

СЕКЦІЯ 2

АКТУАЛЬНІ ПИТАННЯ ОБЛІКУ ТА АУДИТУ В УКРАЇНІ

Liu Chengyu,

PhD student of the Department of Accounting and Taxation,

West Ukrainian National University;

Intermediate accountant, Lecturer,

Nanchang Institute of Science and Technology,

Nanchang City, Jiangxi Province, China

THE INTEGRATION OF ARTIFICIAL INTELLIGENCE AND BLOCKCHAIN IN TAX AUDITS

The application of artificial intelligence (AI) and blockchain technology in tax audit shows great potential to improve transparency, security and efficiency. The immutability of blockchain ensures the real-time verification and security of transactions, while AI processes big data through machine learning and advanced analysis to identify fraud or irregularities. Although the integration of these technologies in tax audit is still in the initial stage, they can be combined to create a more intelligent and automated system. At present, AI faces challenges in dealing with complex blockchain data and distinguishing between legitimate and fraudulent transactions. The application of smart contracts in tax collection also raises regulatory and technical issues.

AI and blockchain can be integrated to create a more intelligent and automated tax audit system by leveraging their respective strengths. Blockchain offers a transparent, immutable ledger for financial transactions, ensuring data security and reducing opportunities for manipulation (Nakamoto, 2008) [7]. AI, with its advanced data processing capabilities, can automate the auditing process by analyzing blockchain's vast datasets in real-time (Marr, 2018) [6]. This integration allows for more streamlined tax audits, reducing human intervention and improving efficiency (Peters & Panayi, 2016) [9]. By combining AI's ability to detect patterns and anomalies with blockchain's secure, transparent infrastructure, this approach can enhance audit accuracy and compliance tracking, thus minimizing errors and potential fraud (Zavolokina, Scherer, & Schwabe, 2020) [13]. Together, AI and blockchain present a promising solution to revolutionize the audit process by transforming it into an automated and highly reliable system (Treleaven, Brown, & Yang, 2017) [10].

AI is instrumental in enhancing blockchain-based audits by analyzing large volumes of blockchain data to detect patterns, anomalies, or irregularities that may indicate tax fraud or non-compliance. Through machine learning algorithms, AI systems can be trained to recognize suspicious activities or deviations from expected financial behaviors, making the audit process more precise and efficient (Bose & Mahapatra, 2001) [2]. These algorithms learn from historical data, identifying common fraud markers,

which then allow tax authorities to gain real-time insights into potential fraud or irregular transactions (Ngai et al., 2011) [8]. Moreover, AI's ability to process large, complex datasets enables it to continuously monitor and flag irregularities in blockchain systems (Wang, 2019) [11]. This capability significantly enhances fraud detection and strengthens the overall reliability of the tax audit process, minimizing human error and improving accuracy (Xu & Zhao, 2020) [12]. By combining AI with blockchain, authorities can proactively address non-compliance and fraud, ensuring greater transparency and trust in the tax system.

AI-driven smart contracts have the potential to revolutionize tax collection by automating various tax-related processes. These smart contracts, built on blockchain, can execute tax payments or enforce compliance requirements automatically when predefined conditions are met, reducing administrative overhead and improving efficiency (Christidis & Devetsikiotis, 2016) [3]. By utilizing AI's decision-making capabilities, smart contracts can handle complex tax scenarios, identifying the appropriate conditions for tax payments, deductions, or exemptions without human intervention (Berg, Davidson, & Potts, 2019) [1]. This automation eliminates delays and ensures timely tax collection, which is crucial for both tax authorities and taxpayers (Catalini & Gans, 2020) [4]. The transparency of blockchain, combined with AI's ability to analyze and interpret data, minimizes errors, prevents fraud, and improves the overall efficiency of tax administration (Cong & He, 2019) [5]. Ultimately, AI-powered smart contracts create a more streamlined, secure, and accurate tax collection process, benefiting all stakeholders involved in the system.

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Momotiuk Liudmyla,
*Professor of Department of Finance, Banking and Insurance;
National Academy of Statistics, Accounting and Audit*

THE ROLE OF THE COUNTRY'S TAX SYSTEM IN ATTRACTING BUSINESS

The tax system plays a crucial role in the functioning of a country's economy and society. The tax system is integral to the economic health and social well-being of a nation. It not only provides necessary revenue for governmental functions but also helps in redistributing wealth, stabilizing the economy, influencing behavior, and ensuring the efficient allocation of resources. Usually when we talk about the tax system, we discuss the tax burden and how negatively it affects business. But there are tax systems that, on contrary, attract business and thus contribute to the economic development of countries.

Luxembourg, a small but affluent country in Europe, has a unique economic structure and tax system. Luxembourg has experienced robust economic growth over the years, characterized by:

- one of the highest GDP per capita in the world. Luxembourg's GDP per capita is approximately €108,000 (or about \$115,000 USD) in nominal terms
- Financial Services Hub: a significant portion of its GDP comes from financial services.
- diversified Economy: while finance dominates, there are also strong sectors in technology, logistics, and manufacturing.

In the table we provide the main taxes that are included in the tax system of Luxembourg.

Table 1

Characteristics of the tax system of Luxembourg

Tax	Characteristics	Rate
Personal Income Tax	Levied on the income of individuals, including salaries, pensions, and	The personal income tax system is progressive, with