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**ECONOMIC EFFICIENCY OF CRYPTOCURRENCY
APPLICATION IN THE BANKING SECTOR:
ANALYSIS OF GLOBAL EXPERIENCE****ЕКОНОМІЧНА ЕФЕКТИВНІСТЬ ЗАСТОСУВАННЯ
КРИПТОВАЛЮТ У БАНКІВСЬКОМУ СЕКТОРІ:
АНАЛІЗ СВІТОВОГО ДОСВІДУ**

Summary. Rapid evolution of the financial sector has led to the increasing integration of cryptocurrencies into banking operations. This study explores the potential of cryptocurrencies as a viable alternative to traditional banking, focusing on cost reduction, transaction speed, security enhancements, and financial inclusion. Despite their advantages, cryptocurrencies face significant challenges, including price volatility, regulatory inconsistencies, cybersecurity risks, and scalability limitations. The study analyzes the role of blockchain technology in enhancing transaction security and transparency while addressing concerns related to fraud, compliance, and financial stability. Additionally, the paper evaluates the impact of stablecoins and central bank digital currencies (CBDCs) on the banking sector, examining their potential to bridge the gap between digital finance and traditional monetary systems. The comparative analysis highlights key differences in transaction efficiency, cost structures, and regulatory oversight among traditional banking, cryptocurrency banking, and CBDCs. Findings suggest that while cryptocurrency banking offers faster transactions and lower costs, regulatory and liquidity challenges persist. Meanwhile, CBDCs provide a balanced approach by combining digital efficiency with government-backed financial stability. The study concludes that integrating cryptocurrencies into banking requires a harmonized regulatory framework, improved blockchain scalability, and enhanced cybersecurity measures. Policymakers must address financial stability concerns while promoting innovation in digital finance. Future research should focus on the long-term implications of cryptocurrency adoption on banking intermediation, monetary policy, and global financial stability.

Keywords: cryptocurrency, banking sector, economic efficiency, blockchain, digital finance, financial stability, regulation, CBDC, stablecoins.

Анотація. Стрімкий розвиток фінансового сектору спричинив активну інтеграцію криптовалют у банківські операції. У цьому дослідженні розглядається потенціал криптовалют як альтернативи традиційним банківським системам, з акцентом на зниження витрат, прискорення транзакцій, підвищення рівня безпеки та розширення фінансової інклюзії. Водночас використання цифрових активів супроводжується низкою викликів, зокрема високою волатильністю, регуляторною фрагментацією, кібербезпековими загрозами та проблемами масштабованості. У статті аналізується роль блокчейн-технологій у підвищенні прозорості та безпеки фінансових операцій, а також окреслюються ключові ризики, пов'язані з шахрайством, дотриманням регуляторних вимог і забезпеченням фінансової стабільності. Особливу увагу приділено впливу стейблкоїнів і цифрових валют центральних банків (CBDC) на банківський сектор. Досліджуються їхні можливості для поєднання технологічних інновацій із традиційними монетарними механізмами. У статті представлено порівняльний аналіз традиційних банківських систем, криптовалютного банкінгу та CBDC за такими критеріями, як швидкість транзакцій, рівень витрат і регуляторний контроль. Результати дослідження свідчать, що криптовалютний банкінг забезпечує значні переваги у швидкості та вартості фінансових операцій, однак стикається з проблемами ліквідності та правової невизначеності. Натомість CBDC пропонують компроміс між ефективністю цифрових активів і стабільністю, гарантованою державними фінансовими інститутами. Зроблено висновок, що ефективне впровадження криптовалют у банківську систему потребує гармонізації нормативно-правових підходів, покращення масштабованості блокчейн-мереж і посилення заходів кібербезпеки. Політикам і фінансовим регуляторам необхідно знайти баланс між фінансовою стабільністю та

стимулюванням інновацій у сфері цифрових фінансів. Подальші дослідження мають зосередитися на довгострокових наслідках криптовалютизації банківського сектору, впливі цифрових активів на монетарну політику та забезпеченні глобальної фінансової стабільності.

Ключові слова: криптовалюта, банківський сектор, економічна ефективність, блокчейн, цифрові фінанси, фінансова стабільність, регулювання, CBDC, стейблкоїни.

Problem statement. The financial sector is evolving rapidly, with cryptocurrencies emerging as a viable alternative to traditional banking. According to the 2024 Global Crypto Adoption Index, several countries have seen significant increases in cryptocurrency usage across various financial sectors [7]. However, concerns remain regarding stability, security, and regulatory compliance [13]. A major challenge in integrating cryptocurrencies into banking is their inherent price volatility. Unlike fiat currencies, cryptocurrencies often experience significant fluctuations, which poses a risk for both financial institutions and consumers. Without proper stabilization mechanisms, these fluctuations could limit their widespread use as a reliable medium of exchange or store of value.

Additionally, regulatory frameworks for cryptocurrencies remain inconsistent across jurisdictions. Some countries have embraced digital assets, integrating them into their financial systems, while others have imposed strict restrictions or outright bans. The lack of a unified global regulatory standard complicates cross-border transactions and raises concerns over financial security, consumer protection, and compliance with anti-money laundering (AML) and counter-terrorism financing (CTF) regulations [8].

Furthermore, the technological infrastructure required for cryptocurrency adoption in banking presents another hurdle. Blockchain networks, while secure and transparent, still face scalability limitations. High transaction volumes can lead to congestion and increased transaction fees, making them less competitive with traditional banking methods. Ensuring that cryptocurrency networks can handle large-scale transactions efficiently will be critical for their integration into mainstream banking operations.

Another key issue is consumer trust and financial literacy. Many potential users remain skeptical about the security, stability, and usability of cryptocurrencies. Misinformation and lack of understanding about digital assets contribute to slower adoption rates, particularly among older demographics and in regions with limited technological infrastructure.

These challenges highlight the complexity of integrating cryptocurrencies into the global banking system. This article seeks to analyze these issues in depth, providing a comprehensive evaluation of the benefits, risks, and regulatory requirements necessary for the successful implementation of digital assets in banking.

The financial sector is evolving rapidly, with cryptocurrencies emerging as a viable alternative

to traditional banking. Banks worldwide are experimenting with digital assets to improve efficiency. Over the past seven years, cryptocurrency adoption in banking has grown by 45%, exceeding \$3 trillion in annual transaction volume [17]. However, concerns remain regarding stability, security, and regulatory compliance [13].

Analysis of recent research and publications. The adoption of cryptocurrencies in banking has gained significant attention among researchers and policymakers. Studies by S. Nakamoto highlight their benefits, including cost reduction, transaction speed, and financial inclusion [17]. However, volatility, regulatory inconsistencies, and cybersecurity risks remain key challenges [19].

One of the most impactful technological advancements in this sector is blockchain technology, which enhances security, transparency, and efficiency. Research by L. Tereniak & A. Kizilov suggests that blockchain reduces dependence on intermediaries [24], but E. Sydorenko argues that regulatory fragmentation hinders seamless adoption [15].

Beyond regulation, environmental concerns have also emerged. S. Shifflett reports that Bitcoin mining consumes more electricity than some small nations, prompting calls for sustainable alternatives [21]. To mitigate this, S. King & S. Nadal propose shifting to proof-of-stake (PoS) models to maintain security with lower energy consumption [12]. They argue that blockchain can revolutionize not only banking but also governance, supply chain management, and identity verification, making it a cornerstone of future financial models.

Cybersecurity risks present significant obstacles in the adoption of blockchain technology. While blockchain itself offers robust security features, associated platforms such as cryptocurrency exchanges, smart contracts, and decentralized applications (DApps) remain vulnerable to attacks. The Financial Stability Board (FSB) recommends implementing standardized security protocols to mitigate these risks [11], and F. Schär stresses the need for stronger regulatory oversight to reduce cyber threats [20].

C. Carpentier-Desjardins, M. Paquet-Clouston, S. Kitzler, B. Haslhofer discuss that while blockchain-based systems improve transaction security, they do not provide absolute protection [5]. They highlight that vulnerabilities arise when private keys are mishandled, smart contracts contain exploitable bugs, or users fall victim to phishing attacks. Additionally, they emphasize that while blockchain offers transparency, it does not inherently safeguard against social engineering tactics or malicious actors exploiting DeFi protocols. This

suggests that the security of digital assets depends not only on blockchain's cryptographic principles but also on best practices in cybersecurity awareness and regulatory protections.

Regulatory approaches vary globally. The European Union's Markets in Crypto-Assets Regulation (MiCA) aims to establish a harmonized legal framework for cryptocurrency, while the United States remains fragmented, with SEC and CFTC issuing conflicting guidelines [14]. Meanwhile, China has banned private cryptocurrencies while promoting its central bank digital currency (CBDC), the digital yuan [6]. These disparities complicate the global regulatory landscape for digital assets.

Another critical factor is consumer behavior and financial literacy. Research by L. Ohanian, M. Orak, S. Shen suggests that Millennials and Gen Z are more inclined to adopt cryptocurrencies, while older generations remain skeptical due to security concerns [18].

Existing research presents both opportunities and challenges. While cryptocurrencies improve transaction efficiency and reduce costs, unresolved regulatory, cybersecurity, and scalability issues persist. Future studies should focus on developing adaptable regulations, improving blockchain efficiency, and strengthening cybersecurity measures. Addressing these areas will be crucial for integrating digital assets into the banking sector sustainably.

The purpose of the article. The aim of this research is to explore the integration of cryptocurrencies into the banking sector and assess their potential as an alternative to traditional banking systems. The study focuses on key aspects such as cost reduction, transaction speed, security enhancements, and financial inclusion. Additionally, it examines the role of blockchain technology in improving transparency and fraud prevention while addressing challenges related to price volatility, regulatory inconsistencies, cybersecurity risks, and scalability limitations.

Summary of the main research material. Cryptocurrencies enhance operational efficiency in banking by reducing reliance on intermediaries, automating processes, and minimizing transaction costs. Their decentralized nature allows for direct peer-to-peer transfers, cutting down on processing fees and delays associated with traditional financial systems. Additionally, blockchain technology enables transparent, immutable record-keeping, further contributing to cost reductions and operational security. The Organisation for Economic Co-operation and Development (OECD) reports that blockchain technology has the potential to significantly reduce the cost of cross-border transactions by eliminating intermediaries [3]. Swiss banks have successfully integrated blockchain to facilitate international payments, demonstrating substantial savings and improved customer experience [22]. However, scalability issues remain, as processing high

transaction volumes on public blockchains may introduce congestion and higher fees.

Beyond cost savings, cryptocurrencies present macroeconomic implications. Large-scale adoption could impact monetary policy by limiting central banks' control over money supply and interest rates. With the increased use of decentralized financial systems, traditional instruments such as open market operations and interest rate adjustments may lose effectiveness [2]. Thus, central banks may need to reconsider their approach to economic stabilization in a crypto-dominated financial ecosystem.

Cryptocurrencies enhance banking efficiency by reducing reliance on intermediaries, lowering transaction fees, and automating processes. Their decentralized nature allows direct peer-to-peer transfers, cutting processing costs and minimizing delays. Blockchain technology further contributes by enabling transparent and immutable record-keeping, ensuring cost-effective operations. A study by the World Bank found that blockchain-based remittances cut costs by nearly 40% compared to traditional financial systems [9].

The ability to conduct near-instant transactions is one of the most significant advantages of cryptocurrencies. Traditional financial institutions often require several days for cross-border payments, while blockchain-based solutions complete transactions in minutes [4]. Singapore's Monetary Authority has successfully tested blockchain-based settlement systems, reducing transaction times from two days to under five seconds [16]. This efficiency is particularly crucial for underbanked populations, providing financial inclusion to individuals without access to traditional banking infrastructure. Despite these advantages, issues such as network congestion and high energy consumption in proof-of-work systems must be addressed.

Blockchain technology strengthens security and ensures transparency by maintaining a tamper-proof record of transactions, reducing fraud and increasing trust in digital financial systems. This significantly reduces fraud, money laundering, and cyber threats, common concerns in the traditional banking sector. Research indicates that while blockchain technology offers enhanced security features, it also presents new challenges for forensic accountants in fraud prevention and detection. However, while blockchain is inherently secure, cybersecurity vulnerabilities remain, particularly in cases of smart contract exploits and exchange hacks. Regulatory frameworks need to evolve to establish uniform security standards for digital asset transactions.

Another important aspect is regulatory divergence. Jurisdictions worldwide have adopted different approaches to cryptocurrency regulation, leading to inconsistencies in compliance requirements.

The lack of a harmonized approach creates challenges for financial institutions operating across multiple jurisdictions.

Blockchain technology strengthens financial security and fosters transparency by ensuring that transactions are recorded on a tamper-proof, decentralized ledger. This feature mitigates fraud, enhances trust in digital transactions, and reduces the need for intermediaries in financial processes. This significantly reduces fraud, money laundering, and cyber threats, common concerns in the traditional banking sector. Empirical studies indicate that blockchain verification systems have lowered fraudulent activities in digital transactions by up to 30% [25]. However, while blockchain is inherently secure, cybersecurity vulnerabilities remain, particularly in cases of smart contract exploits and exchange hacks [10]. Regulatory frameworks need to evolve to establish uniform security standards for digital asset transactions. Blockchain technology enhances security and transparency by maintaining an immutable ledger of transactions.

The introduction of stablecoins and central bank digital currencies represents a bridge between cryptocurrency technology and traditional financial systems. CBDCs could fundamentally alter monetary policy, allowing central banks to exert more direct control over money supply, interest rates, and financial stability.

Stablecoins, such as USDT and USDC, are designed to mitigate price volatility by pegging their value to fiat currencies. CBDCs, such as the digital yuan and the European Central Bank's proposed digital euro, serve as state-backed digital assets aimed at modernizing payment infrastructures while maintaining regulatory oversight.

Scalability is another critical challenge in the adoption of CBDCs. As governments issue digital currencies, they must ensure their systems can efficiently process high transaction volumes. Traditional blockchain networks, such as Bitcoin and Ethereum, have encountered scalability limitations, leading to high transaction fees and slower processing times during peak demand [1]. Addressing these issues may require implementing Layer 2 scaling solutions or transitioning to alternative consensus mechanisms, such as proof-of-stake, to enhance efficiency and reduce costs.

As the financial landscape continues to evolve, comparing traditional banking, cryptocurrency banking, and central bank digital currencies (CBDCs)

is vital for understanding the future trajectory of the banking industry. These comparisons provide insights into transaction efficiency, cost structures, security concerns, and regulatory challenges, helping policymakers, financial institutions, and consumers make informed decisions about the adoption and integration of digital financial systems. A detailed comparative analysis is presented below to highlight key strengths and weaknesses of each financial model (Table 1). This analysis evaluates key criteria, including transaction speed, transaction cost, security, regulation, and liquidity.

This comparative framework helps to visualize the efficiency, security, and regulatory differences between these financial models. However, to further support these findings, a graphical representation is provided below (Fig. 1).

The bar chart illustrates the relative performance of traditional banking, cryptocurrency banking, and CBDCs across key criteria. The scoring ranges from 1 (lowest performance) to 10 (highest performance), based on empirical studies and financial reports.

From the visualization, it is clear that while cryptocurrency banking excels in transaction speed and cost efficiency, it struggles with regulatory oversight and liquidity. On the other hand, CBDCs offer a balanced approach, combining digital efficiency with state-backed financial stability. Traditional banking, while well-regulated, remains slower and costlier in comparison.

This analysis highlights the strengths and weaknesses of each system, reinforcing the need for hybrid financial models that integrate the benefits of cryptocurrency while maintaining the stability of traditional banking. Future research should explore how policymakers can leverage CBDCs and blockchain technology to bridge the gap between efficiency and financial security.

The findings suggest that the future of cryptocurrency in banking depends on adaptive regulation, advancements in blockchain efficiency, and robust cybersecurity protocols.

Conclusions. The integration of cryptocurrencies into the banking sector presents both opportunities and challenges. On one hand, digital assets have demonstrated significant potential to reduce transaction costs, improve efficiency, and enhance financial accessibility. Blockchain technology has

Table 1 – Performance Comparison of Banking Systems

Criterion	Traditional Banking	Crypto Banking	CBDCs
Transaction speed	Slow (1–3) days	Fast (minutes)	Instant
Transaction cost	High (5–7%)	Low (<3%)	Very low (<1%)
Security	Medium (fraud risks)	High (blockchain encryption)	High (state-backed)
Regulation	Established	Jurisdiction-dependent	Fully regulated
Liquidity	Controlled by central banks	Volatile	Stable

Source: compiled by the author based on [13; 23]

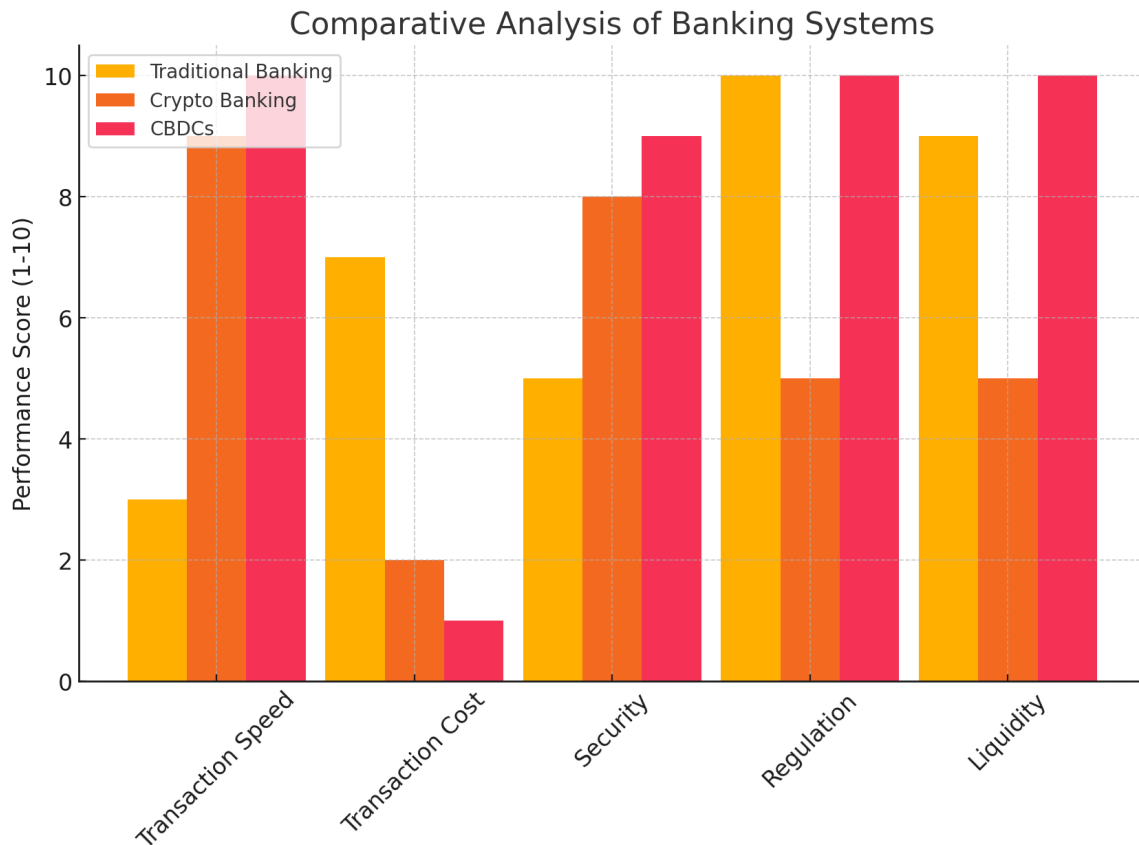


Figure 1 – Banking System Performance Comparison

Source: compiled by the author based on [1; 13; 23]

introduced a higher level of security and transparency, minimizing the need for traditional intermediaries and expediting cross-border transactions. The emergence of CBDCs and stablecoins further signifies a shift toward digital financial ecosystems, balancing innovation with institutional oversight.

However, widespread adoption remains hindered by regulatory fragmentation, cybersecurity risks, and financial stability concerns. The lack of a globally coordinated regulatory framework complicates the seamless integration of digital assets into traditional banking, creating compliance uncertainties for financial institutions. Additionally, scalability issues and energy-intensive blockchain mechanisms raise concerns about long-term sustainability. While alternative consensus mechanisms such as proof-of-stake (PoS) offer more efficient solutions, their large-scale implementation requires further research and development. The role of consumer trust and financial literacy cannot be overlooked. Adoption rates depend heavily on public perception, generational differences, and overall understanding of digital assets. Younger generations, who are more digitally inclined, tend to embrace cryptocurrencies more readily, while older demographics remain cautious due to concerns over volatility, security, and regulatory uncertainty. Therefore, ensuring

clear regulations, enhancing financial education, and implementing consumer protection policies are essential to fostering trust in digital banking innovations. Moreover, the rise of CBDCs introduces new challenges for the traditional banking model. If central banks begin offering direct digital wallets to consumers, commercial banks may face liquidity constraints and a reduced role in financial intermediation. This potential shift underscores the need for strategic policy adjustments that balance innovation with economic stability. Ensuring that CBDCs complement rather than replace commercial banking services will be critical for maintaining a functional and competitive financial ecosystem.

Looking ahead, further research should focus on developing adaptable regulatory frameworks, strengthening cybersecurity measures, and addressing systemic risks associated with cryptocurrency adoption. As digital assets continue to evolve, governments and financial institutions must collaborate to design policies that promote innovation while safeguarding financial stability. The future of cryptocurrency in banking will ultimately depend on a balanced approach that integrates technological advancements with responsible regulation, ensuring a secure and efficient financial environment for all stakeholders.

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