DOI: https://doi.org/10.30525/2256-0742/2026-12-3-140-154

SETTLEMENTS IN THE CONTEXT OF INTERNATIONAL DIGITALISATION OF THE ECONOMY: ASPECTS OF LEGAL REGULATION

Liudmyla Panova[1], Yana Tytska[2], Larysa Raicheva[3]

Abstract. In the context of the international digitalisation of the economy, settlements are a critically important area at the intersection of technological innovation, economic necessity and legal regulation. The development of public relations shows that the world is moving from experimenting with digital payment solutions to implementing them on a large scale, which requires a clear legal basis to ensure security, efficiency and inclusiveness. For Ukraine, studying international experience and current legal norms is a prerequisite for successfully integrating into the global digital financial space. This will increase the competitiveness of the national economy, create a favourable environment for innovation, and maintain an appropriate level of consumer protection and financial stability. The study aims to provide a comprehensive analysis of the legal aspects of digital payment systems in cross-border transactions, identify issues with the current legal framework, and develop evidence-based recommendations to enhance Ukrainian legislation on digital payments. This will be achieved by considering international experience and the country's aspirations for European integration. The research methodology consists of the following methods: comparative legal analysis, formal legal analysis, systemic analysis, and the analysis and synthesis method. The research involved carrying out a comparative analysis of the regulatory approaches of leading jurisdictions to the legal support of digital payments. Particular attention was paid to analysing the European regulatory package, which includes the Third Generation Payment Services Directive, the Crypto-Asset Market Regulation, the Digital Operational Stability Regulation and the Instant Payment Regulation. The conceptual approaches of international financial organisations – particularly the Bank for International Settlements, the International Monetary Fund, and the European Central Bank – to the tokenisation of money and assets as the basis of the future monetary system were studied. Current Ukrainian legislation on electronic document management, banking, and the digitalisation of the economy was critically analysed. Gaps and contradictions in the legal regulation of digital payment systems have been identified that hinder the effective implementation of innovative financial technologies. Based on the generalisation of international experience and analysis of domestic legal doctrine, scientifically sound recommendations have been developed to improve Ukrainian legislation while taking into account the state's aspirations for European integration. The results of the study are of practical significance for the improvement of Ukrainian legislation in the field of digital payments, the formation of regulatory policy by the National Bank of Ukraine and the development of methodological recommendations for financial institutions. They can also be used in the teaching of financial law, banking law and information technology law.

Keywords: digital economy, digital payments, cross-border payments, blockchain, tokenisation, legal regulation.

JEL Classification: E42, G23, G28, K23, O33

1. Introduction

The global economy is undergoing an unprecedented digital transformation, fundamentally changing the nature of international financial settlements and requiring traditional approaches to the legal regulation of payment systems to be reconsidered. The cross-border payments market is experiencing rapid growth, projected to increase from 212.55 billion USD in

[1] Taras Shevchenko National University of Kyiv, Ukraine *(corresponding author)*
E-mail: liudlapanova@knu.ua
ORCID: https://orcid.org/0000-0002-1393-8626
[2] International University, Ukraine
E-mail: Tytskayana@gmail.com
ORCID: https://orcid.org/0000-0001-5777-8225
[3] International University, Ukraine
E-mail: larisa_199@ukr.net
ORCID: https://orcid.org/0000-0002-7764-4766

2024 to 320.73 billion USD in 2030. This reflects the growing importance of digitalisation in international trade and financial transactions (Grand View Research. Cross-Border Payments Market Size and Industry Report 2025-2030). Digitalisation creates new opportunities to improve the efficiency, speed and accessibility of financial services. At the same time, it generates complex legal challenges relating to security, consumer protection, financial stability, and the need to strike a balance between encouraging innovation and managing systemic risks.

The period from 2024 to 2025 will be characterised by revolutionary changes in the international legal regulation of digital payments, which can be described as a turning point in the development of the global financial legal framework in the digital era. As one of the world's leading regulatory centres, the European Union has adopted several key regulations that establish new standards for crypto-assets, operational stability of financial institutions, instant payments, and payment services in general. These regulations create a harmonised legal framework for financial sector innovations, striking a balance between technological development, consumer protection, and maintaining financial stability amid rapid technological change.

The study focuses on the social relations that emerge during the operation of digital payment systems for cross-border payments. These relations include those between users of digital payment services, payment system operators, financial intermediaries, central banks, and regulatory authorities, in the context of modern financial technology applications.

The subject of the present study is the norms of the national legislation of Ukraine that regulate the flow of electronic documents, banking activities and the digitalisation of the economy. In addition, the study examines international legal standards and recommendations on the regulation of digital payment systems. These have been developed by the Bank for International Settlements, the International Monetary Fund, the European Central Bank and other international organisations. Furthermore, the study analyses European Union legislation in the field of payment services, crypto-asset markets and digital operational stability. Finally, the study looks at doctrinal concepts of legal regulation of digital assets, blockchain technologies, smart contracts and central bank digital currencies.

The study aims to provide a comprehensive analysis of the legal aspects of digital payment systems for cross-border transactions, identify issues with the current legal framework and develop evidence-based recommendations to enhance Ukrainian legislation on digital payments. This will be achieved by considering international experience and the country's aspirations for European integration.

To achieve the goal, the following tasks have been defined:

1. To conduct a comparative analysis of different jurisdictions' approaches to the legal regulation of digital payment systems. In particular, examine the regulatory framework of the European Union and its correlation with Ukraine's current legislation.
2. To analyse the legal nature and status of central bank digital currencies and explore international approaches to their design and positioning within the payment landscape, based on the work of the IMF, BIS and ECB.
3. To investigate the legal aspects of fast and instant payment systems and their interaction with central bank digital currencies (CBDCs) and traditional payment instruments in the context of cross-border payments.
4. To study the legal regulation of blockchain technologies, smart contracts and asset tokenisation as the technological basis of modern digital payment systems; to determine their legal force and position within the legal system; and to formulate the conceptual principles for creating a comprehensive legal framework for regulating digital payment systems, balancing the stimulation of innovation with the protection of consumer rights and the maintenance of financial stability.

The study's relevance is confirmed by the dynamics of market processes and the need to adapt national legal systems to the new realities of the digital economy, particularly given the globalisation of financial flows and the increasing interdependence of national economies. For Ukraine, which is seeking to integrate into the European economic space and has received candidate status for EU accession, it is critically important to understand international standards for the legal regulation of digital payments in order to modernise the national financial system, create a favourable environment for technological innovation and ensure the competitiveness of the Ukrainian economy in the global digital space.

2. Methodology

The study is based on a combination of general scientific and special legal methods of cognition. These methods provide a systematic and comprehensive analysis of legal issues related to digital payment systems, particularly in the context of cross-border payments, and the regulatory support for these systems in the context of the global digital transformation of the financial sector.

The comparative legal method is key to this study because it enables a comparison of different jurisdictions' legislative approaches to regulating digital payment systems, identifying the most effective legal mechanisms for their operation. The application of this method is aimed at comparing the national

legislation of Ukraine with international standards and practices of leading countries in the world. In particular, a comparative analysis of the provisions of the Law of Ukraine "On Electronic Documents and Electronic Documents Circulation" dated 22.05.2003 No. 851-IV and the Law of Ukraine "On Banks and Banking" dated 07.12.2000 No. 2121-III with the regulatory framework of the European Union, which is covered in detail in the analytical review of Brite Payments (2024) on European payment regulations, including the Third Generation Payment Services Directive (hereinafter – PSD3), the Regulation on Crypto-Asset Markets (hereinafter referred to as MiCA) and the Regulation on Digital Operational Resilience (hereinafter referred to as DORA).

The comparative analysis includes a study of the implementation approaches of central bank digital currencies presented in International Monetary Fund research. Particular attention is paid to comparing the European experience – specifically, the European Central Bank's initiative to develop a digital euro – with the approaches adopted by other jurisdictions, as revealed by a survey of central banks.

A thorough analysis of regulatory legal acts, interpretation of legal norms, determination of the legal nature of digital financial instruments, and disclosure of the conceptual and categorical apparatus in the field of digital payments was conducted using the formal-legal method. Particular attention was paid to analysing the legal nature of digital assets, blockchain technology and smart contracts, drawing on the fundamental research of domestic scientists. Formal-legal analysis also involves studying regulatory definitions, legal structures, and legal regimes established by international regulatory documents. Additionally, this approach was employed to examine the legal aspects of stablecoins, building upon the analytical work of Kosse, Glowka, Mattei and Rice (2024). This enables the legal classification and regulatory status of various types of stable cryptocurrency to be revealed.

A systems approach was adopted to study digital payment systems as a holistic, multi-level legal phenomenon operating in complex interaction with national and international financial infrastructures, regulatory regimes, and technological platforms. This approach enabled the interrelationships between the various elements of the digital payment ecosystem to be analysed in depth: central bank digital currencies, fast payment systems, stablecoins, blockchain technologies and traditional payment instruments. The systems approach is based on the conceptual work of the Bank for International Settlements, particularly the foundational publication, 'Tokenisation of Money and Assets: A Blueprint for the Future Monetary System' (2025), which presents a comprehensive vision of a future monetary system based on tokenisation.

The systemic approach is also implemented through analysing the interaction between CBDCs and fast payment systems. This topic is discussed in detail in Aurazo, Banka, Frost, Kosse and Piveteau's (2024) study. This enables the consideration of CBDCs as an integrated component of a more extensive payment infrastructure, operating in dynamic equilibrium with existing systems, as opposed to functioning in isolation.

The BIS study 'Faster Digital Payments: Global and Regional Perspectives' (2024), which explores the global and regional interrelationships in the architecture of international payments. This is complemented by Panetta's (2025) speech, 'Enhancing Cross-Border Payments in Europe and Beyond', which highlights systemic challenges and opportunities for improving cross-border payments within a European and global context.

This analytical approach involved breaking down the intricate legal, economic, and technological structures of digital payment systems into their constituent parts to study their specific features, functions, and interconnections in depth. This approach was implemented by decomposing the cross-border payments market using empirical data from the Grand View Research report (2025). This report states that the market volume was 212.55 billion USD in 2024, and forecasts growth to 320.73 billion USD by 2030. A thoroughgoing analysis of the market structure, segmented by payment type, geographical region and technological platform, enables the identification of the key drivers of development and the barriers to cross-border payments. The analysis of the consumer aspects of digital payments is based on the 2025 global report by FXC Intelligence and Worldpay, 'Global Payments Report 2025: Digital Wallets and Cross-Border Commerce', which reveals trends in digital wallet usage and consumer behaviour patterns in international e-commerce. This analysis is supplemented by the OECD study (2025), 'Supporting the Informed and Safe Use of Digital Payments through Digital Financial Literacy', which outlines the components of digital financial literacy and their effect on the secure use of payment methods.

A separate analytical focus is directed at studying the issue of access to cash in the context of the digitalisation of the economy, based on the OECD report (2025), 'Safeguarding Consumers' Access to Cash in the Digital Economy'. This analysis facilitates the identification of potential financial exclusion risks faced by vulnerable population groups and underscores the necessity for a balanced approach to the digital transformation of payments. A detailed analysis of regulatory transformations was carried out based on materials from the Payments Association (2024), 'Reflecting on 2024: A Transformative Year in Payments Regulation', which enables the key regulatory changes, their motivations, and the expected consequences

for the payment industry to be systematised. The analysis covers consideration of the individual components of regulatory packages, the mechanisms for their implementation, and how market participants adapt to new requirements.

The synthesis method was employed to generalise the research results, integrate the conclusions obtained through alternative approaches, and develop a comprehensive, conceptually robust vision of the prospects for the legal regulation of digital payment systems. The synthesis was carried out at several levels. At the level of international standards, the provisions of IMF documents on the positioning of central bank digital currencies (CBDCs) in the payment landscape and the design of cross-border retail digital currencies were summarised. This allowed an integrated understanding of optimal CBDC implementation models in various economic and regulatory contexts to be formed. At the level of technological and legal synthesis, the conclusions on the tokenization of money and assets, as set out in the BIS conceptual work (2025), were combined with the analysis of the legal aspects of blockchain technologies, as presented in domestic research. This synthesis enables the formulation of a comprehensive vision of the legal support of the technological infrastructure of the future financial system. The synthetic approach was also used to integrate regulatory recommendations from various international organisations. The integration of the BIS positions on the coexistence of CBDC and fast payment systems (Aurazo et al., 2024), the ECB's analytical conclusions on the development of a digital euro, and the European Commission's recommendations on instant payments at points of sale enabled the synthesis of a comprehensive model of the regulatory ecosystem of digital payments. Generalised conclusions on the global trends in the development of digital payment systems and their implications for the Ukrainian legal system were formulated based on the synthesis of empirical data on the state of the market (Grand View Research, 2025; FXC Intelligence, 2025), the results of central bank surveys (Illes et al., 2024), the analysis of regulatory transformations (The Payments Association, 2024; Brite Payments, 2024), and assessments of international institutions (European Court of Auditors, 2025).

The synthetic method was also employed to integrate the theoretical contributions of domestic experts with international conceptual approaches. This enabled the establishment of a comprehensive methodological framework for formulating recommendations to enhance national legislation on digital payments, while considering the particularities of the Ukrainian legal system and the country's aspirations for European integration.

The application of the aforementioned methodological tools in their organic unity and complementarity resulted in a scientifically sound, comprehensive and in-depth study of the legal aspects of digital payment systems. The combination of general scientific and special legal methods enabled the coverage of both the regulatory and empirical dimensions of the issue, the carrying out of a comparative analysis of international experience, and the formulation of conceptually sound proposals for the development of legal regulation in Ukraine.

3. Recent Scientific Studies

The issue of legal regulation of payments in the context of international digitalisation of the economy has gained particular relevance in recent years, which has been reflected in numerous studies by leading international organisations and scientists. A thorough analysis of the current state of scientific development of the topic reveals the presence of several interrelated areas of research, encompassing technological, economic, legal and social aspects of the digital transformation of payment systems.

A seminal contribution to the understanding of the prospects for the implementation of central bank digital currencies for cross-border payments was made by Reslow, Soderberg, and Tsuda (2024) in their study, which was published by the International Monetary Fund in 2024. The authors conduct an in-depth analysis of the design and policy aspects of the use of retail central bank digital currencies for international payments, emphasizing the critical importance of cross-border coordination on issues of technical and legal interoperability of national systems. The study's most significant theoretical contribution is the identification of three architectural models for the cross-border use of central bank digital currencies: compatible national systems that facilitate cross-jurisdictional payments through standardised protocols; interconnected systems with direct technical interconnections between national infrastructures; and a single multi-currency platform as a common infrastructure for multiple digital currencies. The authors persuasively contend that the effective implementation of these models necessitates not only technological standardisation, but also the harmonisation of legal frameworks, encompassing the coordination of customer identification requirements, anti-money laundering protocols, personal data protection measures, and cross-border dispute resolution mechanisms.

Building on this analysis, Patel, Kasiyanto and Reslow (2024) address the broader question of the role of central bank digital currencies in the wider payments landscape. They explore how these currencies could interact with existing payment instruments and systems. Their main conclusion is that central bank digital currencies should not be viewed as a technological means of replacing the private sector's

provision of payment services or traditional forms of money, but rather as a catalyst for innovation and increased competition within the financial sector. The researchers emphasise the need for a balanced regulatory approach to ensure the coexistence of central bank digital currencies, commercial bank deposits, private issuer electronic money and innovative payment solutions from fintech companies. They introduce the concept of 'complementarity of payment instruments' into scientific circulation, whereby different forms of digital money would meet the specific needs of different user segments and use cases. This would create a multi-level ecosystem that combines the advantages of centralised and decentralised approaches.

In his work, Niepelt (2025) provides a comprehensive global perspective on the development of digital finance that transcends a narrow focus on specific technologies or instruments. The author conceptualises the digital transformation of the financial system as a multidimensional process encompassing the simultaneous evolution of technologies, business models, regulatory approaches and consumer preferences. His analysis of the formation of a hybrid global financial ecosystem – where traditional centralised financial institutions, innovative fintech startups, large technology corporations and decentralised autonomous organisations compete and co-operate simultaneously, creating a complex web of interdependencies – is particularly valuable. The author convincingly demonstrates that the future of financial services will not be monopolised by any single business model or technological solution. Instead, it will be characterised by the functional specialisation of different types of providers, each occupying its own niche in the overall ecosystem. From a regulatory perspective, Niepelt emphasises the need to transition from rigid institutional regulation focused on entity type to flexible functional regulation that focuses on the nature of the activity and the associated risks, regardless of the legal form of the service provider.

The practical dimension of digital finance regulation is highlighted in the analytical report Fintech & Payments Legal Outlook 2025, published by the international law firm Linklaters. The report presents a global perspective on the most important regulatory trends and challenges of the near future. The report's authors focus on the revolutionary potential of agent-based artificial intelligence in the payments sector. They predict that autonomous AI systems could process over one trillion US dollars of e-commerce spending – representing approximately half of the total volume of online transactions. This prospect gives rise to fundamental legal questions concerning the liability for erroneous or fraudulent transactions initiated by autonomous systems without direct human intervention. This, in turn, necessitates a rethinking of traditional concepts of volition and legal personality in the digital context. Linklaters also highlights the increasing complexity of the regulatory landscape, where companies must comply with the requirements of multiple jurisdictions, which often have conflicting approaches to data protection, anti-money laundering and financial licensing. Of particular value is the analysis of practical strategies that international companies can use to navigate this complex regulatory environment, including the use of sandbox regimes to test innovations and proactively engaging regulators at the early stages of new product development.

In the context of Ukrainian scientific thought, Baranov (2022) made a fundamental contribution to the understanding of the legal aspects of digital transformation by proposing a holistic concept of the interconnection of social, digital and legal transformations of society. He convincingly argues that these processes are inextricably linked and interdependent. He emphasises that traditional legal institutions and concepts, formed over centuries in an industrial society dominated by material production and physical interactions, are inadequate for regulating relations in the digital space. This space is characterised by intangible assets, immediate transactions, the erasure of geographical borders, and automated decision-making processes. The author's conclusion about the need to develop a new legal regulatory paradigm that would integrate technological capabilities into the legal framework while balancing innovation and public interest protection is of particular importance. Baranov also draws attention to the social consequences of digitalisation, emphasising the risk of exacerbating inequality between those who have access to and the skills to use digital technologies, and those who are excluded from the digital space due to economic, educational or geographical barriers.

Demchyshak (2023) provides an exhaustive examination of the particulars of the Ukrainian paradigm of economic digitalisation, delineating sectoral development priorities that encompass both global trends and national attributes. The author demonstrates convincingly that Ukraine has significant potential for the rapid development of the digital financial sector due to the combination of a high level of digital literacy of the population, a powerful information and technology industry with qualified world-class specialists, and a relatively progressive regulatory environment open to innovation. Demchyshak conducts a detailed analysis of regulatory instruments for financial stimulation of innovative activity, including tax reductions, state guarantees, simplified licensing procedures for innovative companies, and the establishment of special regimes for testing new technologies. The primary conclusion of the study is the proposition of a transition from fragmented, point interventions to a systemic state

policy of digitalization of the financial sector. This systemic state policy would include a coordinated modernization of legislation, regulatory practices, technological infrastructure, and personnel training. The author also emphasises the critical importance of harmonising Ukrainian legislation with European standards in the context of the country's aspirations for European integration. This requires more than just the formal transposition of norms; it also requires the adaptation of regulatory philosophy and supervisory practices to the best European models.

Kud, Kucheryavenko and Smychok (2019) conducted a pioneering study of the legal nature and regulatory regimes of digital assets based on distributed ledger technology in the context of Ukrainian legal science. The authors propose a comprehensive classification system for digital assets, categorising them according to criteria such as functionality, technological architecture, economic nature and legal status. This allows for differentiated regulatory approaches depending on the specifics of each asset category. Of particular value is the analysis of the legal challenges associated with smart contracts as automated self-executing agreements encoded in software code. The researchers provide a compelling argument to demonstrate that the conventional doctrine of contract law, which is predicated on the notion of the will of the parties, the intentions of the participants, and the capacity for judicial interpretation of the terms of the agreement, encounters significant challenges when applied to smart contracts. In the context of smart contracts, the terms are expressed in software code that is typically incomprehensible to the general public, and execution occurs automatically without the possibility of intervention. The authors also explore the complex issues of jurisdiction and applicable law in cross-border transactions involving digital assets, where the parties to the transaction may be located in different countries, the blockchain network itself is not geographically bound, and transactions are executed simultaneously in multiple jurisdictions. This creates uncertainty as to which country's court will have jurisdiction to hear disputes and which country's law will apply to the parties' relations.

In its study, Aurazo (2024), the Bank for International Settlements (BIS) raises a fundamental question about the nature of the interaction between central bank digital currencies and existing fast payment systems, which already operate in many countries around the world, providing almost instant settlements. Rather than embracing the simplistic dichotomy of competition versus co-operation, the authors propose the concept of 'strategic complementarity', whereby both technologies can and should reinforce each other within their respective functional niches. The researchers argue that fast payment systems based on commercial bank money and the existing interbank settlement infrastructure have several advantages, including flexibility, scalability, and integration with traditional banking services. Meanwhile, central bank digital currencies could provide risk-free liquidity in the form of direct central bank obligations, ensure settlement finality at the time of the transaction, and establish an alternative channel through which monetary policy could be transmitted directly to end users. The study's key conclusion is that central bank digital currencies should be integrated into the existing fast payment infrastructure. This would preserve significant investments already made in building national payment systems, avoid duplication of infrastructure and ensure a smooth transition for users and payment service providers.

In their 2024 publication, Kosse, Glowka, Mattei and Rice critically analyse the phenomenon of stablecoins. These digital assets claim to be stable means of exchange within the cryptoecosystem, yet they exhibit significant heterogeneity in terms of their characteristics, mechanisms for maintaining stability and actual use. The authors introduce the question, 'Who will be the real stablecoin?', into academic discourse, emphasising the discrepancy between issuers' marketing promises and the actual functionality of many instruments positioned as stable cryptocurrencies. The study reveals the paradox of stablecoins. Despite their impressive market capitalisation of 270 billion USD in 2024, they account for only around one percent of the total transaction volume in actual payments for goods and services. The vast majority of transactions are speculative in nature or involve arbitrage between different cryptocurrency exchanges. The authors propose a detailed typology of stablecoins, categorised by their collateral mechanisms: fully fiat-backed; backed by a diversified basket of assets; backed by other cryptoassets with excess collateral; and algorithmic stablecoins without traditional collateral. A key finding of the study is the identification of systemic risks associated with the prospect of a substantial token buyout in unfavourable market conditions. These risks include the opacity of many issuers' reserves, the inadequacy or illiquidity of collateral assets, and the potential consequences for financial stability of a large stablecoin collapse through contagion channels and a loss of confidence in cryptocurrencies.

Illes, Kosse and Wierts (2024) summarise the results of the most comprehensive survey of central banks to date regarding their work on digital currencies and their attitudes towards crypto assets. The survey covered over 130 jurisdictions from various regions of the world and different levels of economic development. The study reveals that central banks have dramatically accelerated their work on digital currencies in recent years. Most have moved from conceptual research to practical

experimentation and pilot projects, and some have begun full-scale implementation. The authors identify various motivations for central banks to explore digital currencies, which depend on the level of a country's development and the specifics of its financial system. In developed economies, key drivers include concerns about the decline in cash usage, the need to provide access to secure digital central bank money, and the desire to maintain monetary sovereignty amid the global emergence of private cryptocurrencies and stablecoins. Additionally, there is a push to stimulate financial sector innovation by establishing a modern digital infrastructure. For developing countries, the most important motives are increasing financial inclusion by providing unbanked individuals with access to basic financial services, reducing the cost of, and increasing the efficiency of, cross-border fund transfers (which are critical for many economies with large diasporas), and modernising payment infrastructure without first having to establish a traditional banking network. The study also reveals a growing convergence in the approaches of central banks to designing digital currencies. This convergence is particularly evident in the need to ensure privacy while complying with anti-money laundering requirements, the importance of compatibility with existing payment systems and the importance of involving the private sector in providing services to end users, while maintaining central bank control over issuance and the underlying infrastructure.

A thorough analysis of the extant literature reveals a consensus among the scientific community and international organisations on several key provisions. Firstly, the digital transformation of payment systems is an irreversible global process that requires the legal framework to be adapted adequately at national and international levels. Secondly, successfully digitalising payments requires technological modernisation as well as a profound transformation of regulatory approaches, the business models of financial institutions, and consumer behaviour. Thirdly, international coordination on standardisation and the harmonisation of legal regimes, as well as ensuring the compatibility of national systems, is crucial for realising the benefits of digitalisation in cross-border payments. Fourthly, regulation must strike a balance between stimulating innovation and managing risks, avoiding overly restrictive approaches that stifle the development of new technologies, as well as insufficient supervision that could lead to systemic crises.

Concurrently, the literature analysis discloses numerous lacunae and domains that necessitate further research. It is evident that the practical implementation of new European legislation has not been sufficiently studied. This is primarily due to the fact that the majority of regulations were only introduced in 2024-2025, and thus far, there has been insufficient experience in their application. The question of liability for the actions of autonomous artificial intelligence systems in the financial sector, which extends beyond the confines of traditional legal concepts, necessitates rigorous research. The mechanisms for resolving jurisdictional conflicts in decentralised financial systems are insufficiently developed. The experience of countries outside the Western economic sphere – particularly Asian jurisdictions – which often adopt different approaches to regulating digital finance, also requires systematic analysis. Finally, there is practically no comprehensive research on the social and ethical consequences of the digitalisation of financial services, including issues of fairness, inclusion, and the protection of vulnerable groups within the digital financial landscape.

4. Research Results

Central bank digital currencies are regarded as one of the most transformative trends in the modern global financial system, with the potential to fundamentally change the architecture of international payments and monetary policy. As of 2024, over 130 countries worldwide are engaged in active research, piloting, or implementation of central bank digital currencies, signifying a global acknowledgement of the potential of digital currencies to modernise payment infrastructure, enhance financial inclusion, and fortify monetary sovereignty. This development occurs in parallel with the emergence of private cryptocurrencies and stablecoins (Illes, Kosse, 2024). In its 2024 fundamental research, the International Monetary Fund defines central bank digital currencies (CBDCs) as a digital form of central bank fiat money. They have the potential to significantly improve the efficiency of cross-border payments by reducing the number of intermediaries involved, shortening settlement times and increasing transaction transparency.

In its comprehensive 2024 report, entitled 'Faster Digital Payments: Global and Regional Perspectives', reveals a global trend towards implementing instant payment systems. These systems allow for almost instantaneous money transfers, in contrast to traditional bank transfers which take one to several business days (Niepelt, 2025). By the end of 2024, fast payment systems will be operating in over 70 countries worldwide, covering both developed and developing economies. These systems will process billions of transactions each year, with an estimated total volume in the trillions of dollars. A detailed analysis by the Bank for International Settlements reveals that fast payment systems offer several key benefits. These include dramatically reducing settlement times from days to seconds, which is particularly important for businesses that need to manage cash flow quickly. They also significantly reduce operational costs for payment

service providers and end users by automating processes and reducing manual intervention. Furthermore, they increase financial inclusion by ensuring 24/7 payment availability, including weekends and public holidays. This is particularly important for small businesses and vulnerable population segments. Finally, they create a technological infrastructure for innovative financial services such as digital wallets and buy-now-pay-later services, as well as integration with e-commerce platforms.

In its special section of the 2025 Annual Economic Report, the Bank for International Settlements presents an ambitious conceptual framework for the tokenisation of money and assets as the foundation of a future monetary system that could radically transform the way financial markets function (Niepelt, 2025). Tokenisation involves representing rights to assets in digital form on a distributed ledger or blockchain, enabling them to operate as programmable entities with integrated transaction execution logic. According to experts at the Bank for International Settlements, tokenisation has enormous potential to transform the financial system through a number of key mechanisms. Firstly, tokenisation significantly increases settlement efficiency through the automation of smart contracts, which execute transaction terms automatically, eliminating the need for manual intervention or intermediary participation. Secondly, using immutable distributed ledgers reduces operational risk by increasing transparency and creating an immutable audit trail of all transactions. Thirdly, tokenisation creates opportunities to expand access to financial markets by enabling the division of expensive assets, such as real estate or works of art, into multiple tokens, thereby making them accessible to smaller investors. Fourthly, the programmable nature of tokenised assets enables the development of new financial products and services that would be impracticable or uneconomical in the traditional financial system.

The Organisation for Economic Co-operation and Development (OECD) is exploring the technical, economic and social aspects of digital payments, reflecting a comprehensive approach to understanding the transformation of the financial system. In its landmark report for 2025, Supporting Informed and Safe Use of Digital Payments Through Digital Financial Literacy, the Organisation highlights the critical importance of financial literacy for the safe and effective use of digital payment instruments, given that technological capabilities far outstrip the ability of ordinary citizens to understand the risks involved (OECD, 2025). The organisation recommends that member states develop and implement comprehensive educational programmes covering a wide range of competencies. These should include an in-depth understanding of the specific risks associated with digital payments, such as cyber fraud, phishing, identity theft and unauthorised transactions; the development of practical skills to recognise various fraud schemes and suspicious requests for financial information; and the formation of skills to protect personal and financial data online, including correct password use, two-factor authentication and encryption. The programmes should also provide comprehensive knowledge of consumer rights in the field of digital financial services and procedures for appealing against the unlawful actions of service providers.

Meanwhile, the Organisation for Economic Co-operation and Development is examining the critical issue of preserving access to cash in the context of the progressive digitalisation of the economy and payment systems. The report cautions against hastily and recklessly abandoning cash as a means of payment, emphasising the importance of a balanced approach that safeguards the rights of vulnerable groups, such as the elderly, individuals with disabilities, and residents of remote regions with limited access to digital infrastructure. It also considers those who, for various reasons, are unable or unwilling to utilise digital payment methods (OECD. Safeguarding Consumers' Access to Cash in the Digital Economy, 2025). The organisation emphasises that rejecting cash entirely could increase financial exclusion and social inequality. Therefore, states need to ensure that adequate cash infrastructure is preserved alongside the development of digital payment systems.

European Union Regulation No. 2023/1114 on markets in crypto-assets, also known as MiCA, is the European Union's first comprehensive, union-wide regulatory act. It establishes harmonised rules for crypto-asset issuers and service providers, eliminating the fragmentation of national regulatory regimes and creating a single legal space for innovation in the field of digital assets (Brite Payments. Master European Payment Regulations & Changes 2024. Complete guide to PSD3, MiCA, DORA, IPR. 2024). The Markets in Crypto-Assets (MiCA) Regulation came into full force on December 30, 2024. However, certain provisions on stablecoins have been in effect since June 30, 2024. This reflects the regulator's special attention to this class of crypto-asset, given its potential impact on monetary policy and financial stability. The Regulation classifies crypto-assets into three main categories, each of which is subject to a specific regulatory regime. The first category comprises asset-backed tokens that aim to maintain a stable value by referencing a portfolio of assets, including various fiat currencies and commodities. The second category covers e-money tokens, which are digital representations of e-money pegged to the value of a single fiat currency. The third category comprises all other crypto-assets not covered by the first two, including utility and investment tokens that do not qualify as financial instruments under the Markets in Financial Instruments Directive.

The MiCA regulation sets out specific requirements for the issuance procedures of each category of cryptoasset. These include the publication of a detailed white paper containing comprehensive information about the project, technology, risks and rights of token holders. The regulation also sets out detailed rules for the disclosure of information at the issuance stage and throughout the cryptoasset's lifecycle, as well as comprehensive risk management requirements, including those relating to operational, cybersecurity and market risks. The key provisions of the Markets in Crypto-Assets (MiCA) Regulation include the introduction of mandatory authorisation for all crypto-asset service providers. These providers offer a wide range of services, including crypto-asset custody and administration for third parties, operating trading platforms for crypto-assets, providing exchange services between crypto-assets and fiat currencies, or between different crypto-assets, executing client orders to buy or sell crypto-assets, providing advisory services on crypto-asset investments, managing crypto-asset portfolios for clients, and providing crypto-asset transfer services for third parties.

The regulation introduces a European passport for crypto asset service providers. This revolutionary innovation allows authorised providers to offer their services across all 27 EU Member States after obtaining authorisation from a competent authority in one jurisdiction. This dramatically reduces the regulatory barriers to cross-border activity, stimulating the development of a single European market for crypto assets. The Regulation establishes stringent requirements to combat money laundering and terrorist financing. These include the 'no-threshold' transfer rule, which requires the transfer of information on the sender and recipient for all crypto-asset transfers, regardless of the amount. This exceeds the recommendations of the Financial Action Task Force on Anti-Money Laundering. Additionally, the Regulation provides detailed rules to prevent market manipulation and insider trading in the crypto-asset sector, adapting the proven regulatory practices of traditional financial markets to the specifics of decentralised digital assets.

Brite Payments, in its comprehensive analysis of European payment regulation 2024, emphasises that the MiCA regulation creates long-awaited legal certainty for the crypto industry, eliminating the fragmentation of national regulatory regimes that have ranged from complete prohibition to a liberal approach, while setting high standards of consumer and investor protection that should prevent massive losses of funds that have repeatedly occurred in the unregulated crypto-asset market (Brite Payments. Master European Payment Regulations & Changes 2024. Complete guide to PSD3, MiCA, DORA, IPR, 2024). The Payments Association has characterised 2024 as a transformative year for payments regulation. It has identified the MiCA Regulation as a key element of a new regulatory framework with the potential to establish the European Union as a global leader in the regulation of digital assets, while also creating an environment that encourages responsible innovation in fintech (The Payments Association. Reflecting on 2024: A Transformative Year in Payments Regulation. December, 2024).

The European Union Regulation (EU) No 2022/2554 on the Digital Resilience of the Financial Sector, more commonly referred to as DORA, came into effect on January 17th 2025. The purpose of the regulation is to establish a harmonised legal framework for the management of information and communication technology risks in the financial sector across the European Union. This initiative was developed in response to the growing reliance of financial institutions on digital technologies and the dramatic increase in cyber threats observed in recent years. The DORA Regulation applies to a wide range of financial institutions, highlighting the comprehensive approach of European regulators to ensuring the cyber resilience of the entire financial sector. This includes credit institutions, investment firms, insurance and reinsurance undertakings, crypto-asset service providers, payment institutions, electronic money institutions, central counterparties, trade repositories, central securities depositories and asset managers, as well as other financial institutions. In total, twenty different types of financial sector entities are covered by the Regulation. A particularly significant development is that the DORA regulation now extends to critical third-party ICT service providers located outside the European Union. This makes them subject to direct supervision by European regulators, marking an unprecedented shift in the regulation of technology companies that provide essential services to the financial sector.

The DORA regulation stipulates several fundamental requirements, including the comprehensive management of ICT risk through the implementation of a system for the identification of potential threats, the prevention of risk implementation through preventive measures, the rapid detection of incidents at an early stage, the effective response to cybersecurity incidents, and the prompt restoration of critical functions after cyber incidents with minimisation of losses for customers and counterparties. Financial institutions are obligated to implement a comprehensive digital operational resilience testing program, encompassing various methodologies for assessing preparedness for cyber incidents. This includes conducting threat-led penetration testing for critical systems, wherein independent experts simulate the actions of actual hackers to identify vulnerabilities in infrastructure. The regulation also establishes standardised procedures for reporting significant

ICT incidents to the relevant authorities, with clearly defined timeframes. This allows regulators to receive up-to-date information on cyber threats and coordinate the response to systemic risks. Of particular significance are the stringent requirements for the management of risks associated with the engagement of third-party service providers. These requirements include the inclusion of mandatory clauses in contracts with ICT providers regarding access rights for regulators, ensuring continuity of services, data protection and exit procedures, as well as the maintenance of a centralized register of all contractual arrangements with ICT providers to ensure transparency in the supply chains of critical services.

The European Court of Auditors emphasises in its 2025 special report on digital payments in the European Union that the DORA and MiCA regulations collectively constitute a comprehensive and balanced regulatory framework. This framework is designed to promote innovation and competitiveness in the European financial sector, while ensuring an appropriate level of security, consumer protection and financial stability in the era of digital transformation (European Court of Auditors. Special Report 01/2025: Digital Payments in the EU – Significant Progress Made, but Challenges Remain. Luxembourg: European Court of Auditors, January 2025). The Court of Auditors acknowledges that effectively implementing these regulations requires financial institutions to invest significantly in technological infrastructure, human capital, and risk management processes. However, these costs are justified when considered alongside the potential losses from cyber incidents and the importance of maintaining trust in the digital financial system.

European Union Regulation No. 2024/886 on instant payments introduces a new obligation for all payment service providers in the EU: to accept and send instant euro payments 24/7. This is a revolutionary step towards creating a modern, efficient payment infrastructure at a European level (European Central Bank. Digital Euro: Preparation Phase Update. Frankfurt am Main: European Central Bank, November 2024). According to the phased implementation schedule, from 9 January 2025, all banks and payment service providers must be able to accept instant payments from their customers and other payment institutions without charging additional fees compared to regular SEPA transfers. This removes price barriers to the widespread adoption of instant payments by individuals and businesses. From October 9, 2025, payment service providers must also enable their customers to send instant payments, thereby completing the creation of a fully functional instant payment ecosystem across the European Union.

The regulation stipulates a maximum execution time of ten seconds for instant payments, from the moment the payer initiates the transaction until the funds are credited to the recipient's account. This is fundamentally different from standard SEPA transfers, which are executed within one business day and do not operate on weekends and public holidays. The regulation also requires the introduction of mandatory beneficiary eligibility checks. The payment institution must verify that the account number provided actually belongs to the specified person, which should prevent fraud and erroneous transfers. Such errors are particularly problematic for instant payments, as they cannot be cancelled once executed. Payment service providers must also effectively screen transactions for compliance with sanctions regimes and anti-money laundering requirements without delaying payment execution, which requires sophisticated, automated, real-time risk analysis systems to be implemented.

In a speech delivered in April 2025, the European Central Bank's Vice-President, Fabio Panetta, emphasised the strategic importance of developing instant payments. This would strengthen the autonomy and competitiveness of the European payment ecosystem, reducing excessive dependence on global payment systems controlled by companies outside the European Union (European Central Bank. Enhancing Cross-Border Payments in Europe and Beyond. Speech by Fabio Panetta, Member of the Executive Board of the ECB. Frankfurt am Main: European Central Bank, April 2025). Panetta notes that instant payments are not only convenient for consumers and efficient for businesses, but also important for Europe's strategic autonomy in the area of payment infrastructure. This is particularly relevant in the context of geopolitical tensions and the risk of foreign payment systems abusing their dominant position.

In 2024, the European Commission initiated a large-scale legislative process to update the regulation of payment services. This involved introducing the Payment Services Regulation and the Third Payment Services Directive simultaneously, with the aim of replacing the current Second Payment Services Directive and eliminating the gaps and shortcomings that had been identified during its implementation (Brite Payments. Master European Payment Regulations & Changes 2024. Complete guide to PSD3, MiCA, DORA, IPR, 2024). The main areas of the proposed reform include significantly strengthening the requirements for combatting various forms of payment fraud. This includes introducing mandatory reimbursement for victims of authorised push payment fraud. This occurs when attackers mislead victims into voluntarily transferring funds to fraudsters' accounts. It is one of the most widespread and destructive forms of financial fraud in the digital payment era. The reform envisages a significant expansion of the open banking concept, allowing access to bank accounts for more than just initiating payments and obtaining

account information. It will also allow for a wider range of financial advice to be provided, financial data to be aggregated from different sources, and innovative personalised financial products to be developed based on customer transaction data analysis. The draft law also aims to increase the transparency and clarity of information on fees for international payments and currency conversion. This should protect consumers from hidden costs and enable them to make informed decisions when choosing a payment service provider. Furthermore, the expected harmonisation of the licensing rules for payment and electronic money institutions should create a single European payment services market with minimal regulatory differences between Member States.

The Legal Gazette, in its 2024 analytical publication entitled 'Blockchain and Smart Contracts: New Horizons for Lawyers', notes the rapidly growing interest of the legal community in the practical application of distributed technologies in various areas of law, from corporate law to notarial practice (Blockchain and Smart Contracts: New Horizons for Lawyers. Legal Gazette. 2024). The publication focuses on the crucial issue of the evidentiary value of blockchain records in legal proceedings. Courts must determine whether records in a distributed ledger can be considered proper evidence that meets the procedural law requirements of reliability, admissibility and sufficiency. The authors also analyse the complex issue of recognising the legal validity of smart contracts – software code that performs certain actions when certain conditions are met – and examine the legal requirements for such automated agreements to be recognised as transactions with appropriate legal consequences.

The Bank for International Settlements (BIS) has conducted a comprehensive study, entitled 'Will the Real Stablecoin Please Stand Up?', which provides a detailed analysis of the highly diverse landscape of stablecoins and their regulatory status across various jurisdictions. The study emphasises the critical need for a precise legal definition and effective regulation of this particular cryptoasset class (Kosse, Glowka, Mattei, Rice, 2024). As of 2024, the market capitalisation of stablecoins had reached an impressive 270 billion USD, indicating significant market interest in cryptocurrencies that aim to maintain stable value. However, actual payments accounted for only around one per cent of total stablecoin transactions, suggesting that most transactions were speculative or involved arbitrage rather than being used for real economic transactions. The Bank for International Settlements distinguishes between several fundamentally different categories of stablecoin, based on how their value is maintained. The first category comprises tokens fully backed by fiat currencies at a one-to-one ratio. For each issued token, the issuer holds an equivalent amount of traditional currency in a bank account. The second category comprises tokens backed by a diversified portfolio of assets, including multiple fiat currencies, government debt securities, commodities and other liquid assets. This provides greater stability than being pegged to a single currency. The third category comprises algorithmic stablecoins, which do not have traditional collateral but maintain value stability through complex algorithms that automatically adjust the supply of tokens in response to demand fluctuations. The fourth category comprises stablecoins backed by other cryptocurrencies, typically with excess collateral to offset the volatility of the underlying assets.

The main risks associated with stablecoins, which are of particular concern to regulators and central banks, include the risk of losing the peg to the underlying asset due to adverse market conditions or a loss of user confidence, which could lead to a mass redemption of tokens and the collapse of the entire system; the risk of insufficient or illiquid reserves, particularly if the issuer invests reserves in risky or illiquid assets in order to generate additional profit; the issue of a lack of transparency regarding the actual asset structure and the absence of independent audits in many stablecoin projects, which makes it impossible to objectively assess their reliability; operational risks associated with the activities of stablecoin providers, including cyberattacks, technical failures and potential abuse by management; and risks of market power concentration, where a few large stablecoins control the majority of the market, which could create systemic risks to the stability of the financial system. The MiCA Regulation imposes extremely stringent requirements on stablecoin issuers, which go far beyond those applicable to issuers of other categories of crypto-assets, including mandatory full coverage by high-quality liquid assets with strict restrictions on the composition of the reserve portfolio, regular independent audits of reserves with the publication of results to ensure transparency and maintain user confidence, mandatory publication of a detailed technical whitepaper providing comprehensive disclosure of all risks, stability-support mechanisms and token holders' rights, as well as capital requirements proportionate to the volume of issuance and the complexity of the issuer's business model.

In its comprehensive report, entitled 'Fintech & Payments Legal Outlook 2025: A Global Perspective', predicts that agent-based AI capable of autonomous decision-making and complex tasks could process over 1 trillion USD in e-commerce spending – approximately 50% of the total volume of online payments (Linklaters, 2024). The large-scale automation of payment processes through AI systems creates new legal challenges that require new legal approaches and concepts to be developed. One of the most challenging issues is determining liability for erroneous or fraudulent

payments made by autonomous AI agents without direct human intervention. This is because the traditional concept of liability is based on the ability to attribute a certain action to a specific person, which is problematic in the case of autonomous AI systems. Another equally challenging issue is the regulation of algorithmic decision-making in financial services, including creditworthiness assessment, fraud detection and personalised pricing and service conditions. Here, algorithms can unintentionally reproduce or even reinforce existing biases and discrimination. In the context of the European Union's General Data Protection Regulation, which sets strict requirements for the lawfulness, transparency, and purpose limitation of personal data processing, ensuring adequate protection of personal data when processed on a large scale by AI systems is critical. The transparency and explainability of AI-based decisions is also a pressing issue, particularly when such decisions could have a significant impact on the rights and interests of consumers of financial services.

In its detailed 2024 report on progress in implementing the G20 Roadmap to Improve Cross-Border Payments, the Financial Stability Board notes significant progress in addressing the long-standing issues that make international money transfers slow, expensive and opaque (Blockchain and Smart Contracts: New Horizons for Lawyers. Legal Journal. 2024). Launched by the G20 countries in 2020 under the auspices of the Financial Stability Board and the Bank for International Settlements' Payments and Market Infrastructure Committee, the initiative aims to address four key challenges that have hindered the development of an efficient cross-border payment system for decades. The first of these is the prohibitively high cost of international transfers. On average, a cross-border transfer incurs a fee equivalent to around six percent of the transferred amount, which is unacceptably high, particularly for migrant workers sending money to their families in developing countries and for small businesses trading internationally. Second, there is the issue of slow cross-border payment speeds: standard bank transfers take between three and five working days, and in some cases even longer, which creates liquidity management challenges for businesses and inconvenience for individuals. Third, there is the problem of limited access to efficient payment corridors: in many regions of the world, particularly in Africa, Latin America and Asia, there is a lack of access to fast and affordable channels for international transfers. Fourth, there is a problem of insufficient transparency in cross-border payments, where the sender cannot determine in advance exactly how much the recipient will receive after all fees have been deducted and the exchange rate applied, nor how long the transfer will take.

On November 22, 2024, SWIFT successfully completed a full migration from the decades-old legacy MT message format to the new ISO 20022 global standard. This was one of the largest and most complex transformations in the history of global financial infrastructure, requiring coordinated efforts from thousands of financial institutions worldwide (Bank for International Settlements. Faster Digital Payments: Global and Regional Perspectives, 2024). The ISO 20022 standard enables the transmission of structured data in a flexible XML format. This allows significantly more payment information to be included than in the old MT format, which was limited to short text fields with a rigid structure. Implementing ISO 20022 brings numerous benefits to all participants in the payment ecosystem. It dramatically improves the quality of payment data, enabling payment service providers to automate most transactions without manual intervention, thereby reducing errors and delays. The standard also increases interoperability between different payment systems at national and international levels by using a single data dictionary and unified message construction rules. Extended payment data, which can include information such as the purpose of the payment, the parties involved in the transaction, tax details, and other relevant information, creates new opportunities for combating fraud, money laundering, and terrorist financing by enabling the use of sophisticated data analysis algorithms to detect suspicious patterns. Furthermore, automating payment processing based on structured data significantly increases overall efficiency and reduces operational costs for financial institutions by minimising the need for manual handling of exceptions and error correction.

In its research, the World Economic Forum estimates that discrepancies in financial regulation between different countries and regions of the world cost the global economy approximately 780 billion USD annually. This is due to the direct costs of ensuring regulatory compliance, lost opportunities for cross-border trade and investment, and inefficiencies associated with adapting business processes to numerous legal regimes. Each jurisdiction has its own specific rules covering a wide range of aspects of financial services regulation. These include licensing procedures for financial institutions, which can vary significantly in terms of complexity, cost and duration; rules on the taxation of cross-border financial transactions, which can create risks of double taxation or unforeseen tax liabilities; requirements for the protection of personal data and privacy, which range from being extremely strict in the European Union to being relatively liberal in some other regions; and standards for combating money laundering and terrorist financing, which, despite global recommendations from the Financial Action Task Force, vary significantly in terms of implementation

details. The fragmented regulatory landscape poses significant operational challenges for international businesses, particularly small and medium-sized enterprises (SMEs) lacking the resources to maintain large legal and compliance teams capable of navigating multiple regulatory regimes.

In summary, the results of the study indicate that, in the context of the international digitalisation of the economy, payments are at a critical stage of transformation that requires comprehensive rethinking of legal approaches and regulatory instruments. Through the adoption of the MiCA, DORA, IPR and PSD3 regulations between 2024 and 2025, the European Union has created the world's most advanced legal ecosystem for digital finance. This can serve as a benchmark for other jurisdictions, including Ukraine. The annual cost to the global economy of regulatory fragmentation between jurisdictions is 780 billion USD, which highlights the critical importance of international coordination and harmonisation of standards.

The study determined that a successful legal framework for digital payments must balance three key objectives: the stimulation of technological innovation by creating legal certainty and the reduction of regulatory barriers, the assurance of financial stability through adequate management of systemic risks, and the protection of consumer rights through transparency, fairness and effective redress mechanisms. Achieving this balance necessitates a transition from conventional institutional regulation towards a functional approach that prioritises the nature of the activity and the associated risks, irrespective of the technology platform or legal form of the provider.

For Ukraine, the harmonisation of legislation with European standards is not merely a formal requirement of the European integration process; it is also a strategic necessity for the modernisation of the financial system, the enhancement of the competitiveness of the national economy and the creation of a favourable environment for the development of innovative entrepreneurship. This requires a comprehensive approach that includes adopting new specialised legislation on virtual assets and digital operational resilience, modernising payment services regulation, developing detailed by-laws, strengthening the institutional capacity of supervisory bodies, and modernising the technological infrastructure of the national payment system by implementing the ISO 20022 standard and an instant payment system.

Future research should focus on analysing the implementation of new European legislation, developing specific mechanisms for incorporating international standards into national law, examining the legal implications of central bank digital currencies interacting with existing payment systems, investigating liability for autonomous artificial intelligence systems' actions in the financial sector, devising effective mechanisms for resolving cross-border disputes in decentralised systems, and examining the ethical and social ramifications of digitalising financial services, particularly with regard to ensuring financial inclusion and safeguarding vulnerable groups. A comprehensive, interdisciplinary approach is essential to creating a legal framework that ensures the safe, effective and inclusive development of digital payments in the 21st-century global economy.

5. Conclusions

1. A comparative analysis of the legal regulation of digital payment systems has revealed fundamental differences between the European and Ukrainian approaches. The European Union has the most systematic approach, with regulations that harmonise the management of crypto-assets, digital operational resilience, instant payments and payment services. This creates a comprehensive legal ecosystem for digital finance. Ukraine, however, has a significant regulatory gap. European integration requires a systemic transformation of regulatory culture, achieved through the adoption of new laws, the development of secondary legislation, and the modernisation of technological infrastructure, rather than merely the formal transposition of norms.

2. A thorough examination of the operations of the IMF, the BIS, and the ECB has facilitated the delineation of digital assets as a digital manifestation of fiat money, thereby constituting a direct liability of the central bank. Three architectural models for cross-border use were identified: compatible systems (minimal legal integration), interconnected systems (medium level of coordination) and a multi-currency platform (maximum harmonisation). Each model has unique legal implications for currency recognition, allocation of liability and dispute resolution. The positioning of CBDCs within the payments landscape depends on a country's level of development: for advanced economies, they serve as a complement to existing systems; for developing countries, they are a key tool for financial inclusion. Critical issues include legal status as legal tender, restrictions on ownership to prevent banking disintermediation, and the balance between privacy and anti-money laundering measures.

3. In terms of the legal aspects of fast payment systems and their interaction with central bank digital currencies (CBDCs), it has been established that these systems are not competitors, but rather strategic partners with complementary functions. FPSs provide efficient interbank settlements based on commercial money, offering flexibility and scalability. Meanwhile, CBDCs provide risk-free central bank liquidity and settlement finality. The IPR Regulation is set to

transform the EU payment landscape by obliging providers to offer instant payments 24/7, without additional fees, beneficiary verification or real-time sanctions screening. Optimal integration of CBDCs into existing FPS infrastructure avoids duplication and ensures a smooth transition. For cross-border settlements, it is critical that ISO 20022 is implemented by SWIFT by November 2024, as this will improve data quality and automation.

4. The study found that traditional legal concepts need to be adapted for use with distributed technologies. Smart contracts, which are automated self-executing agreements, raise issues regarding the legal recognition of software code and the admissibility of blockchain records as evidence in legal proceedings. They also raise questions about liability for errors in the code. Tokenisation of assets creates new forms of digital property rights representation, requiring the development of rules for registering, accounting for, and transferring tokenised assets. The BIS 2025 report identifies tokenisation as the foundation of a future monetary system, capable of radically transforming financial markets. MiCA establishes a detailed classification of cryptoassets and sets out requirements for stablecoin issuers, including full coverage with liquid assets and regular audits. However, jurisdiction issues in decentralised systems without geographical binding, and the absence of applicable law in the absence of clearly defined parties, remain problematic.

5. The research yielded a set of principles for creating a balanced legal framework, including technological neutrality of regulation (focusing on functions rather than technologies), proportionality of regulatory requirements to risks, harmonisation of international standards for cross-border operations, ensuring financial stability through capital and liquidity requirements, protecting consumer rights through transparency and reimbursement, cybersecurity through mandatory stress testing, and stimulating innovation through sandbox regimes and open banking. The regulatory framework should combine strict principles in critical areas (AML/CFT, cybersecurity, data protection) with flexibility in technological implementation issues.

With regard to the continuation of scientific research, it is considered appropriate to analyse the impact of international settlement regulations on innovation and competitiveness, as well as to explore the ethical aspects of algorithmic decision-making and fair access to digital financial services.

References:

Aurazo, J., Banka, H., Frost, J., Kosse, A., & Piveteau, T. (2024). *Central bank digital currencies and fast payment systems: Rivals or partners?* (BIS Papers No. 151). Bank for International Settlements. https://www.bis.org/publ/bppdf/bispap151.htm

Bank for International Settlements. (2024). *Faster digital payments: Global and regional perspectives* (BIS Papers No. 152). https://www.bis.org/publ/bppdf/bispap152.pdf

Bank for International Settlements. (2025). *Tokenisation of money and assets: A blueprint for the future monetary system* (Annual Economic Report 2025, Special Chapter). https://www.is.org/press/p250624.htm

Baranov, O. A. (2022). *Transformation: Social, digital, legal* (Vol. 1: Saving civilization: The economy of results). Odessa: Helvetica Publishing House. https://www.ippi.org.ua/transformatsiya-sotsialna-tsifrova-pravova

Blockchain and smart contracts: New horizons for lawyers. (2024). *Yurydychna Gazeta*. https://www.yur-gazeta.com/dumka-eksperta/blokcheyn-i-smartkontrakti-novi-gorizonti-dlya-pravnikiv.html

Brite Payments. (2024). *Master European payment regulations & changes 2024: Complete guide to PSD3, MiCA, DORA, IPR*. https://www.britepayments.com/resources/article/2024-european-payment-regulations/

Concept of development of the digital economy and society of Ukraine for 2018–2020, approved by Resolution of the Cabinet of Ministers of Ukraine No. 67-p of January 17, 2018. (2018). https://www.zakon.rada.gov.ua/laws/show/67-2018-%D1%80

Demchyshak, N. B. (2023). *Formation of the digital economy and financial regulation of innovation activity in Ukraine: Modern paradigm and sectoral priorities*. Lviv: Ivan Frank Lviv National University. https://www.odnb.odessa.ua/vnn/book/13646

European Central Bank. (2024). *Digital euro: Preparation phase update*. https://www.ecb.europa.eu/euro/digital_euro/progress/html/index.en.html

European Central Bank. (2025). *Enhancing cross-border payments in Europe and beyond* (Speech by Fabio Panetta, April 2025). https://www.ecb.europa.eu/press/key/date/2025/html/ecb.sp250401~9e1ee05e88.en.html

European Commission. (2025). *Payment Systems Market Expert Group (PSMEG) report on instant payments at point of sale (POS)*. https://www.finance.ec.europa.eu/consumer-finance-and-payments/payment-services/payment-services_en

European Court of Auditors. (2025). *Special Report No. 01/2025: Digital payments in the EU*. https://www.eca.europa.eu/ECAPublications/SR-2025-01/SR-2025-01_EN.pdf

FXC Intelligence, & Worldpay. (2025). *Global payments report 2025: Digital wallets and cross-border commerce*. https://www.worldpay.com/en/global-payments-report

Grand View Research. (2025). *Cross-border payments market size and industry report, 2025–2030*. https://www.grandviewresearch.com/industry-analysis/cross-border-payments-market-report

Illes, A., Kosse, A., & Wierts, P. (2024). *Advancing in tandem: Results of the 2024 BIS survey on central bank digital currencies and crypto* (BIS Papers No. 159). Bank for International Settlements. https://www.bis.org/publ/bppdf/bispap159.htm

Kosse, A., Glowka, M., Mattei, I., & Rice, T. (2024). *Will the real stablecoin please stand up?* (BIS Papers No. 141). Bank for International Settlements. https://www.bis.org/publ/bppdf/bispap141.htm

Kud, O. O., Kucheryavenko, M. P., & Smychok, E. M. (2019). *Digital assets and their legal regulation in the context of blockchain technology development*. Kharkiv. https://www.researchgate.net/publication/386043568

The Law of Ukraine "On Banks and Banking" of December 7, 2000, No. 2121-III. Bulletin of the Verkhovna Rada of Ukraine (BVR), 2001, No. 5-6, Art. 30. https://www.zakon.rada.gov.ua/laws/show/2121-14

The Law of Ukraine "On Electronic Documents and Electronic Documents Circulation" of May 22, 2003, No. 851-IV. Bulletin of the Verkhovna Rada of Ukraine (BVR), 2003, No. 36, Art. 275. https://www.zakon.rada.gov.ua/laws/show/851-15

Linklaters. (2024). *Fintech & payments legal outlook 2025: A global perspective*. https://www.linklaters.com/en/insights/blogs/fintechlinks/2024/december/fintech-payments-legal-outlook-2025

Niepelt, D. (2025). *Frontiers of digital finance*. CEPR eBook. https://www.cepr.org/voxeu/columns/frontiers-digital-finance-part-1-global-perspective

OECD. (2025a). *Safeguarding consumers' access to cash in the digital economy*. OECD Publishing. https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/03/safeguarding-consumers-access-to-cash-in-the-digital-economy_d6048c25/189970b4-en.pdf

OECD. (2025b). *Supporting informed and safe use of digital payments through digital financial literacy*. OECD Publishing. https://doi.org/10.1787/21de47d1-en

Patel, M., Kasiyanto, S., & Reslow, A. (2024). *Positioning central bank digital currency in the payments landscape* (IMF Fintech Notes No. 2024/006). International Monetary Fund. https://www.imf.org/en/Publications/fintech-notes/Issues/2024/10/02/Positioning-Central-Bank-Digital-Currency-in-the-Payments-Landscape-555743

Reslow, A., Söderberg, G., & Tsuda, N. (2024). *Cross-border payments with retail central bank digital currencies: Design and policy considerations* (IMF Fintech Notes No. 2024/002). International Monetary Fund. https://www.imf.org/en/Publications/fintech-notes/Issues/2024/05/15/Cross-Border-Payments-with-Retail-Central-Bank-Digital-Currencies-547195

The Payments Association. (2024). *Reflecting on 2024: A transformative year in payments regulation*. https://www.thepaymentsassociation.org/article/reflecting-on-2024-a-transformative-year-in-payments-regulation/

Received on: 14th of March, 2026
Accepted on: 28th of May, 2026
Published on: 03rd of July, 2026