, identifying the strengths and weaknesses of each model.

## 3 RESULTS AND DISCUSSION

Since 2020, Federal Law No. 259-FZ of July 31, 2020, "On Digital Financial Assets, Digital Currency, and Amendments to Certain Legislative Acts of the Russian Federation," has been in effect to regulate digital financial assets. It established a legal framework for the issuance, circulation, and accounting of digital financial instruments. This law defines the use of smart contracts for the automated execution of digital asset transactions and creates a special accounting procedure, under which only Russian legal entities registered with the Bank of Russia (Finance) can operate digital financial asset information systems. Smart contracts in these ecosystems ensure transaction transparency, automated asset rights transfer, and the ability to implement new models for value exchange without the involvement of intermediaries.

At the same time, the concept of electronic transactions is developing, as detailed in the Civil Code of the Russian Federation and special regulations governing public procurement. Since the second half of the 2020s, digital contracts have been implemented in the Unified Information System for Public Procurement, enabling the automatic

recording, execution, and execution of agreements between parties through smart contracts, minimizing the risks of unfair practices and bureaucratic overhead (Digital Law).

However, despite the existence of a basic regulatory framework, the problems of comprehensive regulation remain unresolved. Legal practice and law enforcement are still developing: issues of identifying parties to a transaction, proving the fact of the conclusion/fulfillment of obligations, and assigning liability in the event of software errors or abuses have not yet been sufficiently developed. Approaches to ensuring copyright and exclusive rights to software are developing, but the widespread adoption of smart contracts is hampered by a limited number of successful cases outside the professional financial sphere ( Digital Future ).

The ambiguity in defining the concept of a "smart contract" is caused by disagreements among researchers on both the technical and legal aspects of this phenomenon.

A number of studies cite the key characteristic of a smart contract as its inextricable connection with distributed ledger technologies, primarily blockchain platforms . This position dominates modern research, which views a smart contract as a software-implemented agreement operating in an electronic environment and executed without the involvement of operators or intermediaries ( Grin , O.S., 2019) .

In foreign literature, distinctions are made between legal smart contract (a legally significant text that enshrines the will of the parties) and smart contract Code (technical implementation of the terms of an agreement in code form) ( Zainutdinova E.V., 2022). By definition, a smart contract can act as an automated program that controls the transfer of digital assets or the fulfillment of obligations—that is, it acts as an intermediary between the parties' intentions and technological execution.

In Russian legal theory, a common definition of a smart contract is that it is implemented in whole or in part using software code in an electronic environment, with automated execution. Thus, B.M. Gongalo and L.A. Novoselova note that a smart contract can be viewed as an agreement concluded in the form of software code and intended for the automatic execution of its terms ( Gongalo B.M., 2019). M.T. Chakhkiev emphasizes the "conditional nature of implementation" of a smart contract: execution occurs strictly upon the occurrence of predetermined circumstances ( Chakhkiev M.T., 2021).

Some argue that a smart contract is not an independent type of agreement, but a new way to

ensure the fulfillment of obligations. This approach is reflected, for example, by M. Yu. Yurasov and D. A. Pozdnyakov, who highlight its security function by analogy with traditional civil law instruments ( Yurasov M. Yu., 2017 ). A. I. Savelyev defines a smart contract as an agreement between the parties, expressed in software code, operating in a blockchain environment and ensuring the inevitability of fulfillment of the stipulated conditions by the parties upon the occurrence of certain events (Savelyeva A. I., 2016). A. A. Volos concluded that a smart contract is a special electronic form of agreement based on specialized software code. According to this author, this is not some kind of new legal construct, but rather a generally accepted one that does not contradict existing principles of contract law (Volos A. A., 2019).

Thus, and not without reason, a persistent conviction is emerging that modern development requires a comprehensive, multi-paradigm approach to understanding the phenomenon of smart contracts and corresponding legislative improvements. Traditional frameworks based on a single concept are increasingly unable to encompass the complex digital relationships that arise at the intersection of law, technology, and international practice.

In the academic debate, three sets of approaches to the legal nature of smart contracts are identified, reflecting the main areas of qualification of this phenomenon in legal doctrine and practice.

The first approach views a smart contract as a type of civil law contract. In this case, the emphasis is on the substantive aspect of the interaction: the program is perceived as a form of expression of the agreed-upon will of the parties. This approach suggests the possibility of recognizing a smart contract as a special form of electronic agreement if the agreement between the parties is recorded in software code, and its terms are executed automatically without further intervention by the parties (Yachmeneva V.M., 2020).

The second approach bases the legal assessment on the essence of a smart contract as a computer program. In this case, the key object is the program code, which is considered an independent work protected by copyright ( Digital Future ).

The third approach assumes that a smart contract is an automated method for fulfilling existing obligations. In this case, the transaction itself is concluded in conventional written or electronic form, and the smart contract, by enshrining a specific algorithm in software code, serves as a security instrument to ensure the inevitability of fulfillment of the agreement. This approach brings smart contracts

closer to institutions for ensuring the fulfillment of obligations, such as automated escrow or surety, but, unlike traditional forms, it minimizes the role of the human factor and third parties (Rozhkova M., 2023).

We believe that the identified approaches have their own advantages and limitations from the point of view of legal theory and the effectiveness of their application in practice.

Thus, by viewing a smart contract as an agreement, proponents of this approach note a high degree of legal certainty: agreements recorded in software code can acquire the status of a transaction with the usual consequences for the parties, including protection in court ( Finkont Legal Center ). However, the problem of inconsistency remains: it is not always possible to determine whether the code reflects the full intent of the parties, especially in complex or non-standard transactions. Furthermore, forensic code review often becomes a necessary, but expensive and time-consuming, tool.

Identifying a smart contract with a program emphasizes the advantages of automation—transactions without intermediaries, reduced costs, and reduced risks of human error. A decentralized environment is believed to enhance security and transaction confirmation, as demonstrated by the experience of blockchain platforms and DeFi services ( Habr.com ). However, the likelihood of failures and bugs in the source code must also be considered: there are known cases (such as the 2016 DAO hack) where program errors led to significant financial losses, and legal response mechanisms were either absent or ineffective (Bank of Russia, 2018). Therefore, by treating a smart contract solely as a program, the legal system does not guarantee the enforcement of protective contract law provisions and requires separate regulation of copyright and property rights to intellectual property.

Finally, the concept of a smart contract as an automated instrument for fulfilling obligations represents a compromise between traditional contract law and innovative mechanisms. Certainly, this approach is in demand in supply chains, automated insurance claims payments, and peer-to-peer services . However, it is incapable of encompassing complex, multi-stage relationships that require constant adjustments by mutual agreement or the intervention of a third party (arbitrator, mediator). Moreover, if software or technical failures occur, as demonstrated by the Arbitrum (Moscow Digital School) case, the process of restoring the original legal status of the transaction is often delayed and entails additional transaction costs.

It's significant that expert communities are proposing the integration of various models, partially acknowledging their advantages: for example, individual agreement provisions are implemented in software code to ensure unambiguous execution, while complex provisions requiring human interpretation are incorporated into the text of the contract. (ECOS) Balanced legal regulation, combining the reliability of automation with the flexibility of traditional law, appears to be the most promising direction for the development of the legal status of smart contracts and requires further doctrinal research.

It appears that polyparadigmality implies the need to consider smart contracts simultaneously from the perspective of several research and legal models: as legal agreements, as objects of copyright, and as technological automation tools.

Attempts to integrate various interpretations face the challenge of finding a balanced approach to the content and classification of smart contracts within the legal system. For example, overly narrow legalization of this instrument could lead to the loss of its innovative nature and flexibility, while focusing exclusively on technological aspects creates risks of legal uncertainty for all participants. Therefore, it is currently impossible to propose a universal legal formula capable of equally effectively regulating smart contracts in all areas.

It is important that the legal system allow for the use of various models—as a contractual instrument, as an automated means of enforcement, and as a software product—depending on the circumstances and interests of the parties. This approach creates a methodological environment for multi-model regulation, where practical law enforcement becomes maximally adaptable and open to new forms of contract formation .

## 4 CONCLUSIONS

Recognizing the multi-paradigmatic nature of legal frameworks necessitates incorporating not only uniform standards into legislation and judicial practice, but also tools for selecting the most relevant legal interpretation in each individual case. Complex legal relationships require a multifaceted analysis and simultaneously allow for the coexistence of several complementary regulatory models, which largely meets the principle of legal flexibility and promotes the sustainability of digital markets.

Russian law has already recognized smart contracts as an independent digital instrument, but a

number of steps are required to truly transition to mass adoption.

First, further development of specialized smart contract repositories is necessary. The infrastructure of such platforms, developed with the participation of the Bank of Russia, is capable of ensuring the transparency, immutability, and verifiability of the terms of digital agreements (Khodorovich M., 2025). Regulatory consolidation of repository requirements , as well as standards for the storage, registration, and identification of smart contracts, will strengthen market participants' trust and ensure a unified digital transaction trail for control and audit purposes.

Secondly, as expected, significant detailing of the procedures for concluding and recognizing the legal force of smart contracts is required. Specifically, it is necessary to legally establish the ability to recognize a smart contract as proof of a transaction without the need to duplicate obligations in a traditional written or other form. Another relevant area is the implementation of standard smart contracts, primarily for the most common types of transactions in logistics, insurance, factoring, and corporate procurement.

Third, a comprehensive regulation of intellectual property issues and exclusive rights to smart contract software code is required. Special procedures for depositing and confirming code authorship should be established, which will reduce conflict and facilitate the resolution of disputes over the illegal copying or modification of smart contracts.

An important step is the development of specific procedural rules for resolving disputes related to the automated fulfillment of obligations and errors in smart contracts. The development of case law, the creation of an expert base, and the training of judges in digital matters will contribute to the advancement of protection of the rights of participants in the digital economy.

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