УДК 657:004
DOI: https://doi.org/10.32782/business-navigator.78-7

Korolovich Oksana
PhD in Economics, Associate Professor at the Department of Accounting,
Taxation and Marketing
Mukachevo State University
Holovachko Vasyl
PhD in Economics, Docent,
Associate Professor at the Department of Accounting,
Taxation and Marketing
Mukachevo State University
Pigosh Vasyl
PhD in Economics, Docent,
Associate Professor at the Accounting and
Taxation and Marketing
Mukachevo State University

Королович О.О.
кандидат економічних наук,
доцент кафедри обліку і оподаткування та маркетингу
Мукачівський державний університет
Головачко В.М.
кандидат економічних наук, доцент,
доцент кафедри обліку і оподаткування та маркетингу
Мукачівський державний університет
Пігош В.А.
кандидат економічних наук, доцент,
доцент кафедри обліку і оподаткування та маркетингу
Мукачівський державний університет

USE OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN ANALYZING THE QUALITY OF ACCOUNTING AND FINANCIAL REPORTING

ВИКОРИСТАННЯ ШТУЧНОГО ІНТЕЛЕКТУ ТА МАШИННОГО НАВЧАННЯ В АНАЛІЗІ ЯКОСТІ ОБЛІКУ ТА ФІНАНСОВОЇ ЗВІТНОСТІ

The article aims is to identify the features of using artificial intelligence and machine learning in the analysis of accounting quality and financial reporting. The research highlights that even under strict regulation and supervision, companies may manipulate their financial statements to conceal real problems, inflate their performance indicators, or attempt to create the illusion of stability and profitability. Given that distortions in accounting and financial reporting can lead to serious consequences for both investors and the economy as a whole, it is important, alongside complying with the quality requirements for accounting and financial reporting (as defined by IFRS), to utilize artificial intelligence and machine learning tools as the foundation for their analysis. Further research could focus on improving existing algorithms for detecting anomalies in financial statements.

Key words: traditional analysis methods, investors, compliance with established reporting standards, quality of accounting and financial reporting.

Метою статті є визначення особливостей використання штучного інтелекту та машинного навчання в аналізі якості обліку та фінансової звітності. У межах дослідження акцентується увага на тому, що навіть в умовах жорсткого регулювання та нагляду компанії можуть маніпулювати фінансовою звітністю з метою приховування реальних проблем, завищення своїх показників або створення ілюзії стабільності та прибутковості. Враховуючи, що спотворення обліку та фінансової звітності можуть спричинити серйозні наслідки як для інвесторів, так і для економіки в цілому, важливо, поряд із дотриманням вимог до якості обліку та фінансової звітності (визначених МСФЗ), використовувати засоби штучного інтелекту та машинного навчання як основу для їх аналізу. Фактично, ці технології дозволяють: автоматизувати виявлення аномалій у фінансових звітах та обліку (що значно підвищує ефективність аудиту та скорочує час, необхідний для виявлення

потенційних маніпуляцій); покращувати точність прогнозів щодо фінансових результатів і стабільності компаній (оскільки алгоритми можуть враховувати величезну кількість факторів, які можуть залишитися поза увагою при традиційних методах аналізу); аналізувати великі обсяги даних за короткий проміжок часу (що дозволяє виявляти тенденції та закономірності, які можуть бути неочевидними за традиційних методів, а також значно покращує здатність до оперативного реагування на зміни на ринку); перевіряти відповідність звітності міжнародним стандартам (використовуючи інструменти, які автоматично порівнюють звіти з вимогами МСФЗ, знижуючи ризики помилок і пропусків у документації); забезпечувати більшу прозорість фінансової інформації (допомагаючи зацікавленим сторонам оцінювати ситуацію в компанії на основі актуальних даних, знижуючи ймовірність маніпуляцій з боку компаній або інвесторів). Так, використання інноваційних технологій у сфері фінансового аналізу може стати потужним інструментом у забезпеченні прозорості, зниженні фінансових ризиків та запобіганні маніпуляцій у фінансовій звітності, що своєю чергою сприятиме стабільності та розвитку економіки в цілому.

Ключові слова: традиційні методи аналізу, інвестори, відповідності звітності встановленим стандартам, якість обліку та фінансової звітності.

Statement of the problem. Given the rapid evolution and integration of technologies into modern business practices, ensuring high-quality accounting and financial reporting becomes paramount. These characteristics are crucial for making informed management decisions, effective investing, and flexible strategic planning. Given the gradual complexity of accounting and reporting systems, traditional methods of ensuring their completeness, accuracy, systematic nature, and compliance with current legislation are becoming increasingly labor-intensive, error-prone, and often insufficiently effective for promptly detecting complex patterns or anomalies. For example, traditional methods of accounting analysis may fail to detect complex schemes of financial manipulation, such as artificial inflation of revenues or concealment of expenses, as they rely on standard checks and simple algorithms. Additionally, in companies with a large number of transactions, manual verification or the use of outdated software may fail to detect errors in accounting records, duplicates, or discrepancies between the summary data of different departments promptly. Consequently, numerous businesses are adopting artificial intelligence and machine learning tools to analyze the quality of accounting and financial reporting.

Analysis of recent research and publications. The essence of modern digital technologies, their impact on the components of accounting quality, and the theoretical and practical foundations of their use in the preparation of financial statements in accordance with IFRS have been studied by domestic scholars such as Kulynych M., Shvorak A., Zhylenko L. [2], Pravdyuk N.L., Obnyavko M.V., Vasylina A.V. [5], Pylypenko A.A., Tyrinov A.V. [4], and several others.

At the same time, the issue of using artificial intelligence and machine learning in the analysis of accounting quality and financial reporting has not become a primary focus of research among domestic scholars, Orlov I. notes that most researchers have focused on traditional methods of financial statement analysis (such as statistical analysis, accounting methods, and financial models) due to a lack of sufficient trust in automated systems and uncertainty regarding their ability to replace or effectively complement human judgment of financial data [3]. Furthermore, Pylypenko A.A. and Tyrinov A.V. note that research on such modern technologies in accounting has often encountered limitations due to insufficiently developed infrastructure and the lack of appropriate training for specialists [4]. This research is relevant, as existing practical examples show that traditional approaches are not capable of adequately analyzing the quality of accounting and financial reporting (due to the increasing complexity of financial transactions, the growing volume of data, and the speed of changes).

Formulation of the research task. The article aims to identify the features of using artificial intelligence (AI) and machine learning (ML) in the analysis of accounting quality and financial reporting.

Summary of the main research material. The perspective on the quality of accounting and financial reporting initially emerged as part of the process of ensuring a reliable information foundation for economic decisions. It should be noted that the need for such a category and its gradual standardization occurred with the development of economic relations, the increasing complexity of business, and the growing number of stakeholders (investors, creditors, regulators, etc.). In particular, during the 16th–18th centuries, the need for standardized information arose (as it was difficult for external parties to understand and use it). At the same time, in the 14th–15th centuries, the first attempts were made to organize financial records to ensure their reliability (including the use of double-entry bookkeeping).

However, it was only in the 20th century, as a result of the development of stock markets, that the need for the unification of approaches to financial reporting arose. Organizations such as the International Federation of Accountants (IFAC) and the International Accounting Standards Board (IASB) defined key quality characteristics now outlined in the IFRS.

Economic crises, particularly the Great Depression of the 1930s, were turning points in recognizing the importance of quality accounting and financial reporting. This crisis revealed serious shortcomings in the financial management and reporting of companies, leading to a loss of investor confidence, bankruptcies, and economic chaos, as well as the evolution of views on the quality of accounting and financial reporting. The formation of unified accounting principles (Generally Accepted Accounting Principles, GAAP) began, aimed at standardizing accounting methods and improving the quality of reporting.

Governments of countries, in response to economic crises and growing societal demands for transparency, have required businesses with stakeholders to publish financial statements and conduct independent audits. This step was aimed at increasing trust in the presented data, as the audit ensures the authenticity and compliance of the financial statements with established standards. For example, in

the United States, the passage of the Sarbanes-Oxley Act in 2002 required public companies to disclose financial statements and undergo external audits.

At the same time, the globalization of the economy and the interconnectedness of markets have led to the quality of accounting and financial reporting becoming universally shared and standardized for the global community. This has resulted in the relevance of International Financial Reporting Standards (IFRS), which were developed by the International Accounting Standards Board (IASB). In particular, the first regulation in the European Union that required public companies to use IFRS for preparing consolidated financial statements was adopted in 2002 and came into effect in 2005.

However, since 2008, the EU has expanded directives and regulations that require businesses to publish financial statements by IFRS standards and undergo independent audits. Directive 2013/34/EU extended reporting requirements for small and medium-sized enterprises (SMEs) and obliged companies to provide financial statements that are subject to independent audits. In Ukraine, steps have also been taken to establish a sustainable approach to the quality of accounting and financial reporting, the foundations of which were laid in the Law of Ukraine "On Accounting and Financial Reporting in Ukraine" (dated July 16, 1999, No. 996-XIV), the implementation of International Financial Reporting Standards (IFRS) for public companies (in the 2000s), and the Law of Ukraine "On Financial Statement Audit and Audit Activity" (dated December 21, 2017, No. 2258-VIII).

Thus, the quality of accounting and financial reporting for businesses should now be considered through the lens of the universal characteristics of IFRS, which ensure reliability, clarity, comparability, relevance, understandability, and completeness of the information presented in accounting and financial reporting.

This is achieved by using consistent principles and accounting methods over time for the benefit of users (Figure 1).

Despite the existing requirements for transparency and compliance with international financial reporting standards, there are still cases where companies deliberately distort their financial statements to manipulate investors and other stakeholders. Such actions have serious consequences for both investors and the economy as a whole, as the loss of trust in financial statements can lead to widespread financial crises, bankruptcies, and significant losses for numerous stakeholders [6]. In 2008, Lehman Brothers became one of the largest investment banks in the world to distort its financial statements through the use of so-called "Repo 105" transactions – financial instruments that allowed the company to temporarily remove debt from its balance sheets before the publication of financial reports, creating an illusion of stability and financial health. The collapse of Lehman Brothers triggered panic in the financial markets and a collapse of trust in banks and financial institutions. Satyam Computers became infamous due to a major financial scandal in 2009. The founder and CEO of the company falsified financial statements amounting to about $1.5 billion in order to maintain the appearance of a stable business and prevent a loss of investor confidence. After the manipulation of financial statements was exposed, the company's stock plummeted, causing significant financial losses for investors – both Indian and international. The British construction and engineering company Carillion went bankrupt in 2018 after it was revealed that its financial statements had been distorted. The company's management manipulated estimates of completed work, allowing it to appear profitable, while the

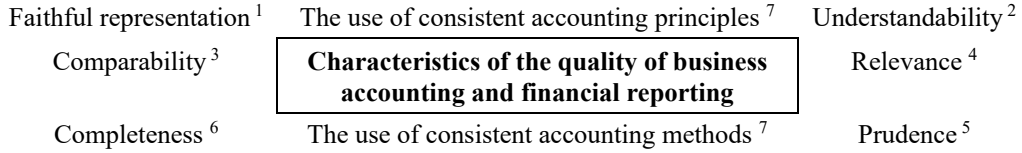

Figure 1. The main principles that determine the quality of accounting and reporting according to IFRS

Note

The financial statements and accounting data should be free from errors, manipulations, or distortions.

The financial statements and accounting should be organized, structured, and accompanied by explanations that help clarify complex issues.

The financial statements and accounting should be constructed in a way that ensures comparability both with other companies and with previous periods.

The financial statements and accounting should provide information about financial position, income, expenses, risks, and future forecasts that may influence decision-making.

The financial statements and accounting should be prepared in a way that does not overstate assets and income or understate liabilities and expenses.

The financial statements and accounting should contain all necessary information for making informed decisions, without omitting important aspects that may affect the assessment of the company's financial position.

The financial statements and accounting should focus on stability and comparability of financial results with previous periods.

Source: compiled based on [1–2; 4–5]

reality was much worse. The bankruptcy of Carillion led to the loss of tens of thousands of jobs and dealt a significant blow to the construction industry in the United Kingdom.

The consequences of such manipulations also highlight the importance, alongside the principles that define the quality of accounting and reporting according to IFRS, of utilizing artificial intelligence and machine learning as the foundation for monitoring the quality of accounting and financial reporting. These technologies allow for [1–2; 4–5]:

1. Automating the detection of anomalies in financial reports and accounting, which may indicate manipulations and errors.

2. Improving the accuracy of forecasts regarding the financial performance and stability of companies helps investors make more informed decisions.

3. Analyzing large volumes of data in a short period, allows the identification of trends and patterns that may be less apparent using traditional methods.

4. Verifying the compliance of reports with international standards helps identify potential violations or inaccuracies.

5. Ensuring greater transparency of financial information, helping stakeholders quickly and accurately assess the company's situation.

In fact, with the advantages outlined above of using AI and Ml in analyzing the quality of accounting and financial reporting, it is possible to significantly improve the effectiveness of audit checks, reduce the risk of human error, and identify potentially harmful practices that could threaten the stability of the market or individual companies.

Automating the detection of anomalies in financial reports and accounting using advanced technologies such as AI and ML to automatically identify unusual or suspicious financial transactions that may indicate manipulations or deficiencies in accounting. This approach significantly enhances the efficiency of analysis and helps to promptly detect potential financial violations. In particular, among the modern practices that help detect anomalies through the automation of anomaly detection (Table 1) are: the analysis of spending and revenue patterns, identification of atypical or suspicious transactions, comparison of asset and liability values at different stages of the reporting period and the detection of unusual fluctuations, comparison of the company's financial results with industry averages or other similar companies, and identification of unusual correlations between different financial indicators.

So, automating anomaly detection in financial reports using AI and ML technologies can significantly improve the accuracy and speed of identifying existing manipulations. At the same time, automating anomaly detection in accounting helps prevent financial fraud, increase transparency, and provide more reliable control over financial processes within organizations [1].

Improving the accuracy of forecasts regarding financial performance and stability of companies is the process of enhancing the precision and reliability of predictions related to a business's financial activities. This is especially important for investors who rely on such information to make informed decisions about investments [2–3]. The core aspects of this process include analyzing historical data, risk modeling, identifying key influencing factors, and utilizing modern technologies such as AI and ML. For example, by analyzing past financial performance, it is possible to identify trends, seasonality, and key factors that affect the profitability and stability of a particular business. This, in turn, allows for modeling future scenarios and assessing how external and internal factors may impact the results.

Analyzing large volumes of data in a short period is the process of collecting, processing, and analyzing vast amounts of structured and unstructured data. The core aspects of this process include intelligent data collection, processing, and storage, with a simultaneous focus on various methods that enable the discovery of relationships and trends. This includes identifying complex patterns and regularities such as classification, regression, clustering, or anomaly detection [1]. This helps enhance the quality of accounting and financial reporting by identifying patterns, trends, correlations, and other valuable information that can be used to make informed business decisions.

Compliance checking of financial reports with international standards is the process of evaluating and analyzing a company's financial statements to ensure they adhere to the requirements of International Financial Reporting Standards (IFRS), as well as other applicable

Table 1

Analysis of core practices in automating anomaly detection in financial reports and accounting

Modern practices	Features of applying anomaly detection practices in financial reports and accounting
Analysis of spending and revenue patterns	If a business typically reports a relatively stable average income, but suddenly shows a 20% or more increase in income without apparent reasons, the system may flag this as potential fraud or an accounting error.
Detection of atypical or suspicious transactions	Payments made by a business entity to accounts of unknown suppliers or to accounts linked to anonymous companies may be flagged as anomalous transactions that require further investigation.
Comparison of asset and liability values at different stages of the reporting period and detection of unusual fluctuations	If a business entity suddenly claims that its inventory has significantly increased without obvious economic reasons, the automated system may flag this as suspicious and draw attention to potential accounting manipulation.
Comparison of the company's financial results with industry averages or other similar companies	If a business operating in a particular industry demonstrates significantly higher profitability than its competitors, this may be suspicious, especially if its expenses have simultaneously decreased significantly.
Detection of unusual correlations between different financial indicators	Unexplained changes or disruptions in usual relationships may signal violations or manipulations.

Source: compiled based on [2–3; 5]

regulations and standards governing accounting and financial reporting. The core aspects of this process include the standardization of the presentation of assets, liabilities, equity, income, and expenses, the standardization of asset and liability valuation methods, and the involvement of an external auditor to verify the compliance of financial statements with international standards. This ensures the reliability of accounting and financial reporting by enhancing the trust of investors, creditors, shareholders, and other stakeholders in the business's performance and operations [3].

Ensuring greater transparency of financial information means providing accessible and understandable financial statements that allow stakeholders to quickly and accurately assess a company's financial health, performance, and prospects. The key aspects of this process include ensuring the transparency of financial data, which is understandable and comparable at an international level, providing information about potential financial risks, changes in the company's strategic objectives, key factors influencing its operations, and plans [1; 4]. This ensures regular updates of financial data, the organization of reporting meetings, and transparency in disclosing information about performance results and forecasts, which helps attract investors, maintain shareholder trust, and strengthen the business's reputation.

Conclusions. The study highlights that even in conditions of strict regulation and oversight, companies may manipulate their financial reporting to conceal real problems, overstate their performance, or attempt to create an illusion of stability and profitability. Considering that distortions in accounting and financial reporting can have serious consequences for investors and the economy as a whole, it is crucial, alongside adhering to the quality requirements for accounting and financial reporting (as defined by IFRS), to use AI and ML tools as the basis for their analysis.

These technologies allow for: automating the detection of anomalies in financial reports and accounting (which can significantly improve audit efficiency and reduce the time required to detect manipulations); improving the accuracy of forecasts regarding financial results and stability of companies (as algorithms can account for a vast number of factors that are typically overlooked by traditional analysis methods); analyzing large volumes of data in a short period (which helps identify trends and patterns that may not be apparent using traditional methods); verifying compliance with international standards (using tools that automatically compare reports against IFRS requirements); ensuring greater transparency of financial information (helping stakeholders assess the situation of the company based on up-to-date data).

Thus, innovative technologies in financial analysis can become a powerful tool in ensuring transparency, reducing financial risks, and preventing manipulations in financial reporting in turn will contribute to the stability and development of the economy as a whole. Further research could focus on improving existing algorithms for detecting anomalies in financial statements.

References:

1. Horyeva A. S., Rudenko O. V. (2019) Bukhhalters′kyy oblik v epokhu tsyfrovoyi transformatsiyi ekonomiky [Accounting in the era of digital transformation of the economy]. DVNZ «Kyyivs′kyy natsional′nyy ekonomichnyy universytet imeni Vadyma Het′mana», pp. 194–197

2. Kulynych M., Shvorak A., Zhylenko L. (2020) Vprovadzhennya tsyfrovoyi hramotnosti v umovakh maybutnikh zmin profesiyi bukhhaltera [Implementation of digital literacy in the context of future changes in the accounting profession]. *Ekonomichnyy chasopys Skhidnoyevropeys'koho natsional'noho universytetu imeni Lesi Ukrayinky,* vol. 1. pp. 216–224.

3. Orlov I. (2022) Orhanizatsiya bukhhalters′koho obliku v umovakh tsyfrovizatsiyi ekonomiky [Organization of accounting in the conditions of digitalization of the economy]. *Acta Academiiae Beregsasiiensiis. Economiics*, vol. 1, pp. 265–274.

4. Pylypenko A. A., Tyrinov A. V. (2020) Systemna paradyhma orhanizatsiyi bukhhalters′koho obliku v umovakh chetvertoyi promyslovoyi revolyutsiyi. *Biznes-inform*, vol. 5, pp. 92–99.

5. Pravdyuk N. L., Obnyavko M. V., Vasylyna A. V. (2022) Vprovadzhennya innovatsiynykh tekhnolohiy v systemu bukhhalters′koho obliku: svitovyy dosvid ta perspektyvy Ukrayiny [Implementation of innovative technologies in the accounting system: world experience and prospects of Ukraine]. *Efektyvna ekonomika*, vol. 11. Available at: https://nayka.com.ua/index.php/ee/article/view/718 (accessed August 29, 2024)

6. Rudych O. O., Herasymenko I. O., Tkachenko K. V. (2016) Sut′ ekonomichnoyi stiykosti pidpryyemstv ta protsesu yiyi zabezpechennya [The essence of the economic stability of enterprises and the safety of the process]. *Innovatsiyna ekonomika,* vol. 11–12. pp. 74–76.

Список використаних джерел:

1. Горєва А.С., Руденко О.В. Бухгалтерський облік в епоху цифрової трансформації економіки. ДВНЗ «Київський національний економічний університет імені Вадима Гетьмана». 2019. С. 194–197.

2. Кулинич М., Шворак А., Жиленко Л. Впровадження цифрової грамотності в умовах майбутніх змін професії бухгалтера. *Економічний часопис Східноєвропейського національного університету імені Лесі Українки.* 2020. № 1. С. 216–224.

3. Орлов І. Організація бухгалтерського обліку в умовах цифровізації економіки. *Acta Academiiae Beregsasiiensiis. Economiics*. 2022. № 1. С. 265–274.

4. Пилипенко А.А., Тирінов А.В. Системна парадигма організації бухгалтерського обліку в умовах четвертої промислової революції. *Бізнес-інформ.* 2022. № 5. С. 92–99.

5. Правдюк Н.Л., Обнявко М.В., Василина А.В. Імплементація інноваційних технологій в систему бухгалтерського обліку: світовий досвід та перспективи України. *Ефективна економіка.* 2022. № 11. URL: https://nayka.com.ua/index.php/ee/article/view/718

6. Рудич О.О., Герасименко І.О., Ткаченко К.В. Сутність економічної стійкості підприємств та процесу її забезпечення. *Інноваційна економіка.* 2016. № 11–12. С. 74–76.