https://www.sworldjournal.com/index.php/swj/article/view/swj35-03-036
DOI: 10.30888/2663-5712.2026-35-03-036

UDK 336.22:004.9

# DIGITALISATION OF TAX AUDITS: THE USE OF ARTIFICIAL INTELLIGENCE AND BLOCKCHAIN IN FISCAL CONTROL

**Olesia Demianyshyna**
*PhD (Economics), Associate Professor, Associate Professor department of Finance, Accounting and Economic Security,*
*ORCID 0000-0001-9820-8878*
*Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine,*

***Abstract.*** *The article provides a comprehensive overview of the digitalisation of tax audits under the conditions of rapid technological transformation of public finance systems. It identifies key problems of traditional fiscal control, including limited audit efficiency, delayed detection of tax risks, and insufficient transparency of tax data.*

*The purpose of the study is to assess the potential of artificial intelligence and blockchain technologies in addressing these challenges and enhancing the effectiveness of tax audits.*

*The research demonstrates that artificial intelligence enables advanced risk profiling, automated analysis of large datasets, and early identification of non-compliance patterns, while blockchain ensures data immutability, transparency, and reliable information exchange between taxpayers and tax authorities.*

*The main results indicate that the integrated use of AI and blockchain supports the transition from reactive to preventive and data-driven tax control models.*

*The article concludes that digital technologies significantly strengthen fiscal discipline and trust, forming a sustainable foundation for modern tax administration.*

***Keywords:*** *digitalisation of tax audits; fiscal control; artificial intelligence; Big data; blockchain technology; tax administration; risk-based auditing; big data analytics; transparency; tax compliance.*

## Introduction.

The rapid advancement of digital technologies is fundamentally transforming public finance systems and the mechanisms of fiscal control. Traditional tax audit approaches, which are largely based on retrospective analysis and manual procedures, increasingly fail to respond to the growing complexity of economic transactions, cross-border activities, and digital business models. These limitations create significant risks for tax compliance, reduce the effectiveness of revenue collection, and weaken trust between taxpayers and tax authorities. In this context, the digitalisation of tax audits has emerged as a strategic priority for modern tax administrations.

Artificial intelligence and blockchain technologies are becoming key instruments in redefining fiscal control practices. AI enables tax authorities to process large volumes of data, identify risk patterns, and detect non-compliance in a timely and objective manner, while blockchain offers new opportunities to enhance data integrity,

transparency, and traceability of tax-related information. This article explores the role of these technologies in addressing existing challenges of tax audits and outlines the main directions of their application in building a more efficient, preventive, and data-driven system of fiscal control.

Recent studies demonstrate increasing academic interest in how artificial intelligence (AI) and blockchain technologies transform tax audit and fiscal control practices. Mariana Poliak-Sverhun analyses how blockchain and AI support automation of tax administration processes, emphasising their role in improving efficiency in financial control and digital transformation of tax systems. Another Ukrainian article highlights digital tools in tax administration that include AI, Big Data and blockchain to enhance risk analysis and transparency in fiscal operations, pointing to strategic importance for modernising Ukraine's tax system. D.A. Kobylnik et al. discuss AI's potential in tax compliance control and forecasting risks, noting both EU and Ukrainian contexts and the need for regulatory harmonisation.

Internationally, research by Adel Khaldi and Amina Boufarh identifies key trends in integrating AI and blockchain in digital audits, showing improvements in audit evidence quality, automation, and transparency. Broader global literature indicates that AI enhances accuracy and fraud detection in tax systems, while blockchain ensures immutable records and increases trust in audit processes. These studies collectively underline that combining AI and blockchain can significantly modernise tax audits by enabling data-driven decision-making, reducing human errors, and strengthening fiscal governance.

**Presenting main material.**

The digitalisation of tax audits represents a systemic shift in fiscal control, characterised by the use of advanced information technologies to collect, process, and analyse tax-related data. Unlike conventional audit models, digital tax audits rely on continuous data flows, automated analysis, and real-time risk assessment.

A key feature of this transformation is the transition from selective audits to risk-based auditing. Digital tools enable tax authorities to identify high-risk taxpayers more accurately, optimise resource allocation, and reduce administrative burdens for

compliant taxpayers. Moreover, digitalisation enhances institutional transparency and accountability, which are critical for strengthening public trust in tax systems.

An analysis of contemporary scientific sources indicates that researchers consider the digitisation of tax audits to be a component of the systemic transformation of fiscal control aimed at improving its effectiveness, transparency, and preventive nature. At the same time, international and domestic studies differ significantly in their focus and methodological approaches, which is due to the varying levels of digital maturity of tax systems.

In OECD reports, the digitisation of tax audits is viewed through the prism of the Tax Administration 3.0 concept, which envisages the integration of tax control directly into taxpayers' digital business processes. The analytical value of these sources lies in justifying the transition from retrospective audits to continuous real-time control, which significantly reduces the level of tax violations at the stage of forming tax liabilities. At the same time, OECD reports are mainly conceptual and advisory in nature and do not always take into account the institutional constraints of countries with transitional economies.

The development of digital tax auditing logically leads to the transition to the use of artificial intelligence (AI) tools, which provide in-depth analytical analysis of large amounts of tax data and the formation of risk-oriented management decisions. As OECD experts emphasise, traditional tax control methods are not effective enough in the context of growing volumes of electronic transactions and complex financial schemes, while AI algorithms allow for the automation of the tax risk identification process and increase the accuracy of audits [1, 2, 3].

Foreign researchers focus on the institutional implications of the digitalisation of tax audits, in particular the changing role of tax authorities and the reduction of the administrative burden on taxpayers. The authors argue that digital tools allow for the creation of a risk-oriented audit model, but emphasise the risks associated with data protection and excessive automation of fiscal decisions. Thus, international studies form the theoretical basis for digital tax auditing, but leave open questions about its practical implementation. In Tanzi and Keen, artificial intelligence is seen as a tool for

changing fiscal control from selective auditing to analytical tax risk management. The authors note that the use of machine learning makes it possible to identify hidden patterns in taxpayer behaviour that cannot be detected using standard statistical methods. In this context, tax auditing is gradually being integrated into the system of strategic tax revenue management [4, 5].

Domestic authors [6, 7, 8] focus on the applied aspects of digitalisation of tax control in Ukraine, in particular on the problems of information and analytical support and limited integration of digital tools into tax audits. The works emphasise that the introduction of digital technologies into the activities of the State Tax Service of Ukraine is fragmented and does not form a comprehensive system of continuous tax monitoring. Domestic studies Tkachyk F. and Korchak A., Polyak-Svergun M., Yurieva I. focus primarily on the possibilities of using AI to improve the effectiveness of information and analytical support for tax control in Ukraine. The authors note that elements of intelligent data analysis are already being used in the activities of the State Tax Service of Ukraine, but they have limited functionality and do not form a comprehensive system of intelligent tax auditing. This indicates that there is significant untapped potential for AI in domestic fiscal practice.

The studies by Polyak-Svergun M. and Sydorovych O., Bukovsky M., and Yaroshovych A. are important in terms of analysing the potential of artificial intelligence and blockchain technologies in fiscal administration. However, these works are mostly descriptive in nature and do not contain a comprehensive assessment of the impact of digital tools on the effectiveness of tax audits, which indicates a gap in scientific research [7, 9].

Some studies [10, 11] consider the digitisation of auditing in the broader context of the transformation of accounting and auditing procedures. Although these works do not focus exclusively on tax auditing, they are valuable for understanding general trends in the automation of control functions and can be used as a methodological basis for further research.

Elaborating on this approach, De la Feria emphasises that AI is changing the functional purpose of tax audits: from a tool for recording violations, it is transforming

into a mechanism for preventive control. Predictive algorithms allow tax authorities to assess the likelihood of violations even before tax returns are filed, which is consistent with the concept of real-time taxation. At the same time, the author warns against the risks of excessive automation of fiscal decisions without proper regulatory oversight.

Thus, the results of the analysis of scientific sources indicate that the further development of digital tax auditing is directly related to the introduction of intelligent analytical tools. In this context, research into the application of artificial intelligence in tax auditing and tax risk assessment systems is particularly relevant.

An analysis of recent scientific publications by domestic and foreign authors shows that the digitisation of tax audits is seen as an irreversible stage in the evolution of fiscal control, driven by the growth in digital data volumes, the increasing complexity of financial and economic transactions, and the need to improve the efficiency of tax administration. At the same time, the studies reveal a certain fragmentation of approaches: some authors focus on institutional changes and the concept of risk-oriented control, while others focus on the practical aspects of introducing digital tools into the activities of tax authorities.

A comparison of scientific positions leads to the conclusion that the digitisation of tax audits is not limited to the introduction of individual information technologies, but is accompanied by a profound transformation of its content, objectives and methods. Tax audit is gradually losing the characteristics of a one-off control procedure and acquiring the characteristics of a continuous analytical process integrated into the overall fiscal management system. This transformation is manifested in changes in the frequency of audits, sources of information, the role of the human factor and the functional purpose of the audit.

In order to summarise the trends identified in scientific research and clearly reflect the key differences between traditional and digital models of tax audit, it is advisable to systematise the results of the analysis in the form of a comparative table (Table 1). This not only allows us to structure the theoretical approaches presented in the literature, but also creates a methodological basis for further analysis of artificial intelligence tools and blockchain technologies in fiscal control.

**Table 1 - The evolution of tax auditing in the context of digitalisation**

| Criterion | Traditional tax audit | Digital tax audit |
|---|---|---|
| Frequency of control | Episodic checks | Continuous monitoring |
| Main source of information | Tax returns | Big data |
| Approach to taxpayer selection | Selective | Risk-oriented |
| Role of the human factor | Dominant | Analytical and auxiliary |
| Main function | Detection of violations | Prevention of violations |

*Source: summarised by the author based on [2, 4, 5, 6]*

The presented evolution of tax auditing creates a theoretical basis for a more detailed analysis of the tools that ensure the implementation of the digital model of fiscal control. In this context, the use of artificial intelligence, which allows for the intelligent analysis of tax data and the formation of risk-oriented decisions in tax auditing, becomes of key importance.

Thus, scientific sources allow us to consider artificial intelligence as a key tool for digital tax auditing, ensuring the automation of analytical procedures, reducing the subjective influence of the human factor, and increasing the effectiveness of fiscal control. To systematise approaches to the application of AI in tax auditing, it is advisable to summarise them in a comparative table.

**Table 3 - Functional Components of Artificial Intelligence in Digital Tax Audit**

| Component | Description | Role in Tax Audit |
|---|---|---|
| Data Sources | Tax returns, e-invoices, banking transactions, customs and VAT databases | Formation of a comprehensive data environment |
| Data Integration Layer | Big Data platforms, APIs, data warehouses | Consolidation and standardization of heterogeneous data |
| AI Analytical Core | Machine learning, anomaly detection, behavioral analysis, predictive modeling | Identification of tax risks and hidden patterns |
| Risk Assessment Module | Risk scoring of taxpayers and transactions | Selection of high-risk entities for audit |
| Digital Tax Audit Procedures | Automated audit selection, continuous monitoring | Implementation of risk-oriented audit |
| Fiscal Outcomes | Reduced tax evasion, increased tax compliance | Preventive and efficient fiscal control |

Despite the significant analytical potential of artificial intelligence, its effectiveness in tax auditing largely depends on the quality and reliability of data. In this context, the use of blockchain technologies, which ensure the immutability of tax information and increase the level of trust in the results of fiscal control, becomes particularly relevant.

As a decentralised data storage technology, blockchain has significant potential to increase the transparency and reliability of tax audits. The use of distributed ledgers ensures the immutability of tax information, prevents its falsification, and increases the level of trust between the state and taxpayers. In fiscal control, blockchain can be used to record tax invoices, track supply chains, and monitor tax payments in real time. This is particularly relevant in the context of cross-border transactions and the development of e-commerce.

The integration of digital technologies into tax audits allows for the automation of a significant portion of control procedures, including desk audits, data reconciliation, and the formation of analytical conclusions. This reduces the duration of audits and increases the level of tax discipline by promptly informing taxpayers of any identified discrepancies. In addition, digital tools provide continuous fiscal control, replacing periodic audits with constant monitoring of tax obligations, thereby helping to reduce the number of disputes between taxpayers and tax authorities.

Robust data encryption constitutes a fundamental component of an effective cybersecurity framework for cloud-based accounting and tax audit systems. Encryption must be applied both to data in transit and data stored within cloud infrastructures. The implementation of Transport Layer Security (TLS) protocols for data transmission, combined with AES-256 encryption for data at rest, significantly mitigates the risk of unauthorised access. Furthermore, the adoption of multi-factor authentication enhances protection against credential compromise.

Advanced automated tools for detecting network traffic anomalies play a critical role in strengthening cybersecurity, as they allow for the timely identification of suspicious behaviour and rapid response to potential threats. In this context, innovative solutions such as Security Information and Event Management (SIEM) systems enable organisations to continuously monitor and analyse security events in real time, facilitating early detection of cyberattacks.

The cloud cybersecurity market demonstrates consistent growth. In 2019, the global cloud security market was valued at approximately USD 7.1 billion and is projected to expand at a compound annual growth rate (CAGR) of 14.64% from 2020

to 2027. Cloud security encompasses a comprehensive set of strategies, policies, and control mechanisms designed to safeguard data, infrastructure, and regulatory compliance within cloud environments. Notably, the financial services sector ranks among the leading adopters of cloud security solutions, surpassed only by the IT and telecommunications industries and exceeding even the public sector in terms of market engagement [12].

The combination of artificial intelligence and blockchain creates a synergistic effect in the tax audit system, as AI provides intelligent data analysis, while blockchain ensures data reliability and security. Based on the data recorded in the blockchain, AI algorithms can make more accurate predictions of tax risks and generate recommendations for fiscal control. This approach minimises the possibility of manipulation of tax reporting and increases the effectiveness of preventive tax audits.

Thus, for Ukraine, the introduction of digital tax audits using AI and blockchain is an important step towards harmonising the national tax system with European standards. In the context of martial law and limited budgetary resources, digital fiscal control tools contribute to increasing the transparency of tax revenues and reducing the shadow economy. At the same time, the effective implementation of such technologies requires the development of a regulatory framework, cybersecurity, and the improvement of the digital competence of tax authority employees.

**Conclusions.**

The digitisation of tax audits is a key area of transformation for fiscal control in the context of the development of the digital economy and the growth of electronic financial transactions. The introduction of modern digital technologies makes it possible to increase the efficiency, transparency and preventive nature of tax administration.

The use of artificial intelligence in tax auditing automates the analysis of large amounts of tax data, identifies risky transactions and predicts tax violations. This facilitates the transition to a risk-based control model and reduces the subjective influence of the human factor.

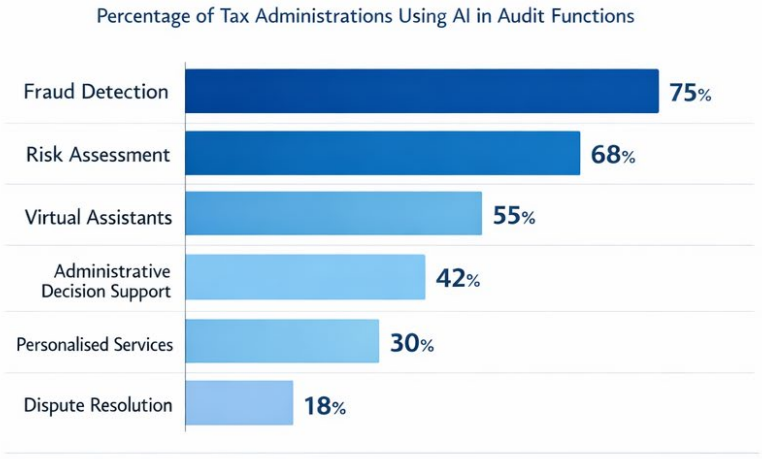
The use of blockchain technologies increases the reliability and accuracy of tax

information thanks to the immutability of data and transparency of transactions. The combination of artificial intelligence and blockchain forms an innovative model of digital tax audit, shifting the focus from post-factum control to the prevention of tax violations.

The further development of digital tax auditing is linked to the expanded use of intelligent analytical systems and blockchain solutions, as well as the transition to continuous real-time tax monitoring.

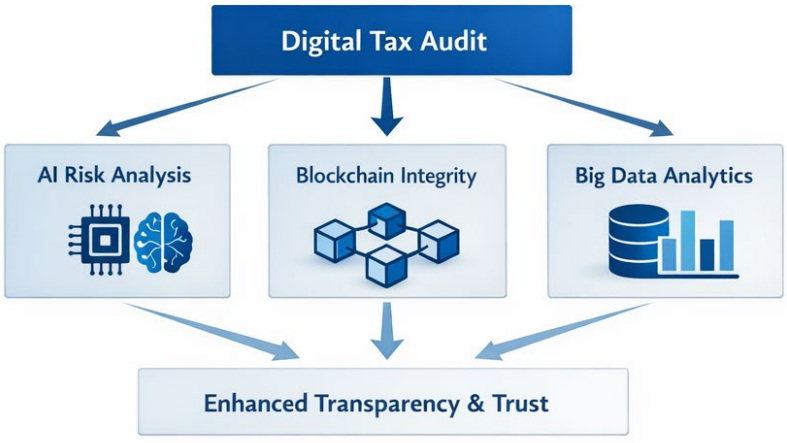
The creation of integrated digital fiscal platforms and the adaptation of best practices from EU and OECD countries to national conditions are promising areas for development. Improving the regulatory framework, cybersecurity standards and the digital skills of tax authority employees remains an important priority.

**Figure 1: AI Usage in Tax Administrations (OECD Countries)**




*Source: OECD Digitalisation Report 2025*

**Figure 2: Components of Digital Tax Audit Systems**



**References:**

1.Organisation for Economic Co-operation and Development (OECD). (2025). *Governing with Artificial Intelligence: The State of Play and Way Forward in Core Government Functions*. OECD Publishing.

2.OECD et al. (2024). *Tax Administration 2024: Services*. OECD Reports.

3.Pires, M. (2025). *Artificial Intelligence (AI) in the field of Tax Administration*. Review of International and European Economic Law.

4.Tanzi, V. (2020) Advanced Tax Administrations: An Analytical Perspective. IMF Working Paper. WP/20/13

5.Keen, M. (2017) Tax Administration in Low-Income Countries. IMF Working Paper. WP/17/140

6.Ткачук Ф, Корчак А. (2024). Інформаційно-аналітичне забезпечення податкового контролю в Україні в умовах цифровізації та євроінтеграції. *Економічний аналіз.* 2025. Том 35. №2. С. 191 – 203. DOI:https://doi.org/10.35774/econa2025.02.191

7.Poliak-Sverhun M. (2024). Automation of fiscal administration processes using blockchain technology and artificial intelligence. *International Science Journal of Management, Economics & Finance.* DOI:10.46299/j.isjmef.20240305.02.

8.Юр'єва І. А. Цифрове забезпечення організації і методики податкових перевірок як чинник фінансової безпеки. *Вісник Національного технічного університету «ХПІ» (економічні науки)*: зб. наук. пр. Харків : НТУ «ХПІ», 2023. № 5. С. 28 – 31.

9.Sydorovych O. Yu., Bukovskyi M. M., Yaroshovych A. Yu. (2024). Digital Tools of Tax Administration: Current Trends and Perspectives. *Innovative Economy.* №4. P. 218 – 230. DOI: 10.37332/2309-1533.2024.4.26

10.Гладчук Г. Г., Дроздова О. Г., Жидовська Н. М. (2025). Використання диджитал-інструментів для аудиту бухгалтерської звітності в Україні. *Актуальні питання економічних наук*. DOI:https://doi.org/10.5281/zenodo.14366862

11.Мельник Л. Ю., Аніщенко Г. Ю., Поліщук О. М. (2025). Вплив цифрових технологій на трансформацію методології обліку та аудиту управлінської

діяльності. *Актуальні питання економічних наук.* DOI: https://doi.org/10.5281/zenodo.15771767

12.Shchyrba I., Lagovska O., Demianyshyna O., Myronchuk Z., Shebeshten E. Challenges of Cloud Accounting Systems Landscape within the Context of Cybersecurity Paradigm. *Management Montevideo,* 2025. 3. 252. DOI: https://doi.org/10.62486/agma2025252

***Анотація.*** *Стаття містить комплексний огляд цифровізації податкових перевірок в умовах швидкої технологічної трансформації систем державних фінансів. У ній визначено ключові проблеми традиційного фіскального контролю, зокрема обмежену ефективність перевірок, запізніле виявлення податкових ризиків та недостатню прозорість податкових даних. Мета дослідження — оцінити потенціал технологій штучного інтелекту та блокчейну у вирішенні цих проблем та підвищенні ефективності податкових перевірок. Дослідження показує, що штучний інтелект дозволяє здійснювати розширене профілювання ризиків, автоматизований аналіз великих масивів даних та раннє виявлення моделей недотримання вимог, а блокчейн забезпечує незмінність даних, прозорість та надійний обмін інформацією між платниками податків та податковими органами. Основні результати свідчать, що інтегроване використання ШІ та блокчейну сприяє переходу від реактивних до превентивних та заснованих на даних моделей податкового контролю. У статті робиться висновок, що цифрові технології значно посилюють фіскальну дисципліну та довіру, створюючи стійку основу для сучасного податкового адміністрування.*