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Blockchain Technology as a Tool to Combat the Shadow Market: A Literature Review

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Abstract: *The purpose of this article is to analyze the potential of blockchain technology in combating the shadow economy, which poses significant threats to the economic stability of states and reduces their tax revenues. The shadow economy, encompassing illegal economic activities, deprives governments of substantial financial resources, undermines trust in public institutions, and fosters corruption. Blockchain, as a decentralized technology, can provide transparency and security in financial transactions, which are crucial factors in reducing corruption risks, preventing tax evasion, and combating money laundering. The article employs*



comparative analysis methods of scholarly publications on implementing blockchain technologies across various economic sectors, alongside a review of practical cases where this technology has been utilized to enhance the transparency of financial transactions. This approach allows for a comprehensive assessment of blockchain's potential in counteracting the shadow economy and identifying opportunities for its integration to improve financial transparency, minimize corruption risks, and optimize financial flow management.

The research results indicate that blockchain holds significant potential for enhancing the efficiency of financial flow management, particularly in the public sector, where its adoption can lower corruption levels and bolster trust in public institutions. Additionally, blockchain shows promising prospects for implementation in sectors such as logistics and healthcare, where data transparency, security, and reliability play a critical role.

Despite specific regulatory and technical barriers to its implementation, blockchain offers considerable opportunities for reforming financial and economic systems on a global scale. The conclusions underscore that the continued development of this technology can substantially reduce the scale of the shadow economy and improve transparency in economic operations. It is emphasized that integrating blockchain into public finance management systems enables tracking all stages of financial flows, thus minimizing the risks of corruption. Furthermore, the technology prevents the alteration or falsification of data, making it an indispensable tool in the fight against the shadow economy. Despite the technical challenges and regulatory hurdles, blockchain can potentially transform the economy's public and private sectors. The conclusions highlight that the further advancement and refinement of blockchain technology can significantly enhance the efficiency of economic transactions, increase trust in public institutions, and reduce the scale of the shadow economy. This demonstrates the potential of blockchain as a technology that could bring substantial changes to the global financial system and serve as an effective instrument in combating illegal economic activities.



Keywords: *financial transactions, corruption, tax evasion, money laundering, decentralized systems, data management, economic transparency, regulatory challenges.*

Технологія блокчейн як інструмент боротьби з тіньовим ринком: огляд літератури

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Анотація: *Метою цієї статті є аналіз потенціалу технології блокчейн у боротьбі з тіньовим ринком, який створює серйозні загрози для економічної стабільності держав та зменшує їх податкові надходження. Тіньова економіка, що включає нелегальні економічні активності, позбавляє бюджети значних фінансових ресурсів, підриває довіру до державних інституцій і сприяє поширенню корупції. Блокчейн, як децентралізована технологія, здатний забезпечити прозорість і безпеку фінансових операцій, що є важливим фактором у зменшенні корупційних ризиків і запобіганні ухиленню від сплати податків та відмиванню грошей. У статті використано методи порівняльного аналізу наукових публікацій щодо впровадження блокчейн-технологій у різні сектори економіки, а також проведено аналіз практичних*



кейсів застосування цієї технології для підвищення прозорості фінансових транзакцій. Такий підхід дозволив всебічно оцінити потенціал блокчейну у протидії тіньовій економіці та виявити можливості його інтеграції для посилення прозорості фінансових операцій, мінімізації ризиків корупції та оптимізації управління фінансовими потоками. Результати дослідження вказують на значний потенціал блокчейну в підвищенні ефективності управління фінансовими потоками, особливо у державному секторі, де впровадження блокчейн-технологій здатне знизити рівень корупції та підвищити довіру до державних інституцій. Відзначено, що блокчейн має суттєві перспективи застосування у таких галузях, як логістика та охорона здоров'я, де особливу роль відіграють прозорість, безпека даних та надійність інформаційних потоків.

Незважаючи на певні регуляторні та технічні бар'єри, які виникають на шляху її впровадження, блокчейн відкриває значні перспективи для реформування фінансових та економічних систем у глобальному масштабі. Висновки підкреслюють, що подальший розвиток цієї технології може значно зменшити масштаби тіньової економіки та покращити прозорість економічних операцій. Наголошено, що впровадження блокчейну в системи управління державними фінансами дозволяє відстежувати всі етапи фінансових потоків, мінімізуючи ризики корупційних зловживань. У свою чергу, технологія блокує можливість зміни або фальсифікації даних, що робить її незамінним інструментом у боротьбі з тіньовою економікою. Незважаючи на технічні дилеми та регуляторні перешкоди, які виникають на шляху її впровадження, блокчейн має значний потенціал для трансформації як державного, так і приватного секторів економіки. У висновках підкреслюється, що подальший розвиток та вдосконалення технології блокчейн можуть істотно покращити ефективність економічних операцій, сприяти підвищенню рівня довіри до державних інституцій, а також зменшити обсяги тіньової економіки. Це свідчить про перспективу блокчейн як технології, яка може внести вагомі зміни у глобальну фінансову систему



та стати дієвим інструментом у боротьбі з незаконною економічною діяльністю.

Ключові слова: *фінансові транзакції, корупція, ухилення від сплати податків, відмивання грошей, децентралізовані системи, управління даними, прозорість економіки, регуляторні виклики.*

Formulation of the problem in general form and its relation to important scientific or practical tasks. The shadow market presents a significant challenge to the global economy, not only by reducing government revenues through tax evasion but also by fostering criminal activities, including money laundering, human trafficking, and drug trafficking. Moreover, the shadow market creates unfair competition for legitimate businesses, as those operating within the legal framework must comply with regulations and tax obligations. In contrast, participants in the shadow economy evade these responsibilities. This disparity undermines public trust in government institutions and diminishes the effectiveness of state governance.

With rapid technological advancements, new tools are emerging that offer the potential to combat illegal transactions and enhance the transparency of financial processes. One such tool is blockchain – a decentralized, distributed ledger technology that ensures data transparency, security, and immutability. Blockchain enables the creation of a reliable system for accounting and transaction monitoring that is resistant to tampering, significantly complicating the operations of the shadow economy and increasing trust in financial transactions.

First introduced in 2008 with the launch of the cryptocurrency Bitcoin, blockchain technology has since evolved and gained recognition as a robust data storage and sharing tool. Its potential to transform the fight against the shadow market lies in its ability to enhance transparency, accountability, and trust across financial systems while reducing corruption within public institutions [3]. However, the widespread adoption of blockchain in combating the shadow economy requires careful consideration of regulatory, technical, and operational challenges. As this technology continues to develop, it offers promising opportunities to reshape



approaches to illicit financial activities and strengthen the integrity of the global economic system.

An analysis of the latest research and publications. Interest in blockchain technology has grown significantly recently, as evidenced by numerous studies and publications. Blockchain is often regarded as a revolutionary technology capable of transforming various sectors of the economy. One of the main areas of research focuses on using blockchain to ensure the transparency of financial transactions and combat the shadow market. The following works are notable contributions to this topic.

In his research, D. Tapscott explores how blockchain technology can contribute to a more just and sustainable future by lowering barriers to economic participation. He argues that blockchain opens up new opportunities for the global economy through increased transparency and decentralization [14, p. 159–187]. In her turn, M. Swan explores the potential of blockchain technology, mainly distributed ledgers, to reduce systemic risks in financial networks. Her research delves into how this innovative technology can contribute to broader economic stability [13].

Joseph Weinberg is one of the key experts in digital currencies and blockchain technology, with extensive experience in regulatory oversight and combating shadow markets. As the chairman of Shyft, he has developed a unified blockchain network that promotes regulatory compliance and provides transparency in implementing due diligence requirements [10]. This approach is promising for countering the shadow economy, as it helps to reduce opportunities for concealing illegal transactions. In addition, his work as co-founder and CEO of Paycase Financial demonstrates the practical aspects of using blockchain technologies to create decentralized financial systems that can operate effectively outside of traditional financial institutions, which is essential for countering shadow markets.

For example, M. Walport explores the possibilities of distributed ledger technology (DLT) in the context of cryptocurrencies and in a wide range of industries, including the fight against the shadow economy. The author's report



addresses the issues of increasing transparency and data security, which are critical to reducing fraud and illegal economic activity. In particular, the emphasis is on how DLT can ensure the reliability and authenticity of transactions, reduce dependence on central institutions, and minimize the risks of data manipulation [15]. These aspects are particularly relevant for developing mechanisms to control shadow markets by introducing blockchain technologies in financial and regulatory systems.

“Blockchain, as a distributed ledger technology, is a key tool in building transparent, secure, and decentralized systems that help eliminate intermediaries in financial transactions and increase the efficiency of data management” [11]. The study by M Khmara and R. Mikhailov is essential for my article because it demonstrates how blockchain can be an effective tool in the fight against the shadow economy. Thanks to its ability to ensure transparency and security of transactions, blockchain minimizes the fraud risk and helps create controlled data exchange systems. This is directly related to the fight against the shadow market, where data control and security are vital to reducing illegal transactions [11].

S. Far and others examine the fundamental importance of blockchain technology and its derivatives for the future of digital business. The authors emphasize the role of decentralized finance (DeFi) as a revolutionary financial technology that eliminates intermediaries and ensures transparency, security, and speed of transactions. DeFi is becoming the basis for new business models like the Metaverse, where users can conduct financial transactions and other activities without physical boundaries. The Metaverse allows the creation of virtual businesses and markets based on the blockchain, ensuring interaction transparency and reliability [9].

These ideas are fundamental, as blockchain and DeFi can become critical tools to combat shadow markets. Using decentralized finance and smart contracts reduces the opportunities for illegal transactions, as all transactions are transparent and immutable. It also reduces the risk of fraud and creates new opportunities to control financial flows on a global scale.



Identification of previously unresolved parts of the overall problem.

Despite the rapid development of blockchain technology and its application in various industries, several aspects of its role in combating the shadow market still need to be solved. One of the primary unresolved issues is the challenge of regulatory adaptation. While blockchain provides a transparent and immutable record of transactions, its use in the shadow market still faces significant legal and regulatory barriers. Many countries need a comprehensive legal framework to address the integration of blockchain technology into existing financial and tax systems. This absence of clear regulations leads to uncertainties, particularly in cross-border transactions and taxation, which, in turn, hinders the full utilization of blockchain for combating illicit activities.

Furthermore, although blockchain ensures transparency, the anonymity of participants on some platforms poses a problem. While this anonymity can benefit privacy, it also enables illegal transactions, including tax evasion, money laundering, and other forms of financial crime. Identifying individuals behind blockchain transactions remains a difficult task, and additional research is needed on how to balance anonymity with regulatory compliance.

Another unresolved issue is the technical challenges associated with implementing blockchain in established systems. Integrating blockchain technology, especially in large-scale financial institutions and government bodies, may require substantial investment in both time and resources. Furthermore, there are concerns about blockchain networks' scalability and capacity to handle a growing volume of transactions without compromising speed and security. Cyberattacks and vulnerabilities related to smart contracts and consensus mechanisms require further exploration. Continuous research is needed to address these security concerns and develop more robust protection mechanisms, ensuring blockchain systems can withstand evolving cyber threats while maintaining their decentralized integrity.

Thus, while blockchain presents a powerful tool for enhancing transparency and reducing fraud in the shadow market, further investigation is needed to resolve these challenges. Addressing these gaps can significantly contribute to the fight



against illegal economic activities, providing a solid foundation for the broader adoption of blockchain technology in regulatory frameworks and financial infrastructures. This would help strengthen trust in financial systems and promote global economic stability by curbing the influence of shadow markets and illegal transactions.

By proposing practical solutions for integrating blockchain into legal frameworks and highlighting its potential for automating financial processes through smart contracts, this research provides a roadmap for addressing the unresolved security, anonymity, and regulatory barriers in the fight against illegal economic activities.

The purpose of the article. This article aims to explore the potential of blockchain technology as a tool to combat the shadow market. The research will examine how blockchain can ensure transaction transparency, reduce corruption risks, prevent tax evasion and fight money laundering. The main challenges and prospects of blockchain implementation in various sectors of the economy will also be analyzed.

Main results of the research. The shadow market, also known as the illegal or black market, includes all types of economic activity carried out without the official permission of the state. This includes tax evasion, selling illegal goods and services, and other illegal activity. The main characteristics of the shadow market include several vital aspects that define its essence and distinguish it from the legal economy.

First, the anonymity of the participants is one of the most essential features of the shadow market. Transactions carried out within the framework of the shadow economy are usually not subject to official accounting and are often hidden from government authorities. This allows participants to avoid taxes, regulations, and other obligations when operating in the legal economy. Anonymity also helps to avoid liability for illegal activities, as it is tough to identify the person involved in such transactions. This leads to an increase in the level of crime and the creation of



favourable conditions for such activities as drug trafficking, weapons, smuggling and other forms of organized crime [2].

Second, the lack of government control is another essential characteristic of the shadow market. Since the shadow economy operates outside the boundaries of legal regulation, government agencies cannot supervise or control such transactions. This means that shadow market activities are not regulated by law, and participants do not follow legal norms or standards. The lack of state control also creates national security risks, as the shadow economy can be used to finance terrorist activities, evade sanctions, or otherwise threaten the stability of the state.

Thirdly, the lack of guarantees for the protection of consumer rights is another characteristic feature of the shadow market. Participants in the shadow economy cannot count on legal protection in case of disputes or problems with purchased goods or services. For example, consumers may encounter counterfeit or substandard goods and fraud. However, they do not have the opportunity to go to court or other official bodies to protect their rights. The lack of legal protection also means that consumers cannot access warranty services, refunds or other protection mechanisms in the legal economy. This creates a vulnerable situation for end consumers, who may lose funds or receive goods dangerous to life and health.

The reasons for the shadow market's existence are diverse and include high tax burdens, corruption, bureaucratic obstacles, and economic inequality. Many people and businesses turn to the shadow economy to avoid excessive spending or to circumvent laws they believe are unfair or overly restrictive.

The shadow market has serious negative consequences for the economy and society. It reduces public tax revenues, undermines trust in public institutions, promotes corruption and crime, and creates an uneven playing field for law-abiding entrepreneurs.

Blockchain technology appeared as the basis for the first cryptocurrency - Bitcoin. Since then, it has developed rapidly and gained recognition as a promising technology for various fields, including finance, logistics, healthcare and many others. Blockchain provides a decentralized, secure, and immutable transaction



recording system that opens up new opportunities for data management and increased transparency.

A blockchain is a distributed database where each block contains a record of confirmed transactions and is added to the chain of previous blocks. Blockchain technologies are made up of a few fundamental principles which you can attribute to the main advantages of blockchain :

- blockchain is a distributed register and will function until the last active network nodes ;
- access to history transactions blockchain have all participants network, and does not have complete control over it, no one;
- in network blockchain absent hierarchy, among many networks, there is no primary node;
- The nature of the blockchain can provide users with a unique combination of openness and data security. The highProgressive encryption methods achieve a high degree of reliability;
- even online blockchains are impossible to remove or replace because they are confirmed through many network nodes;
- technology blockchain provides absolute transparency because access to information about everyone's operations is open, and everyone may verify its probability;
- network blockchain is a “trust” system because transactions are carried out directly between participants and are automatically checked and confirmed. Many nodes do not need network mediators that exclude mistrust of one intermediary organization. As a result, this leads to a significant reduction in cost account transactions reduction of (commission) expenses, as well as - an increase in speed of transactions because of the abbreviation waste of time [4].

Consortium blockchains combine the advantages of public and private blockchains, allowing groups of organizations to manage the blockchain jointly. In the consortium blockchain, only selected participants have the right to verify transactions or add new blocks, which provides a certain level of centralization and



control while preserving the principle of decentralization since management does not belong to a single organization. This approach reduces the risks of fraud and abuse, as participants can interact in an environment of trust. Consortium blockchains are often used in industries where it is necessary to maintain a high level of privacy, but it is essential to have a reliable mechanism for confirming transactions. For example, they can be used by groups of banks to share financial data or companies working in logistics to track deliveries and manage supply chains [12].

Therefore, different types of blockchains provide flexibility in choosing a technological solution depending on users' specific needs and requirements. Public blockchains provide maximum transparency and security, private blockchains offer a high level of confidentiality and control, and consortium blockchains balance decentralization and governance, making them suitable for a variety of applications.

There are currently many examples of using blockchain to fight corruption, listed below (Table 1).

Table 1

Applications of Blockchain Technology

Application Area	Description
Cryptocurrencies	Bitcoin allows direct financial transactions without banks or intermediaries, ensuring security and anonymity.
Smart Contracts	Ethereum introduced intelligent contracts that automate agreements and eliminate intermediaries, simplifying processes.
Logistics and Supply	Companies like Walmart use blockchain for supply chain control, tracking product journeys and ensuring quality.
Medicine	Medicalchain stores medical records securely, allowing patients to share data with healthcare professionals.



Voting	Platforms like Voatz secure elections by ensuring each vote is accurately counted and stored.
Finance	Ripple facilitates international money transfers with high security and low costs for financial institutions.
Real Estate	Propy simplifies real estate transactions by reducing paperwork and speeding up property rights transfers.
Energy	Power Ledger enables decentralized energy networks, promoting efficient use of renewable energy sources.

Source: summarized by the authors based on their analysis [5-9].

Blockchain-powered smart contracts are programs that automatically execute legal agreements and ensure compliance with all necessary legal requirements. Unlike traditional contracts, which require manual fulfilment of conditions and the involvement of intermediaries, intelligent contracts perform all actions automatically as soon as the set conditions are met. This significantly reduces the need for human intervention and shortens the time required to implement transactions [1].

In addition, smart contracts reduce the risk of errors that can occur during manual data entry or non-compliance with the terms of the agreement. Thanks to automated execution, every step in the contract execution process exactly matches what was programmed, eliminating the possibility of human error and significantly reducing fraud risks. Since all contract terms are written in advance in code and stored immutably on the blockchain, smart contracts also ensure high transparency and trust between the parties involved in the transaction.

Also, the use of intelligent contracts increases the efficiency of business processes. They can automatically perform complex operations, such as the distribution of payments, the transfer of ownership or asset management, without needing third-party organizations such as notaries or banks. This not only speeds up processes but also significantly reduces the costs associated with paying for the



services of intermediaries. Implementing smart contracts in various industries, such as finance, real estate and logistics, can radically change the way of doing business, reducing red tape and increasing the overall efficiency of operations. Blockchain technology offers new opportunities to combat the shadow economy but faces several significant challenges [4]. One of the main problems is regulatory barriers. Although blockchain provides transparency in transactions, the lack of a clear legal framework for its application can create legal uncertainties. Authorities and regulators have not yet had time to develop the necessary regulations for integrating blockchain into financial and tax systems. Secondly, the anonymity inherent in some blockchain platforms can be used for illegal activities. Although transactions on the blockchain are displayed transparently, identifying the specific individuals who make them remains challenging. Thirdly, the technical difficulties of implementing blockchain technology are also a significant challenge. Integrating with existing systems may require high costs and efforts, which may be an obstacle to the widespread adoption of this technology. Fourth, security and privacy issues remain relevant. Although blockchain is known for its high security, it can be vulnerable to new attacks, requiring constant improvement of protection systems. Despite these challenges, blockchain has significant potential in the fight against the shadow economy (Table 2).

Table 2

Advantages of blockchain technology

Advantage	Description
Software transparency financial transactions and promotions confidence in financial systems	Contributes increase confidence in financial systems.
Automation processes using smart contracts	Lowers risks corruption and administrative expenses
Tracking and monitoring financial flows	Makes it difficult activity fraudsters and avoidance taxes
The potential to become important a tool in the fight against the shadow economy	Possible development with improvement regulatory standards and technology.

Source: developed by the authors based on the analysis [1]



Consequently, the shadow market, characterized by anonymity, lack of government control and consumer protection, poses significant threats to the economy and society, including increased crime, corruption and loss of government revenue. With its decentralized and secure transaction system, blockchain technology offers promising opportunities to address these challenges. With features such as transparency, automation through smart contracts, and the ability to track financial flows, blockchain has the potential to reduce corruption and increase trust in financial systems. However, blockchain integration has obstacles, such as regulatory gaps, technical difficulties, and privacy concerns. Despite these challenges, the study shows that blockchain can be a crucial tool in the fight against the shadow economy, provided that regulatory standards and technological advances continue to evolve.

Conclusions. Thus, blockchain technology is a powerful tool in the fight against the shadow economy, opening up new opportunities for transparency, security and effective data management. Blockchain, as a distributed database, provides an immutable and transparent record of all transactions, making it difficult to falsify data and reducing opportunities for fraud. Its structure significantly reduces corruption risks, prevents tax evasion and helps fight money laundering by increasing trust in the legitimacy of financial transactions. For example, in the field of tax administration, blockchain can be used to automate accounting processes and verify transactions, reducing the possibility of concealing income. In financial institutions, this technology helps to detect suspicious transactions and prevent money laundering through clear and transparent tracking of capital flows.

With the development of technology and the improvement of the regulatory environment, blockchain has the potential to become a key element in the fight against illegal economic activity. Continuous innovation and technology adaptation to new conditions can help reduce the disadvantages and maximize the advantages of blockchain, making it an effective tool for ensuring fairness and transparency in economic systems.



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