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ARTIFICIAL INTELLIGENCE IN ENSURING THE EFFECTIVENESS OF FINANCIAL STATEMENT AUDIT

Abstract. *The article examines the role of artificial intelligence in improving the effectiveness of financial statement audits. It substantiates the need to transition from traditional auditing approaches to AI-based technologies capable of ensuring greater speed, accuracy, and analytical depth of audits. The practical implementation of AI by the Big Four companies (Deloitte, EY, PwC, KPMG) is analyzed, which integrate AI platforms to automate audit procedures, detect anomalies, and improve the quality of reporting. A comparison of traditional and AI-based auditing was conducted, which showed the advantages of using AI in reducing the factor of human error, accelerating data processing, and expanding analytical capabilities. Key trends for development until 2030 were outlined, including the introduction of continuous compliance, the creation of global AI audit standards, the formation of new professional roles, and the strengthening of regulatory requirements. It was concluded that artificial intelligence is a strategic factor in the modernization of auditing, forming a new model of interaction between humans and technologies based on objectivity, transparency, and trust.*

Keywords: *artificial intelligence, AI, audit, financial statement audit, effectiveness.*

ШТУЧНИЙ ІНТЕЛЕКТ У ЗАБЕЗПЕЧЕННІ ЕФЕКТИВНОСТІ АУДИТУ ФІНАНСОВОЇ ЗВІТНОСТІ

Анотація. *У статті досліджено роль штучного інтелекту у підвищенні ефективності аудиту фінансової звітності. Обґрунтовано необхідність переходу від традиційних підходів перевірки до технологій на базі штучного інтелекту, здатних забезпечити більшу швидкість, точність і аналітичну глибину аудиту. Проаналізовано практичне впровадження ШІ компаніями «Великої четвірки» (Deloitte, EY, PwC, KPMG), які інтегрують AI-платформи для автоматизації аудиторських процедур, виявлення аномалій і підвищення якості звітності. Проведено порівняння традиційного та аудиту на базі ШІ, що показало переваги використання ШІ у зменшенні впливу людського фактора, прискоренні обробки даних та розширенні аналітичних можливостей. Окреслено ключові тенденції розвитку до 2030 року — впровадження безперервного комплаєнсу, створення глобальних стандартів AI-аудиту, формування нових професійних ролей та посилення регуляторних вимог. Зроблено висновок, що штучний інтелект є стратегічним чинником модернізації аудиту, який формує нову модель взаємодії між людиною й технологіями, засновану на об'єктивності, прозорості та довірі.*

Ключові слова: *штучний інтелект, ШІ, аудит, аудит фінансової звітоності, ефективність.*

Formulation of the problem. The current development of economic relations is accompanied by the digitalization of financial processes, the automation of accounting, and an increase in the volume of data that needs to be verified during the audit process. Under such conditions, traditional audit methods based on manual processing of information are becoming ineffective and do not ensure an appropriate level of validity of audit conclusions. At the same time, there is a growing need to improve the quality, speed, and analytical depth of audit procedures.

Artificial intelligence (AI) is rapidly emerging as one of the most transformative technologies of the 21st century. According to a recent report published by UN Conference on Trade and Development (UNCTAD), the global AI market is expected to grow from $189 billion in 2023 to $4.8 trillion by 2033, representing a 25-fold increase within a single decade [1]. Such dynamic growth clearly demonstrates that AI is no longer a futuristic concept, but a driving force reshaping business models, decision-making processes, and professional practices across all sectors of the economy.

Today, it is increasingly difficult to imagine any sphere of human activity that remains untouched by artificial intelligence. Auditing is not an exception. The use of AI technologies creates new opportunities to transform it from a retrospective control into a preventive risk management tool. In such case, it is essential to study and explore the effectiveness of AI in auditing.

Analysis of recent research and publications. The issue of introducing AI into the field of auditing has been actively researched in recent years by both foreign and domestic scientists.

In their publication, Gu Hanchi [2], Schreyer Marco [2], Moffitt Kevin [2] and Vasarhelyi Miklos [2] analyze how the integration of machine learning algorithms, real-time data analysis and explainable AI systems can improve the efficiency, accuracy, and speed of audit procedures. The study also outlines the ethical and professional challenges associated with human-algorithm interaction, emphasizing that the optimal model is collaboration between the auditor and AI, rather than complete automation of the process.

Scientists Zdyrko N. G. [3], Mulik T. O. [3], Mulik Ya. I. [3], Ivakhnenkov S. V. [4] and others note that the use of AI technologies contributes to improving audit efficiency due to the ability to quickly identify financial risks, detect anomalies and fraudulent activities, which has a positive impact on the reliability of audit conclusions. At the same time, researchers emphasize that the introduction of AI is accompanied by a number of challenges, including the need for professional adaptation of auditors to new digital tools, compliance with ethical standards when using intelligent systems, and the definition of responsibility for decisions made using algorithmic technologies.

Despite the significant number of studies, the issue of assessing the effectiveness of AI use in financial statement auditing remains insufficiently researched. This necessitates further scientific research in this area.

The purpose of the article. Therefore, the aim of the study is to comprehensively analyze the theoretical foundations, current status and practical aspects of applying artificial intelligence in the process of auditing financial statement in order to identify their impact on the effectiveness of audit procedures, improve the quality of audit conclusions, and reduce the risks of errors and fraud.

The main material presentation. Nowadays, in an era when digital technologies are more and more penetrating people's life, the issue of their effectiveness is becoming extremely important. Traditional approaches to auditing are no longer an option, as the problem of optimizing the time required to perform procedures, reducing the likelihood of errors, and ensuring the accuracy of audits are becoming increasingly relevant.

In accordance with the laws of Ukraine, financial statement audit is an audit service for verifying accounting data and financial statement lines of a legal entity in order to express an independent opinion on its compliance in all material respects with the requirements of national accounting regulations (standards), international financial reporting standards, or other requirements. [5]

Artificial intelligence (AI) is a technology that enables computers and machines to simulate human learning, comprehension, problem solving, decision making, creativity, and autonomy.

AI significantly transforms auditing, allowing it to be carried out faster, better and more accurately. The main areas of AI application at the audit stages are shown in Figure 1. Among them:

1. During the planning stage, AI helps to study the client's business processes, identify potential risks, and determine the presence or absence of internal controls that would reduce the likelihood of errors or fraud. In other words, it helps the auditor prepare the basis for testing.
2. At the testing stage, thanks to AI, an auditor can easily identify the parts of the client's financial data that need to be analyzed and test them using the selected audit procedure.

3. At the conclusion stage, AI is used to systematize the results obtained. Automated tools facilitate the preparation of audit reports and increase the accuracy of conclusions.

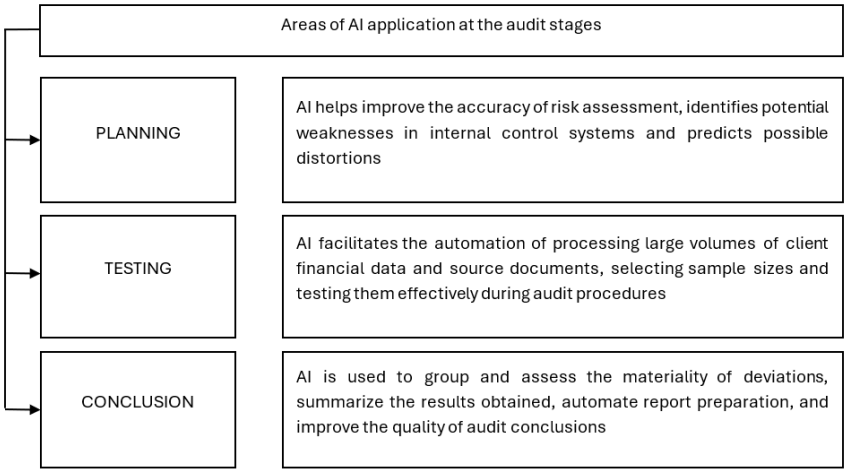

Figure 1. The main areas of Artificial intelligence application at the audit stages
Source: compiled by authors based on [6]

When exploring the effectiveness of implementing AI in auditing, it is advisable to consider its practical application. Due to the rapid spread of digital technologies, the world's leading auditing companies – the Big Four – were among the first to integrate AI into their practices.

They provide a wide range of services, primarily in auditing, tax consulting, management consulting, and legal services. They continuously invest in new technologies, including AI, which helps them provide better quality services to their clients, be more efficient, and be leaders in innovation.

The use of AI by the Big Four is presented in Table 1.

Table 1

The use of AI by the Big Four

The Big Four company	The use of AI
Deloitte	**- Deloitte Omnia and Levvia.** While Levvia is used for smaller and less complex audits, Omnia, a cloud platform designed to conduct larger audits, combines AI tools for real-time risk assessment, anomaly detection, and audit process automation; **- DARTbot,** a GPT-4-based generative tool that allows auditors to conveniently request information on accounting standards (GAAP/IFRS) and audit methodology, receiving quick and accurate responses in natural language; - **SONAR** estimates the probability that the information relating to VAT, product code, and local taxes entered into the product database is correct. - **Argus** compares documents and selects the smallest details and discrepancies, analyzes differences, establishes corrections to categories according to their significance, and compiles a risk report. - **Cortex** (high-tech engine) mines any format of data (both structured and unstructured). - **GRAPA** helps the auditor determine a strategy and evaluate its correctness.
EY	- **EY Helix GLAD**, a patented machine learning tool for detecting general ledger anomalies using supervised (fraud models) and unsupervised (outlier clustering) learning.
PWC	- **CL.ai** monitors all details of the general ledger to recognize abnormalities and threats. - **Cash.ai** uses Google BERT to parse bank statements and reconciliation documents.
KPMG	- **KPMG Clara** is a cloud-based platform that allows performing real-time audits. It combines with systems of clients to conduct 24/7 data feeds and applies AI to undertake risk assessment continuously to be sure. - **MindBridge Ai Auditor.** KPMG's alliance with MindBridge utilizes directed AI and ML for transaction scoring, enabling analysis of 100% of transactional populations to identify outliers and refine risk assessments. - **KPMG Ignite**, a system designed to improve and process business decisions on a digital platform. A distinctive feature of KPMG Ignite is a mechanism that uses AI to obtain information and analysis from leasing or investment agreements. - **Call Center Analytics Engine**, an AI product that creates models for predicting future events using neurolinguistic programming, converting customer calls into unstructured text, which is then organized to identify keywords and auditor sentiments.

Source: compiled based on [7; 8; 9]

The practice of implementing AI by the Big Four demonstrates a systematic and strategic approach to the digital transformation of auditing. Each of these companies develops or integrates its own intelligent platforms aimed at improving the efficiency, accuracy, and transparency of audits.

The use of AI is gradually influencing the nature of an auditor's work, expanding analytical capabilities, and changing the requirements for specialists' competencies. As a result, a new audit paradigm is emerging, in which traditional methods coexist with modern digital solutions, creating conditions for deeper data analysis and qualified opinion. Thus, we believe it is essential to compare the features of traditional and AI-based auditing.

A comparative analysis of traditional and AI-based auditing is presented in Table 2. Among main features are:

1. In traditional auditing, the amount of data that an auditor can analyze directly depends on the number of specialists involved and the time allocated for the procedures. Data processing is done manually, which limits the speed of work. In contrast, the use of AI allows large amounts of data to be processed in real time, automating routing verification, analysis, and comparison procedures. This significantly reduces the duration of the audit and increases its efficiency.
2. Auditors traditionally examine only a part of the data that is considered representative of the entire data set. This approach inevitably carries the risk of underestimating certain indicators. AI-based auditing eliminates this problem, as algorithms are capable of analyzing 100% information obtained, regardless of its volume or complexity. This provides a more complete picture of the company's financial activity and increases the reliability of conclusions.
3. In traditional auditing, the factor of human error plays a significant role: the results of the audit depend on the auditor's experience, attentiveness, and professional judgement. It carries the risk of subjectivity and error. When AI is used, the human factor is minimized – the systems operate on the basis of clearly defined algorithms, which guarantees consistency and objectivity in decision-making. At the same time, the role of auditors does not disappear, but changes – the specialist performs control, analysis of results, and assessment of their reliability.
4. Due to its selectivity and time constraints, traditional auditing carries a certain level of risk of failing to detect material errors or fraudulent activities. AI, on the other hand, detects hidden anomalies, inconsistencies, and patterns that often go unnoticed by humans. Due to machine learning algorithms, the system continuously improves its models, increasing accuracy, and reducing the likelihood of missing risky transactions.
5. Withing the framework of traditional auditing, analysis is mostly limited to verifying past facts and comparing indicators. In the case of AI, the analytical potential is expanded: technologies allow not only retrospective but also predictive analysis, modeling development scenarios, identifying trends, and assessing future risks. This transforms auditing into a more dynamic and strategically oriented process.
6. The results of a traditional audit depend largely on the professionalism of the auditor and the sample chosen. When using AI, the quality of conclusions increases due to more complete data, automated analysis, and the elimination of subjectivity. This contributes to the formation of more qualified, accurate, and reliable audit reports.

Table 2

Comparison of traditional and AI-based auditing

Criteria	Traditional auditing	AI-based auditing
Data processing speed	low	high
The amount of information analyzed	selective	100% of data
Human error factor	high	low
Likelihood of missing misstatements	high	low
Analytical capabilities	retrospective	predictive
Quality of audit reports	depends on sample quality and professional judgment	supported by analytical models and objective data

Source: developed by the authors

Thus, even at this stage of AI implementation in auditing, its impact is already noticeable. We are convinced that its potential is still far from being fully realized, and we expect new discoveries in this field in the near future.

According to the study of Khaled Bagouzi, Khalida Abi and Fateh Serdouk [10], the key trends in the

use of AI in auditing by 2030 will be:

1. Automated continuous compliance — by 2027, blockchain and smart contracts will enable automatic monitoring and real-time reporting.
2. Unified global AI audit standards — by 2028, IAASB, ISO/IEC, and NIST will harmonize AI audit requirements into a common international system.
3. Self-adaptive AI platforms — systems will be able to independently improve their risk analysis models through machine learning.
4. Development of the AI Assurance market — by 2030, AI system auditing and certification will account for about 15% of global AI spending.
5. New professional roles — positions such as AI Risk Manager, Algorithmic Ethics Officer, and Data Integrity Analyst will emerge.
6. Integration of auditing and consulting — audit firms will combine AI analytics with advice on strategy and risk management.
7. Mandatory AI auditing — regulators (EU, US, China) will require high-risk AI systems to be tested for transparency and reliability.
8. Increased accountability — legal liability for AI audit errors will be shared by developers, auditors, and company management.
9. Flexible regulation — introduction of digital "sandboxes" and adaptive standards that will be updated in line with technological developments.

Conclusions. Current trends in digitalization are driving a profound transformation in auditing, making the use of artificial intelligence an integral part of the profession. Traditional methods of auditing financial statements are gradually giving way to intelligent systems capable of processing large amounts of data, reducing the factor of human error, and ensuring continuous control over the accuracy of information.

The experience of the Big Four companies demonstrates a systematic and strategic approach to the digital transformation of auditing. Proprietary technology solutions—such as Deloitte Omnia, EY Helix, PwC GL.ai, and KPMG Clara—are designed to improve the efficiency, accuracy, and transparency of audit procedures. They enable real-time analysis, identification of anomalies and risks, and informed conclusions based on comprehensive data.

A comparison of traditional and AI-driven auditing shows that the use of artificial intelligence significantly changes the nature of an auditor's professional activities. Thanks to automation, comprehensive data coverage, the elimination of subjectivity, and expanded analytical capabilities, auditing is becoming faster, more accurate, and more predictive.

Forecast studies indicate that by 2030, the use of artificial intelligence in auditing will become even more widespread. Automated continuous compliance systems are expected to emerge, international AI auditing standards will be unified, the AI Assurance market will develop, and new professional specializations related to algorithmic risk management will emerge. At the same time, regulatory requirements will be strengthened, in particular regarding the mandatory audit of high-risk AI systems and the determination of legal liability for algorithmic errors.

Thus, artificial intelligence is becoming a key factor in the evolution of auditing, combining technological innovation with professional competence. In the future, it will not replace the auditor, but will add to them, creating a new model of cooperation between humans and technology that enhances the quality, objectivity, and trust in audit services in the digital age.

The prospects for further research lie in an in-depth analysis of the ethical, legal, and professional aspects of using artificial intelligence in auditing. Issues of responsibility for decisions made on the basis of AI systems, standardization of verification algorithms, and integration of AI into international auditing standards require particular attention. Further scientific research should be aimed at developing models of cooperation between auditors and artificial intelligence that will ensure an optimal balance between automation and professional judgment.

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