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REVIEW





Innovative Approaches to the Use of Artificial Intelligence in Accounting, Control, and Analytical Processes to Enhance Enterprise Competitiveness

Enfoques innovadores del uso de la inteligencia artificial en los procesos contables, de control y analíticos para mejorar la competitividad de las empresas

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ABSTRACT

Introduction: in an unpredictable economic climate, the integration of artificial intelligence (AI) has gained prominence in enhancing accounting, control, and analytical processes, thereby improving the competitiveness of businesses. This study aimed to systematize approaches to leveraging AI for refining these processes and strengthening the competitive position of modern enterprises.

Method: the study employed a comprehensive literature review to examine artificial intelligence's implementation, benefits, and limitations in accounting and analytical processes. A structured approach to data selection ensured relevance and reliability, focusing on thematic relevance, recent advancements, and quality assessments to form a balanced dataset for analysis.

Results: the findings indicated that the AI market is rapidly expanding, with a growing interest in applying AI technologies to manage large datasets and complex information requiring detailed analysis. AI was found to reduce the burden of routine tasks for auditors, freeing time for strategic and high-value operations. Furthermore, the integration of AI improved the accuracy and efficiency of accounting and auditing processes, minimized costs associated with repetitive work, and optimized the use of various organizational resources. These benefits are particularly significant for Ukrainian enterprises, which face unique economic and operational challenges.

Conclusions: the study concluded that adopting AI in accounting and auditing provides substantial advantages, including enhanced process efficiency, cost reduction, and better resource utilization. These findings underscore the critical role of AI in transforming traditional accounting practices and offer practical implications for businesses seeking to maintain a competitive edge in a dynamic economic environment.

Keywords: Reporting Automation; Big Data Analytics; Artificial Intelligence In Financial Forecasting; Management Accounting; AI-Based Decision Support.

RESUMEN

Introducción: en un entorno económico impredecible, la inteligencia artificial (IA) ha ganado relevancia al optimizar procesos contables, de control y analíticos, mejorando la competitividad empresarial. Este estudio

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tiene como objetivo sintetizar enfoques que aprovechen la IA para perfeccionar dichos procesos y fortalecer la posición competitiva de las empresas modernas.

Método: el estudio empleó una revisión bibliográfica exhaustiva para examinar la aplicación, ventajas y limitaciones de la IA en los procesos contables y analíticos. Un enfoque estructurado de selección de datos garantizó la pertinencia y fiabilidad, centrando la atención en la relevancia temática, los avances recientes y las evaluaciones de calidad para construir un conjunto de datos equilibrado para el análisis.

Resultados: los resultados muestran que el mercado de la IA está creciendo rápidamente, con un interés creciente en su aplicación para gestionar grandes volúmenes de datos y realizar análisis detallados de información compleja. La IA reduce la carga de tareas rutinarias para los auditores, permitiéndoles centrarse en operaciones estratégicas de mayor valor. Además, su integración ha mejorado la precisión y eficiencia de los procesos contables y de auditoría, minimizado costes asociados a tareas repetitivas y optimizado el uso de recursos organizativos. Estos avances son especialmente relevantes para empresas ucranianas, que enfrentan desafíos económicos y operativos únicos.

Conclusiones: la adopción de IA en contabilidad y auditoría aporta ventajas significativas, como mayor eficiencia, reducción de costes y un mejor aprovechamiento de recursos. Los hallazgos destacan el papel crucial de la IA en la transformación de prácticas contables tradicionales, ofreciendo implicaciones prácticas para empresas que buscan mantenerse competitivas en un entorno dinámico.

Palabras clave: Automatización de Informes; Análisis de Big Data; Inteligencia Artificial en la Previsión Financiera; Contabilidad de Gestión; Apoyo a la Toma de Decisiones Basado en IA.

INTRODUCTION

The competitiveness of an enterprise encompasses various technical, marketing, managerial, and other attributes that enable it to outperform competitors and maintain a stable market position over time. To enhance competitiveness, it is crucial to leverage all available strategies to strengthen the enterprise's market standing.

The competitiveness level of an enterprise is influenced by numerous factors, which can be broadly categorized into two groups: the competitive environment and the foundational provision of various resources. The factors within the competitive environment dictate the strategic positioning of the enterprise, and the appropriateness of this positioning is directly linked to the enterprise's competitiveness.^(1,2)

Additionally, internal factors also significantly impact the level of competitiveness. Managing internal factors is generally more feasible than influencing external ones. Key aspects of accounting, analysis, and control within the internal environment play a critical role in determining the company's performance and its competitive market position.

In contemporary contexts, artificial intelligence serves as a valuable tool for enhancing accounting, analytical, and control procedures, facilitating the completion of numerous complex and vital tasks. The objective of artificial intelligence lies in developing self-learning systems utilizing data sourced from diverse channels.

Current AI advancements enable the application of these capabilities to tasks traditionally handled exclusively by humans. Moreover, machine learning exhibits a capacity to accommodate a wide array of tasks, learning in a manner akin to human adaptation to new tasks and functions.

literature review

This section should convey to readers the novelty of your manuscript (e.g. unsolved issues) concerning existing achievements in earlier studies. Manuscripts are accepted only if they include a detailed literature review rather than a summary of the sources or a list of authors.

Please note that the analysis of relevant literature should be studied globally. If the literature review is limited exclusively to the author's own country of residence or work (and/or adjacent territories), it is necessary to mention the reasons and expediency of such a narrow review.

Just a few decades ago, the implementation of artificial intelligence (AI) in business operations was in its infancy, with its potential mainly existing in theoretical realms. In recent years, AI technologies and applications have continued to advance, providing substantial value to businesses. Estimates from researchers^(1,2) suggest that the artificial intelligence market is projected to grow by 19,6 % in 2024 to reach \$432,8 billion, indicating significant industry expansion. With the continuous enhancement and proliferation of artificial intelligence technologies, individuals are increasingly recognizing their capabilities and the myriad opportunities they present. Presently, businesses are reaping a diverse array of tangible benefits from AI-driven systems. According to studies by^(3,4), there are five primary systemic advantages associated with the

integration of AI technology:

- 1. Incorporating sustainability practices within organizations^(5,6) has become a critical factor for success in today's business landscape. As business leaders increasingly recognize the importance of information as an asset, leveraging data on market conditions and the external environment is essential for developing effective strategies and staying competitive. Technologies such as artificial intelligence and machine learning play a key role in processing large and diverse data sets, optimizing Big Data, and systematizing information, laying a strong foundation for integrating these tools into decision-making processes within management systems.
- 2. Incorporating sustainability practices within organizations^(5,6) has become a critical factor for success in today's business landscape. As business leaders increasingly recognize the importance of information as an asset, leveraging data on market conditions and the external environment is essential for developing effective strategies and staying competitive. Technologies such as artificial intelligence and machine learning play a key role in processing large and diverse data sets, optimizing Big Data, and systematizing information, laying a strong foundation for integrating these tools into decision-making processes within management systems.
- 3. Enhanced decision-making confidence.^(7,8) Leveraging AI capabilities, businesses can tailor their strategies and implement initiatives to drive growth in targeted product lines or overall operations. Through the analysis of vast data sets and customer interactions, AI can provide insights and forecasts on consumer preferences and market demand for specific offerings.
- 4. Relevant products and services. (9,10) Many traditional innovation models rely on outdated information. Performance data and customer feedback were often analyzed only after the product or service was launched. There were no systems that could quickly identify potential gaps and opportunities in the market. With the help of AI-based systems, modern companies can view a wide range of data simultaneously and in real time. This allows them to change existing products and introduce new ones based on the most relevant and up-to-date market and customer data.
- 5. Employee engagement is crucial for companies, as studies have shown that businesses with high levels of engagement see a 21 % increase in profitability. (11,12)

The integration of AI technology in the workplace has revolutionized how employees work, by automating mundane tasks and giving employees the opportunity to focus on more meaningful work. AI-powered workforce management tools can also detect signs of employee burnout or disengagement, allowing for personalized recommendations to improve overall wellbeing and productivity. Ultimately, AI has the potential to help employees achieve a healthier work-life balance and feel more supported in their jobs.

Machine learning, along with its individual components, forms a sophisticated system that enables the utilization of this technology for a wide range of problem-solving purposes. (13,14) Through the application of algorithms in various learning and analytical methods, machine learning systems can autonomously learn and enhance their performance without the need for direct programming. Within organizations, machine learning can be leveraged for tasks or objectives that involve predicting outcomes through intricate data analysis.

In accounting procedures and control, machine learning is a subset of AI and is closely linked to it. They are not completely independent entities but rather function in distinct ways. AI processes data to make informed decisions and predictions, while machine learning algorithms enable AI to analyse and learn from data efficiently without constant manual programming adjustments.

Al-powered technologies are revolutionizing efficiency and productivity by automating tasks and processes previously done exclusively by humans. Additionally, Al enables the analysis of immense volumes of data beyond human capacity, leading to substantial business advantages. For instance, Netflix leverages machine learning for highly personalized recommendations, contributing to a notable 25 % growth in its customer base. (15) The increasing prioritization and investment in data analytics by companies is seen as support for the implementation of Al. According to McKinsey's 2023 Al survey, the adoption of Al in at least one function has risen to 56 %, up from 50 % the previous year. Furthermore, 27 % of survey respondents attributed at least 25 % of their revenues to Al, compared to 22 % in the previous year. (16) In summary, the literature highlights three main benefits of using Al in accounting procedures and control and analytical processes. (17,18) The emergence of cloud computing has made high-performance computing resources more accessible and cost-effective, revolutionizing the Al industry. Previously, Al systems were limited to localized and expensive hardware.

The availability of vast datasets is essential for accurate financial forecasting and error detection in AI. The simplified data labelling process, paired with affordable storage and processing solutions for all types of data, streamlines algorithm development and training.

More businesses are realizing the competitive advantage of implementing AI solutions and are making it a priority. Tailored AI recommendations enable faster decision-making, cost savings, and improved error detection

in various operational and analytical processes.

Aims and Objectives

Given the importance of the topic, the study aims to examine how artificial intelligence can be utilized to enhance accounting and analytical processes, ultimately strengthening the competitiveness of contemporary businesses.

METHOD

Data Design

The methodological approach integrates a diverse set of tools to achieve the study's objective of understanding how artificial intelligence (AI) enhances accounting and analytical processes. A literature review explored the state of AI implementation, its benefits, and its limitations in accounting and control. Objectivity was ensured by avoiding sources from regions with potential political or economic biases, such as countries currently involved in geopolitical conflicts.

Data Selection

The data selection for this study adhered to a structured and transparent process, ensuring that the final dataset aligned with the research objectives and maintained relevance and reliability. Initially, an extensive search was conducted using academic databases such as Scopus, Web of Science, and Google Scholar. 120 sources were identified, including peer-reviewed articles, monographs, and analytical reports, providing a broad foundation for further analysis.

The first stage of filtering focused on thematic relevance. Only sources that explicitly addressed the integration of artificial intelligence into accounting, control, and analytical processes were retained. Studies that needed a direct connection to these topics or focused on unrelated fields were excluded. This step removed 40 sources, constituting 33 % of the initial dataset, leaving 80 sources for further consideration.

In the second stage, a temporal filter was applied to ensure that only the most recent studies were included. Given the rapid advancements in AI technologies, only publications from the last five years were retained. This filtering excluded an additional 30 sources, representing 25 % of the remaining dataset, and resulted in 50 sources for the subsequent analysis stage.

The final stage involved a detailed quality assessment to prioritize highly relevant and impactful studies. Preference was given to empirical studies and case analyses that illustrated practical applications of AI in enhancing competitiveness in accounting systems. Key areas of focus included automation of routine tasks, predictive analytics, and strategic decision-making using AI tools. This rigorous step excluded 20 more sources, constituting 40 % of the remaining dataset, leaving the final set of 30 sources.

This step-by-step selection process ensured that 100 % of the 120 sources initially identified were systematically filtered, resulting in a final dataset of 30 sources. These sources were thematically and methodologically aligned with the study's goals and provided a balanced and unbiased foundation for subsequent analysis.

Data Analysis

The analytical process employed qualitative and quantitative methods. Qualitative analysis involved thematic categorization of the literature to identify recurring themes, such as efficiency improvement and error reduction in accounting processes through AI. Quantitative methods included citation analysis to determine the impact and credibility of the sources.

The collected data was then systematically grouped to outline key tasks AI solves and the strategic advantages its integration into accounting systems offers. The results of this analysis were cross-validated with empirical data from business practices, ensuring reliability.

The conclusions drawn highlighted AI's transformative role in enhancing organizational competitiveness by streamlining accounting and analytical processes. Both theoretical frameworks and practical case studies supported these findings.

RESULTS

The global AI in accounting market is projected to grow from USD 1,56 billion in 2024 to USD 6,62 billion by 2029, indicating a significant CAGR of 33,5 % over the forecast period. (19) The adoption of AI in accounting is on the rise as it enhances accuracy, efficiency, and decision-making processes. (20) By automating repetitive tasks like data entry, accounting, and financial reporting, AI enables accounting professionals in Ukraine to shift their focus towards more strategic tasks. There is a noticeable increase in interest among professionals in leveraging AI technologies for control and analytics purposes, as illustrated in figure 1, which highlights the various sources of funding for innovation in the real sector of the economy.

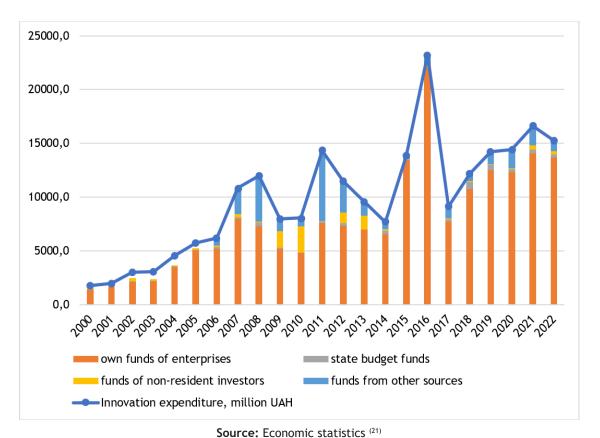


Figure 1. Funding sources for innovative activities of industrial enterprises, in millions of Ukrainian hryvnia

Figure 1 indicates that currently, financing for innovations predominantly rely on own funds in Ukraine, with limited involvement from the financial sector and government programs or guarantees to stimulate investment activity. To gain a comprehensive understanding of the potential market for investment in innovative projects, it is recommended to include statistics on innovation expenditures of industrial enterprises alongside the analysis of statistical data.

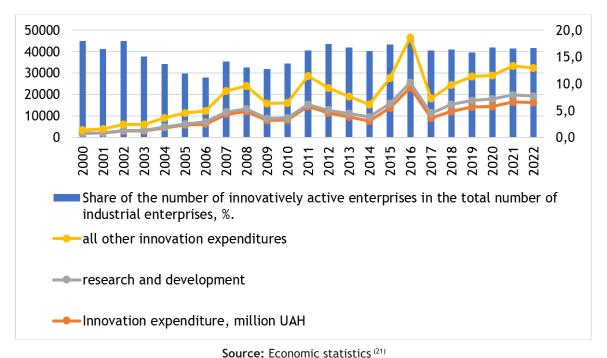


Figure 2. Innovation expenditure of industrial enterprises, million UAH

Upon examining the innovation activity within both the financial and real sectors, these industries possess the potential for digital development through innovative technologies. Despite the limitations imposed by martial law, there is a slow but steady progression in this area. However, artificial intelligence (AI) has the potential to greatly aid in post-war recovery efforts.

For years, both global and Ukrainian companies have utilized specialized accounting software, but in recent times, there has been a surge in the adoption of various modern technologies. All has revolutionized the accounting system by enabling tasks that were previously unavailable. Currently, All has the capability to streamline almost all aspects of accounting, thereby enhancing the efficiency of accounting and control specialists.

By leveraging AI technologies, finance professionals are actively embracing a supplementary system that can efficiently execute intricate tasks swiftly and at minimal expense. A key advantage of incorporating AI into accounting practices is its ability to handle vast amounts of data and derive analytical insights from the outcomes of big data analysis. (22)

Furthermore, the integration of AI enables businesses to forecast cash flows, analyse financial positions to identify potential issues and areas of high risk in financial operations, and share insights with experts such as financial analysts, accountants, and management personnel. These functionalities offer additional opportunities to enhance control and analytical procedures, while also strengthening the efficiency of financial management processes.

In today's modern auditing practices, the utilization of the latest digital technologies, specifically artificial intelligence, is essential. Al plays a crucial role in processing vast amounts of data, detecting key trends, and pinpointing any irregularities. Tasks such as data collection, processing, accuracy checks, and forecasting are all efficiently handled by Al during the auditing process. Previously, the manual processing and structuring of large data sets would consume a significant portion of an auditor's time. With Al taking on these responsibilities, the workload for auditors has been greatly eased. However, a notable challenge that remains unresolved is the high percentage of rework required in auditing tasks. This problem is derived from the labour-intensive process of auditing, which requires specialized knowledge and skills, along with the routine, monotonous tasks that could be streamlined with the use of artificial intelligence.

Additionally, AI technology in accounting and control effectively tackles challenges stemming from the complex nature of sourcing information and document utilization. Software is often utilised to extract information from industry-specific documents provided by end users. Given the text-heavy nature of accounting documents such as financial statements, management estimates, standards, rules, and supporting paperwork, AI tools are essential for businesses to extract valuable understandings and strengthen their risk management strategies. One prominent example is Botkeeper, a solution that automates various accounting tasks like data entry, financial reporting, invoice processing, and receipt management through natural language processing, a critical component of AI technology. Botkeeper Inc. reports significant time savings for its clients, with over 1,2 million labour hours automated and potential monthly savings of up to \$9 240. Major accounting and law firms have also embraced AI-based robotic process automation for streamlining audits procedures, showcasing the widespread adoption and effectiveness of AI in the accounting industry. (23)

The utilisation of artificial intelligence tools by large international companies has led to the emergence of a new field within audit known as "cognitive audit." Cognitive technology involves the utilization of data processing, knowledge-based data generation, diagnostics, monitoring, and forecasting. However, the integration of AI into the data collection, processing, classification, and digital technology implementation aspects of audit necessitates additional adjustments. During the audit process, the auditor must not only conduct procedures and reach conclusions on the work performed but also prepare audit documentation, including relevant audit evidence. This documentation cannot be fully generated by AI. Audit documentation is crucial as it provides a detailed understanding of the finances of an organization's activities at every stage of the audit process. Interim opinions are formulated by the auditor after assessing individual balance sheet items during the audit.

This documentation requires a significant amount of time to prepare, leading to increased time and effort spent by auditors and accountants on accounting and monitoring procedures. Using AI technology to tackle this problem can greatly reduce the time employees spend on it. The basic needs for financial reporting in organizations may change slightly each year, but certain indicators like doubtful debts and accounts receivable and payable may not require ongoing adjustment methods. The company has the authority to determine the likelihood of a debt being collected and how long it has been overdue to allocate a provision. As a result, the evaluations of these indicators either stay the same or experience minimal changes. Therefore, this process can be automated by incorporating AI technology. It is assumed that artificial intelligence should perform the following tasks in ensuring the improvement of accounting and control and analytical procedures to increase business competitiveness, as demonstrated in table 1.

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Table 1. The task of AI is to improve accounting and control and analytical procedures to increase business competitiveness		
Goals	Explanation	
	Al enables you to validate data before utilizing it for deeper analysis and processing. Moreover, by streamlining repetitive tasks, professionals like analysts, accountants, and auditors can concentrate on interpreting processed information rather than raw data. In the realm of financial reporting, Al can further aid in ensuring data accuracy and evaluating the financial health of a company.	
Decreasing the time spent on repetitive tasks	Utilizing AI in the accounting and auditing field can alleviate the burden on professionals, enabling them to shift their focus from routine tasks to more valuable and innovative work. This includes pinpointing errors, delving into their root causes, and crafting strategies for enhancement.	
	Forecasting financial performance and preparing financial statements relies on analysing historical data spanning several years and examining the internal and external business landscape. All technology plays a crucial role in this process by assessing these elements and generating forecasts for business growth. While accountants and analysts should verify Al-generated data, most of the work can be efficiently performed by All through the utilization of machine learning and integrated algorithms	
,	The use of AI to analyze company data is tailored to each company's individual needs and goals. AI is a flexible tool that can adapt to different data sets and leverage its own specialized knowledge to improve managerial decision-making	
Composed by the author through referring to (24,25,26)		

Moreover, AI can enhance the work of accountants and auditors by mitigating the danger of errors in critical areas that necessitate specialized expertise in a specific role. It can:

Continuously learn from the legal regulations and evolving financial trends specific to an organization.

Independently generate conclusions and articulate the changes, alongside the factors that influence business operations within the legal framework being studied.

Predict the financial performance indicators for the upcoming reporting period.

The potential of AI to elevate accounting and analytical processes opens new openings for enhancing the quality of internal audit and accounting functions. This is highlighted in Table 2, delineating the areas of competitive advantage in this realm.

Table 2. Directions for improving competitiveness in the context of improving the quality of internal audit and accounting with the implementation of AI tools	
The prospect of increasing competitiveness	Details
Short-term perspective	Al is considered as an assistant auditor when writing conclusions on easier indicators that change slightly and have a constant calculation method. Improvement of the quality of accounting and analytical procedures while detecting errors, incomplete accounting of certain items and time costs, which will provide opportunities to reduce costs and more effectively manage tactical processes in the business
Medium-term perspective	Al is seen as an accountant's or auditor's companion, enabling the assessment and influence of complex indicators that depend on external and internal factors. Al is utilised to forecast financial indicators considering environmental factors and analyse competitors' activities, take into account market share and market positions
Long-term perspective	Al can replace accountants and auditors during the routine work and allow them to focus on analytical tasks and support strategic management decision-making to increase competitiveness by improving accounting technology, internal control, optimizing the utilisation of various types of resources, and rationalizing costs.
Based on (27,28,29)	

Despite the significant advantages of integrating AI into accounting and auditing practices, notable risks and drawbacks to consider exist. One such drawback is the reliance on potentially flawed source data for training AI algorithms, which can result in inaccurate outcomes. This necessitates thorough scrutiny of data quality inputted by specialists, adding to the time and effort required.

Additionally, the subjective nature of human judgment is a key consideration. While human auditors can provide valuable insights and considerations beyond what AI can offer, there is also a risk of bias influencing their opinions. However, human judgment can also identify potential red flags or unethical behaviour within an organization, complementing the capabilities of AI.

Therefore, a balanced approach that leverages the strengths of both AI and human auditors is crucial. By fostering a collaborative environment between the two, organizations can harness the benefits of AI while mitigating the risks associated with human judgment and data quality issues.

DISCUSSION

The study highlighted the benefits of implementing AI in accounting and control procedures to enhance efficiency and identify opportunities for increased business competitiveness. Steel, there are polarizing debates surrounding the deployment of AI in business management, especially when it comes to identifying and combating financial fraud in a swiftly changing economy.

In complex financial systems where legal loopholes exist, human judgment plays a crucial role in the audit process. The introduction of AI tools in auditing poses challenges in ensuring the accuracy of financial reports, as the full range of legal avoidance schemes may not be detectable by AI alone. Scholars argue that human input is essential in evaluating the integrity of financial data.⁽²⁴⁾

Furthermore, the utilisation of AI in multinational companies is complicated by varying financial legislations across different countries. Despite the potential for automation in mundane tasks within the audit process, such as drafting memos and methodologies, human oversight remains critical in maintaining the reliability of financial audits. (30,31,32) AI technology, while advancing rapidly, is not yet completely independent in the realm of financial auditing.

In conclusion, while AI offers opportunities for streamlining accounting processes, the subjective judgment and expertise of human auditors are indispensable in ensuring the integrity and compliance of financial practices. The evolving landscape of financial regulations and the complexity of global business operations necessitates a cautious approach to integrating AI in audit procedures.

It is essential to address the software environment for implementing AI tools separately. Currently, many companies provide software solutions for incorporating AI into accounting, control, and analytical processes. While major international IT firms like Google Inc., Microsoft Corp., Xero, and Intuit offer robust AI and machine learning systems globally, Ukrainian businesses also have access to such advanced software. Given Ukraine's strong IT capabilities and the importance of supporting local businesses during times of martial law, it is advisable to explore AI solutions offered by Ukrainian companies. These domestic providers can cater to the unique requirements of the Ukrainian market and align with internal accounting and financial reporting standards. (33)

An emerging area of AI application involves utilizing cognitive technologies for document verification, resulting in significant time savings for auditors. The potential for artificial intelligence to replace auditors in verifying documents on a larger scale, even up to 100 % of all documentation, is promising. This can also enable instant analytical procedures, such as automatically flagging documents with warnings about unstable prices for further review. While this can enhance audit quality, it may not fully consider the dynamic nature of price and exchange rate fluctuations common in Ukrainian business.

With the use of cognitive technologies, accounting and control specialists can adopt a novel approach to risk identification by analysing financial data in documents. Automation tools for processing financial statements are already in use, facilitating easier information retrieval and cross-verification. However, the costs and practicality of implementing AI should be carefully considered.

The integration of cognitive technologies and advancements in the audit process can bring about positive changes in business management. It is essential to evaluate the anticipated benefits against the expenses associated with adopting these cutting-edge technologies.

CONCLUSIONS

In the process of conducting the research, it was determined how artificial intelligence can be used to improve accounting and analytical processes, which will ultimately strengthen the competitiveness of modern businesses. Artificial intelligence has been proven to open up great opportunities for modern accounting, while AI technology can aid in streamlining processes such as analysing financial data, there is still a need for the expertise of accounting professionals to interpret complex factors that AI may not fully grasp. However, leveraging AI in audits can enhance efficiency, cut costs, and optimize resource utilization, ultimately boosting competitiveness. By utilizing AI in audits, businesses can save time, enhance audit quality, reduce reliance on external auditors, and bolster their reputation in the market. It was also found that AI technologies have prospects for use. In the future, for example, machine learning can be used to recognize, extract and process numerical data from many supporting documents. This will allow for automatic confirmation without any significant involvement of the auditor. This can also increase the competitiveness of the business.

Such an analysis of the controversial issues also made it possible to outline areas for further research in this area, which may primarily concern the ethical issues of AI application and various aspects of interdisciplinary AI integration.

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