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Features of the civil law status of tokenized property rights in the modern economic system

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Abstract: The relevance of this study is determined by the rapid expansion of asset tokenization technologies and the emergence of new models for the exercise of property rights within the digital economy. The transformation of economic relations under the influence of distributed ledger technologies has led to the appearance of new objects of civil circulation that require appropriate legal recognition, effective mechanisms of transfer, and reliable protection of the rights of market participants. At the same time, existing approaches to the regulation of tokenized property rights remain fragmented, creating a need for a deeper scientific understanding of their civil law nature and operational characteristics. **The purpose** of the article is to advance the scholarly understanding of the civil law status of tokenized property rights by clarifying their legal nature, examining the specific features of their circulation in the digital economy, and substantiating approaches to the improvement of their legal regulation and protection. **Methods.** The study employs both general scientific and special legal research methods, including formal-legal, systemic-structural, comparative-legal, logical-legal, and analytical methods. The research is based on international legal

instruments, European Union regulations, Ukrainian legislation, and contemporary academic literature addressing digital assets and tokenization. **Results.** The conceptual and legal foundations of tokenized property rights were examined, and their place within the system of civil law relations was determined. The principal mechanisms and models of real-world asset tokenization were analyzed, and their impact on the transformation of property rights circulation in digital environments was identified. It was found that tokenization contributes to increased asset liquidity, broader access to investment opportunities, and the development of new forms of participation in economic value creation and distribution. It was demonstrated that tokenization transforms traditional ownership models through the fractionalization of proprietary interests, the separation of economic participation from direct control over assets, and the emergence of new forms of collective ownership. Key legal, regulatory, and practical challenges associated with the legal qualification of tokenized rights, cross-border circulation of digital assets, protection of token holders, application of smart contracts, and legal certainty of digital transactions were identified. **Conclusions.** The effective development of tokenized property rights requires the adaptation of traditional civil law institutions to the realities of the digital economy, the strengthening of legal mechanisms linking tokens with underlying assets, and the enhancement of safeguards for market participants. Future research should focus on the legal nature of digital control over assets, the civil law implications of smart contracts, dispute resolution mechanisms in decentralized environments, and the harmonization of international approaches to the regulation and protection of tokenized property rights.

Keywords: digital assets, asset tokenization, proprietary interests, ownership rights, digital economy, smart contracts, legal regulation, rights protection, blockchain technology, rights circulation.

Особливості цивільно-правового статусу токенізованих майнових прав у сучасній економічній системі

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Анотація: Актуальність дослідження зумовлена стрімким поширенням технологій токенізації активів та формуванням нових моделей реалізації майнових прав у цифровій економіці. Трансформація економічних відносин під впливом технологій розподіленого реєстру спричиняє появу нових об'єктів цивільного обороту, що потребують належного правового визначення, ефективних механізмів обігу та належного захисту прав учасників цифрових ринків. Водночас існуючі підходи до правового регулювання токенізованих майнових прав залишаються фрагментарними, що обумовлює необхідність подальшого наукового осмислення їх цивільно-правової природи та особливостей функціонування. **Метою статті** є поглиблення наукового розуміння цивільно-правового статусу токенізованих майнових прав шляхом уточнення їх правової природи, дослідження особливостей їх обігу в умовах цифрової економіки та обґрунтування підходів до вдосконалення правового регулювання і захисту таких прав. **Методи.** У процесі дослідження використано загальнонаукові та спеціально-юридичні методи пізнання, зокрема формально-юридичний, системно-структурний, порівняльно-правовий, логіко-правовий та аналітичний методи. Інформаційну основу дослідження становили міжнародні нормативно-правові акти, акти Європейського Союзу, законодавство України, а також сучасні наукові праці, присвячені проблематиці цифрових активів і токенізації. **Результати.** Досліджено концептуальні та правові засади

токенізованих майнових прав та встановлено їх місце у системі цивільно-правових відносин. Проаналізовано основні механізми і моделі токенізації реальних активів та визначено їх вплив на трансформацію процесів обігу майнових прав у цифровому середовищі. Виявлено, що токенізація сприяє підвищенню ліквідності активів, розширенню доступу до інвестиційних можливостей і формуванню нових механізмів участі у розподілі економічної вартості. Доведено, що розвиток токенізації змінює традиційні моделі власності через фракціонування майнових інтересів, відокремлення економічної участі від безпосереднього контролю над активом та виникнення нових форм колективного володіння. Встановлено ключові правові, регуляторні та практичні проблеми, пов'язані з правовою кваліфікацією токенізованих прав, транскордонним обігом цифрових активів, захистом прав власників токенів, застосуванням смарт-контрактів і забезпеченням юридичної визначеності цифрових транзакцій. **Висновки.** Ефективний розвиток токенізованих майнових прав потребує адаптації традиційних інститутів цивільного права до особливостей цифрової економіки, удосконалення механізмів правового зв'язку між токеном і базовим активом, а також посилення гарантій захисту прав учасників цифрових ринків. Перспективи подальших досліджень пов'язані з вивченням правової природи цифрового контролю над активами, особливостей застосування смарт-контрактів, механізмів вирішення спорів у децентралізованих системах та гармонізації міжнародних підходів до регулювання токенізованих майнових прав.

Ключові слова: цифрові активи, токенізація активів, майнові інтереси, право власності, цифрова економіка, смарт-контракти, правове регулювання, захист прав, блокчейн-технології, обіг прав.

Problem statement. The rapid expansion of digital technologies, distributed ledger infrastructures, and tokenization mechanisms has fundamentally transformed traditional approaches to the circulation of property rights within contemporary

economic systems. Tokenized property rights increasingly serve as legal and economic instruments for representing ownership interests, claims, and other proprietary entitlements in digital environments. At the same time, the growing practical application of tokenization has exposed significant legal uncertainties concerning the civil law nature of tokenized rights, the mechanisms of their transfer and protection, and the determination of their place within existing systems of property and contractual relations. These issues are particularly relevant in light of the increasing integration of digital assets into investment, financial, and commercial transactions, where legal certainty constitutes a prerequisite for market stability and effective protection of participants' interests. Consequently, the study of the civil law status of tokenized property rights is directly connected with the broader scientific task of adapting legal doctrine to the realities of the digital economy and with the practical need to develop coherent regulatory approaches capable of ensuring the lawful circulation, recognition, and enforcement of rights represented through tokenization.

Analysis of recent research and publications. A review of contemporary scholarship demonstrates the gradual formation of a comprehensive scientific approach to understanding the civil law status of tokenized property rights, combining private law, economic, and technological dimensions of the digital transformation of ownership. Considerable attention to the legal characterization of digital assets is devoted by A. V. Zakablukivskyi, who substantiates criteria for the identification and classification of digital assets, determines their place within the system of modern property relations, and emphasizes the need to establish clear legal regimes for different categories of digital objects [1]. In a subsequent study, the same author examines economic models of accounting and taxation of digital assets, highlighting the relationship between the legal status of digital assets and the mechanisms governing their economic circulation [2]. Furthermore, A. V. Zakablukivskyi analyzes the risks of digital asset loss throughout the owner's life cycle, substantiating the necessity of improving legal mechanisms for the protection and transfer of digital rights and interests [3].

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A separate strand of research focuses on digital inheritance and succession with respect to digital assets. V. I. Trach explores the implementation of notarial information systems for the registration and transfer of digital assets to heirs, emphasizing the importance of integrating digital registries into notarial practice [4]. D. I. Liushenko and co-authors further develop this perspective by examining information systems for managing digital heritage and their integration into legal processes, highlighting the significance of technological infrastructure for the effective exercise of property rights in digital environments [5].

A substantial contribution to the study of the economic foundations of tokenization is provided by Z. S. Pestovska, who considers tokenization as a promising direction for the transformation of Ukraine's economy and the development of new mechanisms for investment attraction and digital asset circulation [6]. T. I. Brovchenko and D. Ye. Bilous advance a civil law approach to the issue by substantiating the concept of the digital thing as a new object of civil rights and identifying the specific features of its legal regime within the contemporary civil law system [7].

A significant body of international research is devoted directly to the legal nature of tokens and tokenized assets. J. Wyczik analyzes the applicability of property law concepts to crypto tokens, arguing that certain categories of tokens may be treated as objects of property rights relations [8]. J. M. Moringiello and C. K. Odinet develop the concept of the "property law of tokens," demonstrating the need to adapt traditional property law doctrines to digital assets and distributed ledger technologies [9]. P. Çağlayan Aksoy conducts a comparative analysis of civil law and common law approaches to crypto assets and substantiates the applicability of traditional property law remedies to digital objects [10].

Further development of the legal framework for tokenized assets is presented in the work of X. Lavayssière, who examines the legal structures of tokenized assets and the mechanisms through which rights to underlying assets are represented and exercised through digital tokens [11]. J. Kaisto and co-authors investigate the relationship between non-fungible tokens (NFTs), tokenization processes, and

ownership rights, emphasizing the transformation of traditional models of possession, use, and disposition of property in digital environments [12].

A comprehensive interdisciplinary perspective is offered by V. Tsiura and co-authors, who examine the economic and private law dimensions of virtual assets in the era of digitalization, highlighting the necessity of harmonizing economic and civil law mechanisms for their regulation and circulation [13].

Identification of previously unresolved parts of the general problem. Despite the growing scholarly interest in digital assets, the civil law status of tokenized property rights remains insufficiently conceptualized. Existing research predominantly addresses technological and regulatory dimensions of tokenization, whereas the legal nature of tokenized rights, the transformation of proprietary relations, and the mechanisms of their legal protection have not received comprehensive consideration.

The unresolved nature of these issues limits legal certainty in the circulation of digital assets and complicates the development of coherent regulatory approaches. Their further examination is therefore necessary for improving the theoretical foundations and practical mechanisms governing tokenized property rights within the digital economy.

Formulation of the article's objective (research purpose). The purpose of this article is to develop a comprehensive understanding of the civil law status of tokenized property rights by clarifying their legal nature, examining the specific features of their circulation within the digital economy, and substantiating approaches to their effective legal regulation and protection.

Objectives of the article:

1. To determine the legal nature and civil law status of tokenized property rights within the digital economy.

2. To examine the transformation of proprietary relations and ownership models resulting from asset tokenization.

3. To identify key legal challenges and substantiate approaches to improving the regulation and protection of tokenized property rights.

Main material. Tokenized property rights represent a new form of legal organization of proprietary interests within the digital economy. Their emergence reflects the increasing integration of blockchain infrastructures into economic transactions and challenges traditional approaches to the identification, transfer, and protection of civil rights. Although tokenization is based on technological mechanisms, the legal significance of a token is determined not by its digital form but by the proprietary entitlement that it represents and the extent to which such entitlement is recognized within the applicable legal framework [14] (table 1).

Table 1

Conceptual and legal foundations of tokenized property rights within civil law relations

Conceptual element	Legal content	Civil law significance	Practical manifestation in tokenized circulation
Tokenized property right	Proprietary entitlement represented through a digital token	Connects the digital record with a legally protected economic interest	Use of tokens to represent claims to real estate, securities, receivables, intellectual property, or investment assets
Underlying asset	Tangible or intangible asset to which the token refers	Determines the scope and enforceability of the holder's rights	A token may confirm access to income, ownership participation, licensing rights, or contractual claims
Digital token	Technical instrument for recording and transferring a right	Serves as evidence of entitlement but does not automatically replace legal title	Blockchain records support transaction verification and holder identification
Civil law transaction	Legal act through which rights arise, change, or terminate	Ensures that token transfers produce legal consequences	Sale, assignment, licensing, investment, or other contractual arrangements linked to token issuance
Transferability	Ability of the right to move from one holder to another	Provides legal continuity of proprietary relations	Smart contracts facilitate automated transfers subject to legal requirements
Legal protection	System of remedies available to the holder	Guarantees enforceability in the event of disputes or violations	Judicial protection, restitution, damages, and recognition of rights

Source: developed by the author based on [1; 6, p. 27; 7, p. 27; 9, p. 620; 10, p. 190; 13, p. 369].

The legal significance of tokenized property rights extends beyond their technological architecture and lies in their capacity to transform traditional mechanisms of asset circulation. In practice, tokenization is increasingly employed in sectors where ownership structures are complex, transactions are costly, or access to investment opportunities is limited [1]. Real estate projects illustrate this trend particularly clearly, as tokenization enables the fractional allocation of economic interests among multiple participants while maintaining a connection with a single underlying asset. This approach broadens market accessibility and facilitates more flexible investment models.

A similar transformation can be observed in the field of intellectual property, where tokenized rights may provide access to future royalty revenues, licensing income, or other forms of economic participation derived from intangible assets. In such cases, the token functions as a digital representation of a legally recognized claim rather than as an independent object of ownership [7, p. 27]. This distinction remains essential for determining the legal consequences of transactions and the scope of protection available to right holders.

The growing relevance of this model is reflected in the regulatory developments of the European Union. The Markets in Crypto-Assets Regulation establishes a legal framework for crypto-assets and contributes to greater legal certainty regarding digital representations of economic value, while preserving the importance of the underlying legal relationship from which rights originate [14]. At the national level, the Ukrainian Law “On Virtual Assets” similarly recognizes virtual assets as objects of civil circulation, thereby creating legal preconditions for the further development of tokenized economic relations [15].

At the same time, practical implementation demonstrates that technological reliability does not automatically eliminate legal risks. Blockchain records may provide an immutable history of transactions, yet disputes concerning ownership, invalid transfers, conflicting claims, inheritance, insolvency, or enforcement against third parties continue to be resolved through traditional legal mechanisms. Consequently,

international legal initiatives increasingly emphasize the necessity of ensuring legal recognition of electronic transferable records and digital representations of rights within existing systems of private law [16].

These developments indicate that tokenized property rights should be regarded as a distinct legal phenomenon situated at the intersection of property law, contract law, and digital asset regulation. Their effective operation depends not only on technological innovation but also on the existence of coherent legal rules capable of ensuring legal certainty, enforceability, and protection of the interests of all participants involved in tokenized transactions.

Real-world asset (RWA) tokenization has become one of the most significant developments in the digital economy, creating new mechanisms for integrating physical and intangible assets into blockchain-based environments. Unlike the general recognition of tokenized property rights, RWA tokenization focuses on the legal and organizational processes through which assets are transformed into digitally transferable units capable of circulating across decentralized and conventional market infrastructures. This process expands the functional possibilities of property rights by enabling their division, transfer, financing, and management through technologically mediated systems while preserving their connection to identifiable underlying assets [17] (table 2).

Table 2

Legal mechanisms and models of real-world asset tokenization in digital environments

Tokenization model	Asset category	Legal structure of rights allocation	Economic and transactional implications
Direct ownership tokenization	Real estate, infrastructure assets	Token represents a legally recognized ownership interest in the underlying asset	Facilitates fractional ownership and broader investor participation
Special purpose vehicle (SPV) model	Commercial property, investment portfolios	Token holders acquire rights through shares or interests in a separate legal entity	Simplifies asset management and regulatory compliance

Asset-backed tokenization	Commodities, receivables, inventories	Token value is linked to specific assets held by a custodian or issuer	Enhances liquidity of traditionally illiquid assets
Revenue-sharing model	Intellectual property, creative assets	Token grants entitlement to future income streams rather than ownership	Expands financing opportunities through income-based participation
Debt tokenization	Loans, bonds, financial claims	Token represents creditor rights arising from contractual obligations	Increases efficiency of debt issuance and secondary market trading
Hybrid tokenization model	Multi-asset structures	Combines proprietary, contractual, and financial rights within a single framework	Supports complex investment and financing arrangements

Source: developed by the author based on [2; 6, p. 29; 9, p. 641; 10, p. 204; 11, p. 6; 13, p. 370].

A distinctive feature of contemporary tokenization models is the gradual separation of economic participation from direct physical control over assets. This development enables proprietary interests to circulate independently from the asset itself while preserving a legally identifiable connection between the token holder and the underlying source of value [2]. As a result, tokenization is increasingly used not merely as a technological tool for digital recordkeeping but as a mechanism for restructuring the legal and economic architecture of asset circulation.

In practical terms, tokenization expands the range of transactions that can be performed with a single asset without altering its physical or legal integrity. A commercial building, for example, may remain a single object of ownership while the economic interests associated with it are distributed among numerous participants through digital tokens [9, p. 641]. Similar approaches are applied to private debt instruments, infrastructure projects, investment funds, and intellectual property portfolios, where token holders acquire rights linked to future revenues, repayment obligations, or other economically measurable benefits. Such arrangements create additional liquidity channels for assets that have traditionally been characterized by limited transferability and high transaction costs.

Another important consequence concerns the transformation of market access. Conventional investment structures often require substantial capital commitments and involve extensive intermediary participation. Tokenization reduces these barriers by enabling fractional allocation of economic interests and facilitating transactions through digital infrastructures. Consequently, smaller investors gain access to asset classes that were previously available primarily to institutional participants, while asset owners obtain alternative mechanisms for attracting capital and diversifying financing sources.

From a legal perspective, the effectiveness of these models depends on the existence of a reliable framework linking the token to the underlying asset and defining the rights attached to digital units. International legal instruments increasingly recognize the importance of electronic transferable records and their role in supporting legally effective digital transactions [16]. At the same time, the European Union has established a regulatory environment for testing distributed ledger technology within financial market infrastructures, thereby encouraging the controlled integration of tokenized assets into regulated markets [17].

These developments indicate that RWA tokenization is gradually evolving from an innovative financing instrument into a broader legal and economic mechanism capable of altering the circulation of property rights. Rather than replacing existing legal institutions, tokenization introduces new methods of organizing ownership participation, transferring economic interests, and managing assets within digitally interconnected markets.

The tokenization of tangible and intangible assets is reshaping traditional concepts of ownership by introducing new forms of participation in economic value creation and asset management. While classical property law is generally built around the idea of an identifiable owner exercising a unified set of rights over an asset, tokenization enables the distribution of economic interests, governance functions, and revenue entitlements among multiple participants. As a result, ownership is increasingly evolving from a static legal relationship into a more flexible structure

capable of accommodating the realities of digitally interconnected markets and data-driven economic activity [18] (table 3).

Table 3

Transformation of Ownership Models and Proprietary Relations under Asset Tokenization

Transformation dimension	Traditional ownership framework	Tokenized ownership configuration	Implications for right holders
Ownership concentration	Rights held by a limited number of owners	Rights distributed among multiple token holders	Broader participation in asset ownership
Asset divisibility	Physical or legal division often restricted	Digital fractionalization of economic interests	Increased accessibility and capital mobilization
Control mechanisms	Direct management by owner or representative	Governance functions may be exercised collectively through digital systems	New forms of stakeholder participation
Revenue allocation	Income distributed according to conventional ownership shares	Automated allocation through programmable mechanisms	Greater efficiency and transparency of distributions
Cross-border participation	Limited by jurisdictional and procedural barriers	Digital access to ownership structures across multiple jurisdictions	Expansion of international investment opportunities
Ownership verification	Reliance on centralized registries and documentation	Verification supported by distributed ledger records	Enhanced traceability of ownership changes

Source: developed by the author based on [6, p. 30; 8; 9, p. 653; 10, p. 212; 12; 13, p. 371].

One of the most significant consequences of tokenization is the gradual separation of ownership into several functional components that may be exercised by different actors simultaneously. In conventional legal systems, ownership is typically perceived as a consolidated bundle of powers encompassing control, use, and economic benefit. Tokenized environments increasingly challenge this model by allowing economic participation, governance rights, and legal title to coexist within distinct yet interconnected layers of a single asset ecosystem. Consequently, the concept of ownership becomes more dynamic and adaptable to the requirements of digital markets [8].

This transformation is particularly visible in relation to high-value and innovation-oriented assets. In commercial real estate projects, for example, investors may hold tokenized interests linked to the economic performance of an asset without participating directly in its management [13, p. 371]. Similar structures are emerging in technology ventures, intellectual property portfolios, and digital content ecosystems, where token holders obtain rights connected to future revenue streams, licensing activities, or governance decisions rather than exclusive ownership of the underlying asset itself. Such arrangements enable more efficient allocation of capital while preserving centralized operational management [12].

The impact of tokenization is even more profound in the sphere of intangible assets. Unlike physical property, digital assets, software products, datasets, and intellectual property rights generate value through continuous interaction, licensing, and data utilization. This creates conditions in which ownership is increasingly associated with access, control, and participation rather than with exclusive possession. Contemporary private-law scholarship therefore places growing emphasis on the concept of control over digital assets as a legally relevant criterion complementing traditional ownership doctrines [18].

Another notable development concerns the emergence of ownership structures that transcend national boundaries. Tokenized assets may be held, transferred, and managed by participants located in different jurisdictions while remaining connected to a single digital infrastructure. Such arrangements create new opportunities for international investment and collaborative asset management but simultaneously raise complex questions regarding applicable law, recognition of proprietary interests, and cross-border enforcement. European regulatory initiatives increasingly acknowledge these challenges and seek to establish legal conditions capable of supporting the secure operation of digital asset markets while maintaining legal certainty and investor protection [14].

The evolution of data-driven economic models further reinforces the transformation of proprietary relations. The growing recognition of economic rights

associated with data access, utilization, and sharing demonstrates that value creation is no longer confined to traditional categories of tangible property. The European Union's Data Act reflects this shift by establishing new approaches to the allocation and exercise of rights connected with data-generated value, thereby influencing the broader development of ownership concepts in digital environments [19].

Taken together, these developments suggest that tokenization is not merely introducing new technological mechanisms for asset management. Rather, it is contributing to the emergence of ownership models characterized by shared participation, functional differentiation of rights, and greater flexibility in the allocation of economic value. This transformation represents one of the most significant contemporary challenges for private law and requires the continued adaptation of traditional proprietary concepts to increasingly decentralized and digitally mediated forms of economic interaction.

The expansion of tokenized property rights has revealed a range of legal, regulatory, and practical challenges that continue to constrain their wider adoption. A fundamental problem concerns the absence of a uniform legal understanding of tokenized rights, resulting in uncertainty as to whether they should be treated as property rights, contractual claims, financial instruments, or digital records representing existing legal entitlements [9, p. 653]. This lack of conceptual consistency complicates the determination of applicable legal regimes and weakens legal predictability for market participants.

Another challenge stems from the fact that blockchain records do not automatically guarantee the validity or enforceability of the underlying rights. The legal status of a token remains dependent on contractual arrangements, asset registries, custodial structures, and national legislation, creating risks of conflicts between digital records and legal reality [8]. These difficulties are amplified in cross-border transactions, where questions relating to jurisdiction, applicable law, recognition of rights, and enforcement remain insufficiently harmonized [14].

Practical concerns also arise from the protection of token holders. Loss of private keys, cybersecurity incidents, unauthorized transactions, fraudulent token issuance, platform insolvency, and smart-contract vulnerabilities may result in significant economic losses while existing legal remedies often remain inadequate or difficult to apply. The irreversible nature of many blockchain transactions further complicates restitution and dispute resolution mechanisms [16].

Additional regulatory challenges involve compliance with anti-money laundering requirements, investor protection standards, taxation rules, data governance obligations, and financial market regulations. At the same time, the rapid development of decentralized technologies frequently outpaces legislative adaptation, creating regulatory gaps and legal uncertainty for both issuers and investors. Consequently, the effective recognition, circulation, and protection of tokenized property rights require not only technological reliability but also coherent legal frameworks capable of ensuring legal certainty, enforceability, and adequate protection of market participants [17; 18].

The effective development of tokenized property rights requires the gradual modernization of civil law approaches in order to ensure legal certainty, technological neutrality, and adequate protection of market participants. A primary priority is the establishment of a clearer legal framework defining the nature of tokenized property rights, their relationship to underlying assets, and the legal consequences arising from their creation, transfer, and termination. Such clarification would reduce interpretative inconsistencies and facilitate the integration of tokenized assets into existing systems of private law.

Particular attention should be devoted to strengthening the legal connection between digital tokens and the rights they represent. Civil legislation should provide transparent mechanisms for confirming the existence, ownership, and enforceability of underlying rights, thereby minimizing the risk of discrepancies between blockchain records and legal reality. The development of standardized legal models for asset

tokenization would further contribute to greater consistency in contractual practice and market operations.

The protection of token holders could be enhanced through the introduction of more comprehensive requirements regarding disclosure, custodial arrangements, asset verification procedures, and liability allocation among issuers, platform operators, and other intermediaries. At the same time, legal frameworks should provide effective remedies for disputes involving unauthorized transfers, technological failures, fraud, and insolvency-related claims involving tokenized assets.

Given the inherently cross-border nature of digital asset markets, greater regulatory coordination and legal interoperability among jurisdictions are also required. The harmonization of legal standards governing the recognition and circulation of tokenized rights would reduce transaction costs, improve legal predictability, and facilitate international market participation. In parallel, regulatory approaches should remain sufficiently flexible to accommodate future technological developments without requiring constant legislative revision.

Ultimately, the modernization of civil law regulation should seek to balance innovation with legal certainty. The objective is not to create a separate legal system for tokenized assets, but rather to adapt existing civil law institutions to the realities of the digital economy while preserving the fundamental principles of ownership protection, contractual stability, and effective judicial enforcement. Such an approach would provide a more sustainable legal foundation for the continued development of tokenized property rights and digital asset markets.

Conclusions. The study establishes that tokenized property rights constitute a distinct category of civil law relations in which digital tokens function as technological representations of legally recognized proprietary interests. It is demonstrated that tokenization transforms traditional ownership structures by enabling fractional participation, expanding asset liquidity, and creating new mechanisms for the circulation of economic value within digital environments. At the same time, the legal

effectiveness of tokenized rights remains dependent on the legal status of the underlying asset and the enforceability of the rights it represents.

The principal challenges include the absence of a uniform legal qualification of tokenized rights, regulatory fragmentation across jurisdictions, uncertainty regarding the legal relationship between tokens and underlying assets, insufficient protection of token holders, and the limited adaptation of traditional civil law remedies to digital transactions.

It is substantiated that improving civil law regulation requires clearer legal definitions of tokenized property rights, stronger legal linkage between tokens and underlying assets, enhanced investor protection mechanisms, and greater harmonization of regulatory approaches at the international level. Future research should focus on the legal nature of digital control over assets, the civil law implications of smart contracts, dispute resolution mechanisms in decentralized environments, and the development of coherent cross-border frameworks for the recognition and protection of tokenized property rights in the digital economy.

References

1. Закаблуківський А. В. Правові механізми ідентифікації та класифікації цифрових активів. *Український політико-правовий дискурс.* 2025. № 16. DOI: https://doi.org/10.5281/zenodo.17463244.

2. Закаблуківський А. В. Економічні моделі обліку та оподаткування цифрових активів в Україні. *Здобутки економіки: перспективи та інновації.* 2025. № 23. DOI: https://doi.org/10.5281/zenodo.17439021.

3. Закаблуківський А. В. Аналітика ризиків втрати цифрових активів упродовж життєвого циклу власника. *Академічні візії.* 2025. Вип. 48. DOI: https://doi.org/10.5281/zenodo.17457634.

4. Трач В. І. Упровадження інформаційних систем нотаріату для обліку й передачі цифрових активів спадкоємців. *Український політико-правовий дискурс.* 2025. № 16. DOI: https://doi.org/10.5281/zenodo.17466269.

5. Люшенко Д. І., Шарафан Р. В., Туголуков О. Є. Інформаційні системи для управління цифровою спадщиною та їхня інтеграція у правові процеси. *Український політико-правовий дискурс.* 2025. № 15. DOI: https://doi.org/10.5281/zenodo.17197093.

6. Пестовська З. С. Токенізація економіки України: мрія чи реальність. *Академічний огляд*. 2022. № 1. С. 24–34. DOI: https://doi.org/10.32342/2074-5354-2022-1-56-3.

7. Бровченко Т. І., Білоус Д. Є. Цифрова річ як новий об'єкт цивільних прав. *Вчені записки ТНУ імені В. І. Вернадського. Серія: Юридичні науки.* 2024. Т. 35, Вип. 74, № 1. С. 25–31. DOI: https://doi.org/10.32782/TNU-2707-0581/2024.1/05.

8. Wyczik J. The Property Law of Crypto Tokens. 2023. *arXiv Preprint*. arXiv.2311.01461. arXiv:2311.01461. DOI: https://doi.org/10.48550/arXiv.2311.01461.

9. Moringiello J. M., Odinet C. K. The Property Law of Tokens. *Florida Law Review*. 2022. Vol. 74, № 4. P. 607–680. URL: https://scholarship.law.ufl.edu/cgi/viewcontent.cgi?article=4071&context=flr (дата звернення: 01.07.2025).

10. Çağlayan Aksoy P. The Applicability of Property Law Rules for Crypto Assets: Considerations from Civil Law and Common Law Perspectives. *Law, Innovation and Technology*. 2023. Vol. 15, № 1. P. 185–221. DOI: https://doi.org/10.1080/17579961.2023.2184140.

11. Lavayssière X. Legal Structures of Tokenised Assets. *European Journal of Risk Regulation*. 2025. Vol. 16, № 1. P. 1–13. DOI: https://doi.org/10.1017/err.2024.88.

12. Kaisto J., Juutilainen T., Kauranen J. Non-Fungible Tokens, Tokenization, and Ownership. *Computer Law & Security Review*. 2024. Vol. 54. Article 105996. DOI: https://doi.org/10.1016/j.clsr.2024.105996.

13. Tsiura V., Panova L., Gramatskyy E. Virtual Assets in the Digitalization Era: Economic and Private Legal Aspects. *Baltic Journal of Economic Studies*. 2024. Vol. 10, № 3. P. 366–374. DOI: https://doi.org/10.30525/2256-0742/2024-10-3-366-374.

14. Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-assets. *EUR-Lex: вебсайт.* 2023. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1114 (дата звернення: 01.07.2025).

15. Про віртуальні активи : Закон України № 2074-IX від 17.02.2022. *Верховна Рада України : вебсайт*. 2022. URL: https://zakon.rada.gov.ua/laws/show/2074-20#Text (дата звернення: 01.07.2025).

16. UNCITRAL Model Law on Electronic Transferable Records. United Nations Commission on *International Trade Law: вебсайт.* 2017. URL: https://uncitral.un.org/en/texts/ecommerce/modellaw/electronic_transferable_records (дата звернення: 01.07.2025).

17. Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot regime for market infrastructures based on distributed ledger technology. *EUR-Lex: вебсайт*. 2022. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022R0858 (accessed: 01.07.2025).

18. UNIDROIT Principles on Digital Assets and Private Law. International Institute for the *Unification of Private Law : вебсайт.* 2023. URL: https://www.unidroit.org/wp-content/uploads/2024/01/Principles-on-Digital-Assets-and-Private-Law-linked-1.pdf (дата звернення: 01.07.2025).

19. Data Act. Regulation (EU) 2023/2854 of the European Parliament and of the Council of 13 December 2023 on harmonised rules on fair access to and use of data. *EUR-Lex : вебсайт.* 2023. URL: https://eur-lex.europa.eu/eli/reg/2023/2854/oj (дата звернення: 01.07.2025).