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Legal Regulation of Smart Contracts in China and the United States: A Comparative Legal Analysis

This paper presents a comprehensive comparative study of the legal regulation of smart contracts in the United States and the People's Republic of China, taking into account both theoretical frameworks and practical applications. Smart contracts are examined as both technological and legal instruments that facilitate the automation of contractual obligations, enhance transactional transparency, and streamline the management of digital assets within the digital economy. The relevance of this research arises from the rapid integration of blockchain technology into the financial sector, public services, international trade, logistics, and insurance. Nevertheless, despite the widespread use of the technology, the legal status of smart contracts and their recognition by national and international courts remain subjects of academic and professional debate. The methodological basis of this study combines comparative legal analysis, a systematic review of regulatory acts and judicial practice, an examination of academic literature, and the synthesis of information from diverse sources. This research highlights the key features of the Chinese and American regulatory models. The Chinese model is characterized by centralized control, where smart contracts are integrated into state-backed digital platforms, including the Blockchain-based Service Network (BSN) and the digital yuan. This approach ensures standardization and security, however constrains the pace of innovative adoption. By contrast, the American model demonstrates flexibility and fosters innovation by recognizing program code as a legally significant instrument under digital transactions and contract law (e.g., the E-SIGN Act of 2000 and various state laws). However, it lacks clear standards and uniform security protocols.

Keywords: smart contract, blockchain, legislation, legal regulation, USA, China, digital economy, decentralization, judicial practice, Anglo-Saxon legal system, legal force.

Introduction

The development of the digital economy generates new opportunities while simultaneously presenting novel challenges for legal systems. A smart contract is program code that enables the automated execution of contractual terms without the involvement of third parties, thereby ensuring transactional transparency and facilitating the management of digital assets [1]. Smart contracts operate on blockchain technology, which provides decentralized verification of transactions and immutability of records [2]. Their application extends to public services, international trade, financial technologies, insurance, and logistics.

The relevance of this study lies in the widespread adoption of smart contracts within the digital economy andthe presenting need to define their legal status. Different jurisdictions adopt divergent approaches to regulation: China emphasizes standardization and centralized control through state-backed digital platforms and the digital yuan, whereas the United States prioritizes flexibility and the promotion of innovation.

The central research problem is the absence of a unified international approach to recognizing the legal force of smart contracts. Regulatory frameworks in the United States and China diverge due to differences in their legal systems, traditions, and economic priorities, highlighting the necessity of developing recommendations for harmonizing national legislation and minimizing legal risks.

The object of this study is the smart contract as both a technological and legal phenomenon [3].

The aim of this research is to conduct a comparative analysis of the legal regulation of smart contracts in the United States and China, and to identify prospects for the development of their legal status.

The research objectives are as follows:

1. To examine the technological characteristics and theoretical foundations of smart contracts;
2. To analyze legislation and judicial practice in the United States regarding smart contracts;
3. To study the approaches of the People's Republic of China in regulating smart contracts;
4. To conduct a comparative legal analysis of the Chinese and American models, identifying their strengths and weaknesses;

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5. To propose recommendations for adapting national legislation and harmonizing international regulation in the context of the digital economy.

As global leaders in the development of advanced technologies, the United States and China play a pivotal role in the legal frameworks for smart contracts. Analyzing the regulation of smart contracts in these countries is therefore essential for understanding their legal nature.

Methods and materials

The study conducted a comprehensive analysis of the legal regulation of smart contracts in the People's Republic of China and the United States, employing comparative legal analysis, systems analysis, and the examination of legislative acts and judicial practice. Both general scientific and specialized legal methods were applied, including doctrinal, analytical, and comparative approaches.

The materials for this research comprised a wide range of official documents, including the E-SIGN Act of 2000, state legislation, digital finance laws, electronic transactions, standards of the BSN, official judicial decisions, as well as academic papers and doctrinal sources.

Comparative analysis was conducted with due regard to the specific features of Chinese and American legal systems.

A systems approach was employed to examine the interrelation between technological infrastructure and the legal dimensions of smart contracts, including the role of decentralized finance platforms (DeFi) in the United States and public digital platforms such as the BSN in China.

The method of synthesis enabled the integration of data on legal approaches, practical examples of smart contract implementation, and judicial practice, and further facilitated the formulation of recommendations for harmonizing regulatory frameworks.

Results

Smart contracts were first conceptualized by Nick Szabo in 1994 as program codes designed to enable the automatic execution of contractual terms without involvement of third parties [4]. With the advent of blockchain technology, smart contracts have rapidly developed and gained widespread application. Accordingly, their legal regulation and enforceability have become issues of central importance. The legal force of a smart contract depends on the recognition of the code as a legally binding agreement. In China, smart contracts are integrated into centralized, state-backed platforms, and the evidentiary weight of blockchain records has been recognized by courts, including the Beijing Internet Court [5]. By contrast, in the United States, the legal framework for digital transactions is established through legislation as the E-SIGN Act of 2000 and the Uniform Electronic Transaction Act (UETA) [6].

The People's Republic of China

Although the People's Republic of China lacks direct legislation specifically addressing smart contracts, their use is regulated by a range of legal instruments. The Blockchain-based Service Network (BSN) standards provide the infrastructure for deploying smart contracts on state-backed digital platforms. Laws governing digital finance regulate electronic transactions, payments, tokenization, and digital assets, while electronic transactions laws ensure the admissibility of blockchain-based evidence in electronic documents.

Several distinctive features of the Chinese model can be highlighted. First, there is a unified (centralized) control: the state regulates the infrastructure, verification, and security standards for smart contracts. Second, the Supreme People's Court of China has issued a ruling requiring internet courts to recognize electronic data verified by blockchain methods, including hash values, timestamps, electronic inscriptions, and others, if their authenticity and resistance to counterfeiting can be established. Third, smart contracts are integrated with the digital yuan, allowing interaction with the national digital currency [7].

Judicial practice further illustrated the recognition of blockchain-based evidence in China. The first such case occurred in June 2018 in Hangzhou, where blockchain records were accepted as admissible and reliable evidence. The court emphasized that smart contracts should not be dismissed merely due to their technological complexity. In 2019, the Beijing Internet Court automatically submitted a case using smart contract technology. If the terms of mediation were not fulfilled, the case was automatically sent to court, which became the first such precedent in China. A dedicated platform, "Balance Blockchain", is integrated with the judicial system and applies smart contracts to speed up the consideration process and increase transparency. This platform stores tens of millions of pieces of evidence. For example, in Sichuan, the court accepted blockchain evidence in a copyright infringement case. An audio work protected by hashes was recognized as admissible evidence, and compensation in the amount of 20,000 yuan was awarded. Blockchain ev-

idence is even being applied in criminal cases. This was in a fraud case in the Shaoxing City Court (Shanyu County). The defendant was sentenced to imprisonment [8].

The United States of America

In the United States, smart contracts are regulated on the basis of contract law and electronic commerce. There are three main aspects in the U.S. approach. First, the E-SIGN Act of 2000 recognizes electronic contracts as legally binding. Second, state laws, for example, the Wyoming Digital Asset and Smart Contract Law, provide a legal basis for digital assets and smart contracts. Third, in judicial practice, legislation is applied to smart contracts on decentralized platforms, such as CFTC v. Ooki DAO (a judicial precedent).

The features of the American model lie in its flexibility and support of innovation. The laws may allow experimentation with new technologies [9]. Recognition of code as a contract depends mainly on the fulfillment of the conditions of offer, acceptance, and the intention to create an obligation. However, while decentralized platforms increase the speed of innovation, they may also create create legal uncertainty. The U.S. overcomes this uncertainty through major precedent-setting cases [10].

Judicial practice in the United States is based on precedents, as the country follows the Anglo-Saxon legal system. The CFTC (Commodity Futures Trading Commission) and the SEC (Securities and Exchange Commission) are the main regulatory bodies, although sometimes individuals also act as plaintiffs in U.S. courts, with decentralized platforms often appearing as defendants. After analyzing five major cases concerning blockchain technology, such as CFTC v. Ooki DAO (2022-2023), SEC v. Telegram (2020), SEC v. Ripple Labs (2020-2023), Archer v. Coinbase (2019), CFTC v. McDonnell (2018), the following conclusions can be drawn:

1. Smart contracts are a technical instrument of execution rather than an independent agreement;
2. Liability rests with the developer, the DAO administrator, or the companies that use smart contracts;
3. Automation through code does not exempt parties from the application of traditional contractual and financial law.

In conclusion, the Chinese model ensures security and standardization, but slows down the adoption of new technologies, while the American model is flexible and encourages innovation, but lacks legal standardization and clear regulations.

Discussion

The comparative analysis of the legal regulation of smart contracts in the two countries has shown that there are significant differences in their approaches. Both the United States and China recognize the legal force of smart contracts, but their integration into the existing legal systems differs significantly.

Menell P. believes that the American system encourages the introduction of innovative technologies and ensures maximum flexibility, allowing smart contracts to operate within the framework of contract law [11]. N. Szabo notes that the recognition of program code as a legally binding agreement opens broad opportunities for the digital market, but at the same time creates legal uncertainty, especially in cross-border transactions.

Judicial practice, such as CFTC v. Ooki DAO, shows that U.S. courts tend to apply existing laws to new digital instruments, but such decisions often require interpretation and may be ambiguous or even contradictory. Thus, the American experience demonstrates high potential for innovation, while maintaining significant legal risks.

Chinese author Y. Liu emphasizes that China focuses on centralized legal regulation and standardization of smart contracts, which ensures legal certainty and security. The People's Bank of China (PBC), between 2020 and 2022, issued recommendations and regulatory guidelines. According to their position (2022), the implementation of smart contracts in state-backed digital platforms has allowed blockchain transactions to be used as evidence in court, thereby reducing the risks of dishonest pratices. However, the Chinese model limits innovative potential and slows the integration of new technologies. Researchers from BSN Development (2023) have noted that centralized infrastructure facilitates the control and verification of smart contracts, but also created dependence on government decisions.

As we can see, each model has its advantages and disadvantages, and they differ significantly from one another. Therefore, some authors, including UNICITRAL, propose developing international standards for smart contracts in order to minimize risks and increase legal certainty in cross-border transactions. This confirms the need to harmonize national approaches with international practices [12]. Effective use of smart contracts requires a combination of flexibility and standardization, which will establish legal certainty,

strengthen trust among participants in the digital economy, and ensure the sustainable development of innovative technologies.

As for domestic scientists, Ilyassova G.A. and Aitimov B.Zh. believe that, based on blockchain technology, the national regulation for the protection of personal data should be adopted [13]. Authors Bazarov M.M. and Tokatov R.A. argue in their article that the legal correctness of smart contracts in blockchain technology, including the mechanisms regulating its legal definition, should be thoroughly studied by legal professionals. We assume that the experience of the two leading countries can help in resolving these issues [14].

We also believe that the following recommendations could be added to this list:

1. The practical implementation of smart contracts requires improving the legal literacy of developers and market participants;

2. The adaption of national laws to the digital economy must take into account the balance between security and innovation;

3. The integration of elements of decentralized and centralized control would allow combining the advantages of the U.S. and Chinese models.

Overall, the comparative analysis of the legal regulation of smart contracts in China and the United States has showed that both countries strive to create favorable conditions for the use of blockchain technologies. It should also be emphasized that further development of the regulatory framework and the harmonization of international norms will contribute to strengthening trust in smart contracts and their widespread use.

Conclusion

This study has shown that the legal regulation of smart contracts in China and the United States differs significantly in its approaches. These differences stem from national legal traditions, economic priorities, and strategies for implementation of digital technologies.

In the United States, smart contracts are regarded as a flexible tool that supports innovation and allows program code to be used as a legally binding agreement. However, the decentralized nature of these platforms creates legal uncertainty in the absence of standardization.

In China, the model is oriented toward centralized regulation and standardization. The digital yuan and state-backed digital platforms provide a high level of legal certainty, and blockchain-based transactions are recognized as admissible evidence in court. Control and restriction of flexibility and innovation result in enhanced security and traceability of actions, although this significantly slows the pace of technological adoption.

Undoubtedly, the regulatory approaches of these two global powers have their own advantages and disadvantages. In China, the People's Bank of China and other government agencies fully control the blockchain sector; smart contracts may only be implemented on approved state-backed digital platforms. This limits the innovative initiative of private startups and companies. Cryptocurrency trading is prohibited in China, and therefore international projects on Ethereum or other public blockchains cannot operate legally within the country. China does not have a separate law on smart contracts; they are interpreted solely as a type of electronic contract. Similarly, in the United States there is no unified federal law on smart contracts. In some states, smart contracts are recognized in civil law circulation, but the rules vary, leading to legal fragmentation. The U.S. Securities and Exchange Commission (SEC) defines many tokens as securities, while the Commodity Futures Trading Commission (CFTC) treats them as commodity derivatives. This creates inconsistencies in determining the legal nature of smart contract involving tokens.

In both jurisdictions, smart contracts have demonstrated tangible results and continue to develop rapidly.

The findings of this analysis allow for following conclusions and recommendations:

1. National approaches should be systematized, and international standards should be developed to increase legal certainty and foster trust among participants in the digital economy.

2. The Civil Code of the Republic of Kazakhstan currently lacks a definition of smart contracts. It is therefore proposed to enshrine such the definition in order to determine their legal nature and to regulate the legal mechanism for their application in legislation.

3. To practical implementation of smart contracts requires improving the legal literacy of developers and market participants. It is also essential to prepare IT specialists capable of implementing smart contracts.

4. The integration of elements of centralized and decentralized control would make it possible to combine the advantages of both models.

In conclusion, it should be noted that smart contracts represent a promising instrument of the digital economy. However, their effective application requires legal regulation, primarily at the international level, followed by the harmonization of national legislation with international instruments.

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С.С. Боранбай

АҚШ пен ҚХР-да смарт-келісімшартын құқықтық реттеу: салыстырмалы-құқықтық талдау

Жұмыста смарт-келісімшарт ұғымының құқықтық табиғаты мен оны қолдану тәжірибесі АҚШ пен ҚХР мысалында салыстырмалы-құқықтық талдау негізінде қарастырылған. Смарт- келісімшарт — шарттық міндеттемелерді автоматтандыруға ықпал ететін, мәмілелердің ашықтығын арттыратын, цифрлық экономика жағдайында цифрлық активтерді басқаруды жеңілдететін технологиялық және құқықтық құрал ретінде зерделенген. Мақаланың өзектілігі қаржы секторына, мемлекеттік қызметтерге, халықаралық саудаға, логистика мен сақтандыруға блокчейн технологиясын жедел енгізуге байланысты. Алайда, технологияның кең таралуына қарамастан, смарт-келісімшарттың құқықтық мәртебесі және оларды ұлттық және халықаралық соттарда мойындау мамандар мен ғалымдар арасында даулы мәселе болып саналады. Зерттеудің әдіснамалық базасы салыстырмалы құқықтық талдаудан, нормативтік құқықтық актілер мен сот практикасын жүйелі зерттеуден, ғылыми әдебиеттерді талдаудан, әртүрлі дереккөздерден алынған ақпарат синтезінен тұрады. Сонымен қатар мақалада қытайлық және американдық реттеу модельдерінің негізгі ерекшеліктері көрсетілген. Қытай моделі орталықтандырылған бақылауға ие және смарт-келісімшарттар мемлекеттік цифрлық платформаларға (Blockchain-based Service Network (BSN) пен сандық юаньды қоса алғанда) енгізілген. Бұл стандарттау мен қауіпсіздікті қамтамасыз етеді, алайда инновациялық енгізу жылдамдығын шектейді. Американдық модель, керісінше, орталықсыздандырумен, икемділікпен және технологиялық инновацияларды қолдаумен ерекшеленеді. Федералдық және штаттық заңдар деңгейінде смарт-келісімшарт заңды маңызды құрал ретінде танылады, атап айтқанда, E-SIGN Act (2000), жеке штат заңдарына және бірқатар штаттардың цифрлық мәмілелер туралы заңдарына сәйкес. Алайда, бірыңғай қауіпсіздік стандарттары мен хаттамаларының болмауы құқық қолдану

практикасын фрагментациялау қаупін тудырады. Осылайша, салыстырмалы талдау көрсеткендей, АҚШ-та инновациялардың дамуын ынталандыратын либералды тәсіл басым, ал ҚХР-да мемлекеттік қауіпсіздік пен цифрлық платформаларға сенімділікті қамтамасыз етуге бағытталған құқықтық бақылау мен стандарттау моделі жүзеге асырылуда.

Кілт сөздер: смарт-келісімшарт, блокчейн, заңнама, құқықтық реттеу, АҚШ, Қытай, цифрлық экономика, орталықсыздандыру, сот практикасы, англо-саксондық құқықтық жүйе, заң күші.

С.С. Боранбай

Правовое регулирование смарт-контракта в КНР и США: сравнительно-правовой анализ

В данной работе проведено комплексное сравнительное исследование правового регулирования смарт-контракта в США и в КНР, охватывающее как теоретические основы, так и практические аспекты их применения. Смарт-контракт рассматривается как технологический и юридический инструмент, обеспечивающий автоматизацию исполнения договорных обязательств, повышение прозрачности сделок и эффективное управление цифровыми активами в условиях развития цифровой экономики. Актуальность исследования обусловлена стремительным внедрением блокчейн-технологии в финансовый сектор, государственное управление, международную торговлю, логистику и страхование. Несмотря на широкое распространение технологии, правовой статус смарт-контракта и их признание в национальных и международных судах остается предметом споров как среди специалистов, так и среди ученых. Методологическую основу работы составляют сравнительно-правовой анализ, системное изучение нормативно-правовых актов и судебной практики, а также анализ научной литературы и синтез данных из различных источников. Исследование выявляет особенности китайской и американской моделей регулирования. Китайская модель характеризуется высокой степенью централизации: смарт-контракты интегрируются в государственные цифровые платформы, включая Blockchain-based Service Network (BSN) и систему цифрового юаня. Такой подход обеспечивает стандартизацию и высокий уровень безопасности, однако ограничивает скорость инновационного развития. Американская модель, напротив, отличается децентрализацией, гибкостью и поддержкой технологических инноваций. На уровне федерального законодательства и законодательства штатов смарт-контракт признается юридически значимым инструментом — в частности, в соответствии с E-SIGN Act (2000) и законами о цифровых сделках ряда штатов. Однако отсутствие единых стандартов и протоколов безопасности создает риски фрагментации правоприменительной практики. Таким образом, сравнительный анализ показывает, что в США преобладает либеральный подход, стимулирующий развитие инноваций, тогда как в КНР реализуется модель правового контроля и стандартизации, направленная на обеспечение государственной безопасности и доверия к цифровым платформам.

Ключевые слова: смарт-контракт, блокчейн, законодательство, правовое регулирование, США, Китай, цифровая экономика, децентрализация, судебная практика, англо-саксонская правовая система, юридическая сила.

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