POSSIBILITIES OF INTEGRATING ARTIFICIAL INTELLIGENCE TECHNOLOGIES INTO THE SYSTEM OF ACCOUNTING AND ANALYTICAL SUPPORT TO PUBLIC SECTOR ENTITIES

The object of this study is artificial intelligence technologies in the system of accounting and analytical support to public sector entities.

This paper addresses the task related to the possibility of integrating artificial intelligence technologies into the accounting and analytical support system of public sector entities. The key differences between conventional accounting automation and artificial intelligence technologies in the system of accounting and analytical support have been determined. Analysis of investment volumes for the introduction of artificial intelligence, including in the accounting system, was carried out. It was established that according to forecasts for 2025 the amount of investment in the field of artificial intelligence for the automation of accounting and reporting will grow actively: in the USA (USD 45–50 billion), China (USD 30–35 billion), Germany (USD 15–18 billion), Japan (USD 13–15 billion), Great Britain (USD 12–15 billion). Analysis of the characteristics and cost of integrating modern artificial intelligence technologies into the system of accounting and analytical support was carried out. Zoho Books AI cloud technology, which in terms of cost and properties is most suitable for integration into the system of accounting and analytical support of public sector entities, has been identified as recommended. The key factors of the impact of artificial intelligence on the automation of the accounting and analytical support system, which lead to saving time on document processing, reporting and data analysis, have been determined. Based on the calculation results, it was determined that as a result of the integration of Zoho Books AI technology into the accounting and analytical support system, time will be reduced by 2164 hours/year, which will lead to the optimization of public funds

Keywords: artificial intelligence, cloud technologies, automation, accounting, analysis, public sector

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1. Introduction

In many countries around the world, public sector entities use computer technology to automate accounting data. Automation of accounting is extremely important, especially under the conditions of the modern digital world, where the speed, accuracy, and transparency of financial transactions become critical for the successful functioning of any organization, in particular in the public sector [1].

The management of state finances involves the processing of large volumes of accounting and analytical data [2]. Conventional accounting automation involves using software to perform routine tasks such as document processing, record keeping, and reporting. AI technologies, in addition to accounting automation, add intelligent capabilities that allow systems to learn, analyze, and predict results based on data.

The use of artificial intelligence (AI) in the public sector for accounting and analysis is becoming a necessity due to the need for increased efficiency, transparency, accuracy, and resource savings. The integration of AI into the accounting system will help bring the work of accountants to a new level, in particular, free up time for forecasting and analytical work. Based on processed accounting and analytical data with the help of AI, managers will be able to make prompt and effective management decisions in the area of public finance management [3].

The use of AI technologies in the system of accounting and analytical support forms tangible competitive advantages and determines the development trends of the public sector [4]. The prospects for the development of AI are to revolutionize the profession of accountants and analysts, contributing to growth, revealing the potential, and increasing the value of accounting and analysis specialists [5].

In countries such as the USA, China, Great Britain, Germany, and Japan, investments are increasing in the implementation of AI technologies, including in the accounting and reporting system of public sector entities [6].

The integration of AI technologies into the system of accounting and analytical support is a strategically important task of public sector entities, which is accompanied by a number of challenges. In particular, the choice of the appropriate AI technology requires technical, financial, and organizational analysis, which indicates the relevance of research in this area.

2. Literature review and problem statement

In study [7], the problem of reconstructing the stages of recognition of accounting elements in a conventional automated system to the mechanism of recognition of accounting data with the help of AI in electronic commerce is solved. But there are still unresolved issues related to the possibility of introducing artificial intelligence into the accounting system of public sector institutions.

In work [8], the results of the study proved that the introduction of AI into the accounting system would lead to full automation of the accounting and analytical process, increasing the reliability and transparency of financial reporting data, and the effectiveness of management decision-making. However, there are still unsolved problems in terms of distinguishing between conventional automated accounting systems and AI in the system of accounting and analytical support.

The application of artificial intelligence (AI) in the accounting system will lead to significant changes, which will lead to automation, increased efficiency, improved analytics, and transformation of the accountant's role [9]. However, there remains the problem of the lack of assessment of the impact of the integration of artificial intelligence technologies on the automation of the accounting and analytical support system.

Artificial intelligence increases the value of professional roles, leads to an increase in wages, includes increased scalability and savings of public finances, actualizes the focus on activities with higher value [10]. When integrating AI technologies, it is important to understand the specificity and financial constraints of public sector entities. An option to overcome the relevant difficulties is the generalization of characteristics, production capacities, and the cost of integrating modern AI technologies into the system of accounting and analytical support.

There remain objective difficulties in the integration of AI technologies into the system of accounting and analytical support, which are related to the expenditure part, optimization of state funds, the specificity of the budget process, etc. In part, the problem of estimating the cost component when implementing AI technologies is studied in [11]. However, there are still unresolved questions regarding the optimization of state resources when integrating AI technologies into the system of accounting and analytical support.

It is worth noting that studies on the integration of AI technologies into the accounting system are mostly related to subjects of entrepreneurial activity. The public sector has its own industry specificity, the problem of introducing AI technologies into the public finance management system is partially considered in [12]. Therefore, a study aimed at determining the possibility of integrating AI technologies into the system of accounting and analytical support of public sector entities is important. The chosen direction could make it possible to find new solutions that meet the modern challenges of the digital economy and ensure effective management of state resources.

3. The aim and objectives of the study

The purpose of our work is to determine the possibility of integrating AI technologies into the system of accounting and analytical support of public sector entities. This will improve the efficiency of public finance management, ensure accuracy and reliability of data, improve analytical support to decision-making, increase data transparency, save time, and reduce costs.

To achieve the goal, the following tasks were set:

– to determine the differences between conventional accounting automation and artificial intelligence technologies in the accounting and analytical support system;

– to analyze the amount of investments of the world's leading countries for the introduction of artificial intelligence into the system of accounting and analytical support;

– to analyze the characteristics and cost of integrating artificial intelligence technologies into the system of accounting and analytical support;

– to evaluate the impact of the integration of artificial intelligence technologies on the automation of the accounting and analytical support system.

4. The study materials and methods

The object of our research is artificial intelligence technologies in the system of accounting and analytical support to public sector entities.

The research hypothesis assumes that the introduction of artificial intelligence technologies into the system of accounting and analytical support could improve the efficiency of public finance management, save time for processing accounting and analytical data, and reduce costs.

The introduction of artificial intelligence technologies into the system of accounting and analytical support for the management of state finances is evidence of a serious desire to increase the efficiency, transparency, and rationality of the management of budgetary resources.

There is reason to assume that public sector entities demonstrate readiness for digital transformation and the use of innovative solutions to optimize processes, reduce the impact of the human factor, and implement modern standards of public finance management.

In the research process, the feasibility of integrating the Zoho Books AI technology into the accounting and analytical support system, which is one of the most affordable solutions and suitable for public sector entities with a limited budget, has been substantiated.

Public statistical data from financial reports of the USA, China, Great Britain, Germany, and Japan were used for the research.

A set of general scientific methods of cognition was used to conduct the research. The methods of analysis, comparison, generalization, and synthesis were applied in the study of theoreti-

cal aspects regarding the determination of differences between conventional accounting automation and artificial intelligence technologies. Analysis of the investments of the world's leading countries for the introduction of artificial intelligence into the system of accounting and analytical support was carried out on the basis of dynamic series methods. Determination of the influence factors of the integration of artificial intelligence technologies on the automation of the accounting and analytical support system was carried out on the basis of expert analysis.

5. Results of investigating the integration of artificial intelligence into the system of accounting and analytical support

5. 1. Defining the differences between conventional accounting automation and artificial intelligence technologies

Flows of public funds are related to the ability of public sector entities to accumulate funds in the process of achieving set current and strategic goals. The receipt and use of public funds provide additional information about the institution's ability to generate economic benefits from the use of its assets. Identifying trends and patterns of development of public sector entities requires constant analysis of financial stability in case of factors that will negatively affect its financial condition. Analytical calculations based on financial statements make it possible to assess the level of solvency and liquidity, financial stability, level of business activity, etc. [13].

The public finance management system is a complex and orderly set of tools that influence the cash flows of public sector entities and their direction of movement in order to achieve their financial stability. In the economic literature, accounting and analytical support is considered as a set of methods and techniques that make it possible to implement all functions of accounting, analysis, and control. Accounting and analytical support is based on a combination of accounting and analysis systems, the result of which interaction is accounting and analytical information [14]. At the same time, the accounting and analytical support for the management of state finances is a process that includes the collection of accounting data (accounting registration), the integration of accounting information (compilation of reports), the analysis of the received data arrays, and the preparation of options for management decisions. With this approach, a combination of the main components of this system, their form and content is necessary. This condition can be fulfilled by combining accounting and analytical functions that make it possible to increase the effectiveness of control over the state finance management system.

Conventional methods for processing information in the system of accounting and analytical support are not fast and efficient enough. The active use of computer technologies and software for accounting completely automates accounting procedures from the registration of primary data to the formation of financial statements. The changes that have taken place in the professional activity of accountants thanks to the integration of artificial intelligence technologies are revolutionary [14].

Automation of the accounting system is extremely important, especially in today's digital world, where speed, accuracy, and transparency of financial transactions become critical for the successful functioning of any organization, particularly in the public sector.

In many countries, the accounting system in the public sector is already partially automated. The implementation of automated accounting systems in state institutions make it possible to increase the efficiency of financial processes, reduce the number of errors, ensure transparency of financing and implementation of the state budget, as well as improve control over the use of budget funds.

In the public sector, the automation of accounting procedures is partial for several reasons: limited funding, in particular governments often have limited budgets for the introduction of the latest technologies in the public sector, which can limit the scope of automation; the complexity of financial operations, state institutions perform various financial operations, from budget planning to expenditure control, which requires adaptation of existing systems to the specificity of each process [15].

The possibilities of using artificial intelligence technologies in various domains of professional activity are of wide interest and need to be studied in every profession. The accounting profession includes routine tasks related to the processing of primary documents, the analysis of large data sets, the organization of internal and external communications, as well as tasks that require professional decision-making.

AI technologies in the accounting system have a number of opportunities compared to human resources, among which we can highlight:

– active transition from "paper" to electronic forms of document management, data storage using databases;

– ensuring business continuity based on regular automated backups, storage of archival copies of databases in the cloud and quick recovery after unforeseen events;

– mobility of using databases located in the cloud, in any part of the world where there is Internet and appropriate computer equipment;

– automatic updating of software by the provider without the participation of company personnel and reducing the need for maintenance of equipment and communication networks;

– scale of the infrastructure as the activity of the institution grows;

– a significant reduction in the costs of information technology users (construction of data processing centers, purchase of servers and network equipment, purchase of software and hardware solutions to ensure continuity and efficiency of work), which are borne by providers [16].

Unlike conventional accounting automation systems that operate according to predetermined rules and algorithms, AI is able to learn, adapt and make decisions based on the analysis of large volumes of data, which make it possible to perform functions that are significantly different from classical accounting automation.

There are a number of differences between conventional accounting automation and artificial intelligence technologies in the accounting and analytical support system; the key ones are summarized in Table 1.

So, the key differences between conventional accounting automation and AI technologies in the system of accounting and analytical support are:

– self-learning and adaptation; conventional automation systems work according to rigid algorithms and cannot independently change their work; AI uses machine learning for self-learning based on available data and experience;

– forecasting and analytics; conventional automated systems can generate reports based on existing data, but cannot make predictions or detect hidden patterns;

– automatic detection of errors and fraud; conventional automation systems work on the basis of fixed control rules. AI is able to analyze data in real time and detect unusual transactions that may indicate fraud or errors;

– intelligent document processing; conventional automation systems require manual data entry. AI can automatically read and process documents thanks to OCR and machine learning technologies;

– robotic financial assistants; conventional automation systems cannot interact with users in real time. AI provides the work of digital assistants who answer requests and help with accounting tasks;

– advanced analytics and visualization; conventional systems provide static reports. AI makes it possible to create dynamic and interpretable analytical reports with recommendations;

– deep integration; conventional systems have limited integration. AI provides deep integration with various applications and platforms to merge data.

Thus, AI not only fully automates accounting and analytical processes, but also makes them intelligent, adaptive, and efficient, which allows public sector entities to make informed management decisions.

Table 1

Key differences between conventional accounting automation and AI technologies in the accounting and analytical support system

General differences	Types of differences	Characteristic
Self-learning and adaptation	Automatic learning of categorization of operations	AI independently analyzes transactions, learns to classify them, and automatically allocates them to the appropriate accounting categories
	Adaptation to new conditions	If accounting rules change or new types of documents appear, AI can adapt without additional programming
Forecasting and analytics	Cash flow forecasting	AI analyzes historical data and creates predictions for future financial performance or potential risks
	Identification of trends and anomalies	AI-based systems identify anomalous transactions that may indicate errors or fraud
Detection of errors and fraud	Analysis of transactions for anomalies	AI analyzes large volumes of data and highlights unusual financial transactions
	Monitoring compliance with policies and standards	AI automatically verifies that accounts meet regulatory requirements
Intelligent processing of documents	Intelligent recognition of documents	AI automatically scans invoices, contracts, receipts, extracting the necessary information for accounting
	Automatic integration into the system	Data from documents are automatically entered into accounts without the need for human intervention
Robotic financial assistants	Chatbots for financial inquiries	AI assistants provide advice on accounting, tax and reporting issues
	Voice assistants	Using AI for voice commands when searching for accounting information or creating a report
Advanced analytics and visualization	Building interactive dashboards	Analysis of large volumes of data and visualization of key indicators
	Automatic recommendations	AI offers optimal solutions to improve financial performance
Deep integration	Integration of data from ERP, CRM, and tax systems	AI integrates data from various sources for comprehensive analysis
	Synchronization in real time	Constant updating of financial data

Source: summarized by Author based on data [14, 16].

5. 2. Analysis of investment volumes of the world's leading countries for the introduction of artificial intelligence into the system of accounting and analytical support

The volume of investments for the integration of artificial intelligence in the accounting and reporting system depends on the level of development of the economy and infrastructure of the respective country. Among the leaders in the field of integration of the latest AI technologies, including the automation of accounting and reporting, is the USA. Among the large technology companies, it is appropriate to single out Google, Microsoft, IBM, and Oracle, which are actively working on the implementation of artificial intelligence in the financial domain, including accounting and reporting. At the same time, financial institutions such as JPMorgan Chase and Goldman Sachs fully use AI to automate accounting processes, forecast financial indicators, and identify financial risks [17].

Investment volumes in the field of artificial intelligence technologies in the United States are growing every year due to high demand from corporations and government agencies. In 2024, the volume of investments in the field of artificial intelligence technologies in the USA amounted to more than USD 40 billion, in particular due to the expanded use of RPA (robotic process automation) and tools for automatic compilation of reports.

It is also worth highlighting such countries as China, Great Britain, Germany, and Japan, which are increasing the amount of investments in artificial intelligence technologies. Demand for such technologies is growing due to the need to automate financial processes, improve accounting accuracy, and ensure transparency in the public and private sectors.

Fig. 1 summarizes the amount of investments for the introduction of artificial intelligence, including in the accounting system of advanced Western countries for 2023–2025.

According to forecasts for 2025, investments in the field of AI for automation of accounting and reporting are actively growing and may reach the following indicators:

– USA (USD 45–50 billion);
– China (USD 30–35 billion);
– Germany: (USD 15–18 billion);
– Japan (USD 13–15 billion);
– Great Britain (USD 12–15 billion).

Among the leaders, China is highlighted, which actively invests in the development of AI, aiming to become a global leader in this field by 2030. Major Chinese technology companies such as Alibaba, Tencent, and Baidu are implementing AI to automate financial processes, including accounting and reporting. Chinese banks and financial organizations are actively integrating AI to optimize operations and automate the collection and processing of financial data [19].

The UK is investing heavily in AI in many areas, including accounting and financial services. London is an important financial center where many financial organizations are using AI to automate financial accounting, analysis, and reporting. Major UK banks such as HSBC and Barclays are already actively using AI to automate account processing, reporting, and predicting financial performance.

Germany is actively investing in AI technologies, especially in the manufacturing and financial sectors. German companies such as Siemens and

Deutsche Bank are using AI to automate financial accounting and streamline reporting processes. The German government supports investment in research and development in the field of AI, in particular through initiatives aimed at integrating AI into public finance and management accounting [20].
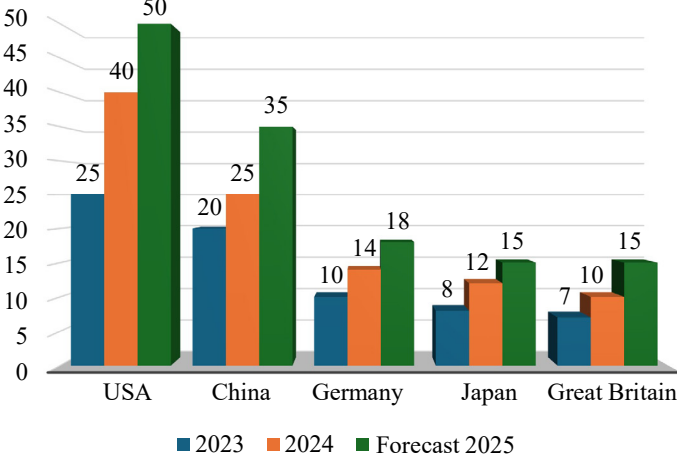

Fig. 1. Volumes of investments for the introduction of artificial intelligence, including in the accounting system of advanced Western countries for 2023—2025, USD billion
Source: summarized by Author based on data [18]

Japan is actively developing artificial intelligence to improve efficiency in business processes, including accounting and financial reporting. Japanese corporations such as Sony, Toyota, and Mitsubishi are using AI to automate financial processes, improve the accuracy of financial forecasts, and create intelligent accounting systems. The Japanese government also supports innovation in this field through various programs to integrate AI into the financial domain [21].

In view of the above, in recent years, the volume of investments in the introduction of artificial intelligence technologies, in particular, in the accounting automation system, increasing the efficiency of financial management, reducing costs, improving the transparency of data in the public sector, has been constantly increasing.

5. 3. Analysis of characteristics and cost of integration of artificial intelligence technologies into the system of accounting and analytical support

AI technologies continue to transform accounting and analytical processes in the public sector. AI-based services make it possible to automate accounting operations, provide advanced analytics, forecasting, and quality control of accounting and analytical data. Table 2 summarizes the most popular AI technologies used in the analytical and accounting processes of public sector entities.

Table 2

The most popular AI technologies used in analytical and accounting processes of public sector entities

ID	Characteristic	Function	Latest changes
QuickBooks Online Advanced (Intuit)	A cloud accounting system for small and medium-sized businesses with elements of artificial intelligence	Automatic categorization of transactions. Forecasting cash flows. Recognition of expenses and income based on historical data. Integration with bank accounts for automatic updating of transactions	Improved machine learning-based analytics module for cost optimization recommendations
Xero AI	An accounting service that actively uses AI to automate financial accounting	Automatic reading of documents using OCR. Forecasting financial results and budgeting. Detection of anomalies in transactions. Integration with analytical dashboards	Integration with real-time financial planning tools, allowing you to build forecasts based on current data
Zoho Books AI	A cloud accounting system with AI capabilities for government institutions	Automation of routine accounting tasks (input, processing of accounts). Detection of errors in financial reports. Forecasting of expenses and income. Built-in analytical tools for building reports and recommendations	Improved integration with other systems via API to consolidate financial data
Microsoft Dynamics 365 Finance	A powerful ERP system for large companies and government institutions with integrated AI algorithms	Forecasting of financial results and automatic budgeting. Analysis of cost efficiency and optimization of work processes. Identification of risks and anomalies in financial data. Automatic preparation of financial reports in real time	Using Azure AI to predict and optimize public sector financial flows
Oracle Net-Suite AI	A cloud-based ERP system for financial management with AI capabilities	Forecasting of working capital. Automatic updating of accounting records. Real-time analytics of costs and income. Machine learning to optimize financial transactions	Integration with Oracle AI for deep analytics and government resource management
IBM Watson Analytics	A powerful AI-based service for processing and analyzing large volumes of financial data	Analysis of trends and identification of patterns in financial indicators. Automatic forecasting of budgets and expenses. Intelligent recommendations to improve accounting efficiency	Improved Natural Language feature. Processing (NLP) to generate financial reports based on user requests
UiPath (RPA+AI)	Robotic process automation (RPA) system integrated with artificial intelligence for accounting, including government institutions	Automation of invoice and financial document processing. Recognition and classification of financial transactions. Fast execution of routine accounting operations with minimal human intervention	Integration with AI Builder for data mining and error reduction
Tableau+Einstein analytics (Salesforce)	Analytical platform for deep analysis of financial and accounting data with AI algorithms	Automatic creation of analytical reports. Forecasting costs, revenues, and possible risks. Data visualization with integrated AI-based recommendations	Integration with Einstein GPT to generate reports and recommendations in text format based on requests

Source: summarized by Authors based on [22, 23].

Technologies based on AI provide not only automation of accounting and analytical processes, but also increase their efficiency, accuracy, and depth of analytics. Among the market leaders, we can highlight QuickBooks, Xero, Zoho Books AI Microsoft Dynamics 365, which integrate machine learning, forecasting, document processing, and robotic automation to optimize the work of accountants and analysts.

Given the limitations of public finances, public sector entities should take into account not only powerful technologies but also their cost of integration into the system of accounting and analytical support. Therefore, it is advisable to conduct an analysis of the average cost of integrating AI-based technologies into the system of accounting and analytical support.

The average cost of integrating AI-based technologies into the accounting and analytical support system is summarized in Table 3.

As you can see, such technologies as Oracle NetSuite AI, UiPath (RPA+AI), QuickBooks Online Advanced (Intuit), Microsoft Dynamics 365 Finance, Tableau+Einstein Analytics (Salesforce) have a rather high cost, which is impractical for the public sector at the stage of initial integration .

IBM Watson Analytics technology for initial test versions is free, but in further use, obviously, the use of such technology involves monthly costs from USD 99/month (Standard) to USD 500/month.

Technologies that are less costly:

– Xero AI, the cost varies from USD 14/month to USD 54/month, advanced forecasts and analytics will cost an additional USD 7/month;

– Zoho Books AI, the cost varies from USD 15/month to USD 60/month.

Given the above, the last two technologies Xero AI and Zoho Books AI are the most cost-effective for the public sector. However, taking into account the possibilities, which are practically identical, we come to the conclusion that the Zoho Books AI technology is one of the most affordable solutions and is also suitable for government structures with a limited budget.

Table 3

The average cost of integrating AI-based technologies into the accounting and analytical support system

ID	Average cost of integration
Oracle Net-Suite AI	Basic subscriptions: $999/month (base platform fee). Cost per additional user: $99–$150/month. Implementation and customization: depending on the complexity of the process: $10,000 to $100,000/one-time. Additional modules and features: advanced AI-powered automation – can increase cost by 20–30 %
UiPath (RPA+AI)	UiPath Studio: starts at $350/year per user. UiPath Orchestrator: starts at $2,000/year for a basic license. UiPath Robot: from $1,500/year per robot (Attended) and from $4,000/year (Unattended). AI Fabric and AI Center: starts at $10,000/year
QuickBooks Online Advanced (Intuit)	Basic Subscription: $200/month (when billed monthly) or $2,160/year (discounted when billed annually). Number of users: up to 25 users at a time. Additional costs: connecting additional tools (e.g., HubSpot, Salesforce, Expensify) may have separate costs. Staff training: $500 to $2,000 for large teams. Basic support included, but additional fees may apply for premium services
Microsoft Dynamics 365 Finance	Base cost: $180/month per user. Advanced modules up to $300/month per user. Total implementation costs for large government or commercial organizations can range from $50,000 to $200,000, including setup, support, and training
Tableau+Einstein Analytics (Salesforce)	Tableau: – Tableau Creator: $70/month; – Tableau Explorer: $35/month; – Tableau Viewer: $12/month. Salesforce Einstein Analytics: – Einstein Analytics Plus: $75 – $150/month; – CRM Analytics Plus: $125/month; – Einstein's Platform: $250/month
Xero AI	Base cost from $14/month – $54/month (Premium). AI features are available in all plans, but advanced forecasts and analytics will cost an additional $7/month with Xero Analytics Plus. The total cost depends on business scale and integrations, but Xero remains an affordable solution for automating accounting processes using AI
Zoho Books AI	The base cost is $15/month (Standard). AI features with automation and predictive analytics are available in the Premium plans ($60/month). The full cost depends on the number of users, integrations, and the amount of automation. Zoho Books is one of the most affordable solutions and is also suitable for government agencies with a limited budget
IBM Watson Analytics	Base cost: $0 for initial test versions. For full-fledged analytics and AI features, the cost can range from $99/month (Standard) to $500/month (Premium) for more advanced features. For large organizations and specialized solutions, the price may vary depending on the volume and configuration of the platform

Source: summarized by the authors based on [24].

5. 4. Assessment of the influence of the integration of artificial intelligence technologies on the automation of the accounting and analytical support system

The impact of artificial intelligence on the automation of the system of accounting and analytical support to public sector entities is significant and multifaceted. Artificial intelligence is transforming conventional methods of accounting and financial analysis, improving the efficiency, accuracy, transparency, and effectiveness of accounting processes in public administration.

Among the main factors of the influence of artificial intelligence on the automation of the accounting and analytical support system, the following can be distinguished: automation of processing of primary documentation, accounting processes, improvement of data accuracy and reduction of errors, data analysis and

forecasting, improvement of transparency of accountability and reporting data, detection of financial violations and optimization of the budget process [25].

The main factors of the impact of artificial intelligence on the automation of the accounting and analytical support system of public sector entities are illustrated in Fig. 2.
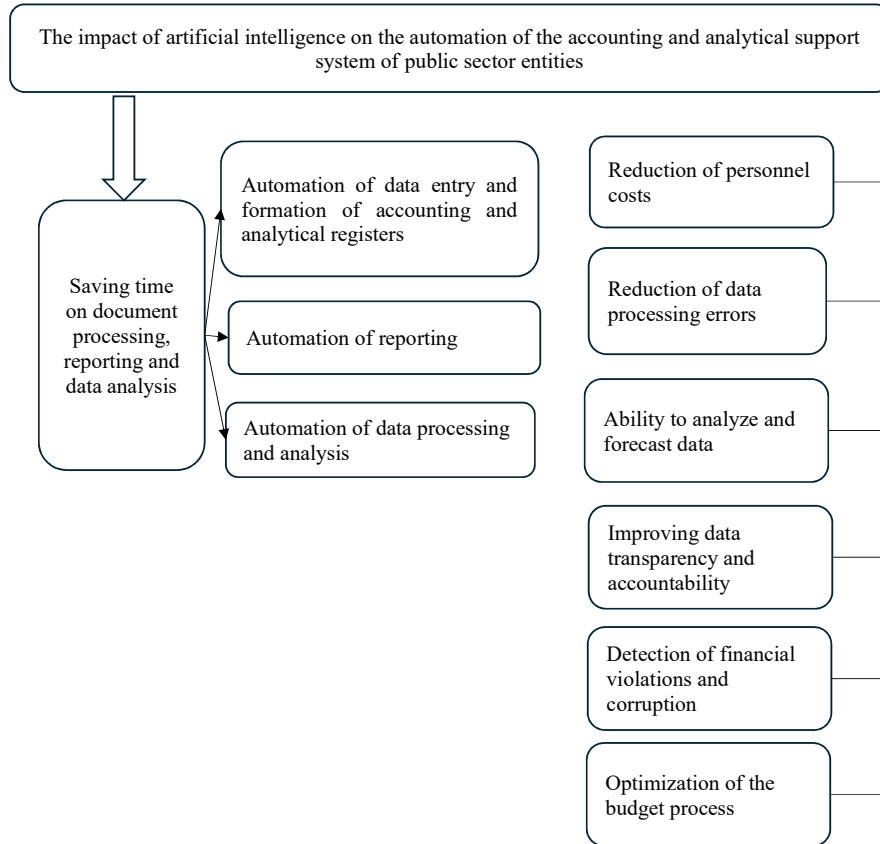

Fig. 2. Factors of the influence of artificial intelligence on the automation of the system of accounting and analytical support to public sector entities

Among the key factors, it is advisable to highlight factors that lead to time savings for document processing, reporting and data analysis, namely: automation of data entry and formation of accounting and analytical registers, automation of reporting, automation of data processing and analysis.

With the help of expert analysis, a survey was conducted among 200 experts in accounting, reporting, and analysis to determine the amount of time savings as a result of the integration of the cloud accounting system with AI capabilities of Zoho Books AI.

In order to determine the amount of time required for the processing of primary data, the accounting process, and the preparation of reports of public sector entities, a questionnaire (guide) has been compiled with a list of questions, which are given below:

1. How long does it take to process one document?

2. How many document processing operations are carried out per day?

3. How long does it take to prepare one financial report?

4. How many forms of financial reporting are made per year?

5. How much time does it take to prepare one budget report?

6. How many budget reporting forms are made per year?

7. How long does it take to prepare one tax report?

8. How many tax reporting forms are made per year?

9. How much time does it take to prepare one statistical report?

10. How many forms of statistical reporting are made per year?

11. How much time is required for data processing and analysis?

Most experts gave practically the same answers, the results of which are summarized in Table 4.

The cloud accounting system with AI capabilities Zoho Books AI has powerful functionality, namely, full automation of document accounting (input, invoice processing); detection of errors in the process of forming various forms of reporting, data analysis and forecasting of income and expenses, availability of analytical tools for building reports and recommendations. Thus, it can be stated that most of the accountant's work will be performed automatically, which will lead to saving time, reducing the number of employees, and saving budget funds.

Table 5 summarizes the level of change in the amount of time before and after the integration of Zoho Books AI into the accounting and analytical support system of public sector entities.

According to the results of our calculations, the following result was obtained: when the Zoho Books AI cloud system is integrated into the accounting and analytical support system, the time in the accounting department will decrease by 2164 hours/year.

Table 4

Answers from experts regarding the amount of time needed to process accounting and reporting processes in the public sector

List of questions	Experts' answers
1. How long does it take to process one document?	5 min
2. How many document processing operations are carried out per day?	50 operations
3. How long does it take to prepare one financial report?	10 h
4. How many forms of financial reporting are made per year?	20 forms
5. How much time does it take to prepare one budget report?	10 h
6. How many budget reporting forms are made per year?	40 forms
7. How long does it take to prepare one tax report?	10 h
8. How many tax reporting forms are made per year?	10 forms
9. How much time does it take to prepare one statistical report?	5 h
10. How many forms of statistical reporting are made per year?	30 forms
11. How much time is required for data processing and analysis per week?	15 h

Table 5

The level of change in the amount of time from the integration of the Zoho Books AI cloud system into the accounting and analytical support system of public sector entities

Influencing factors	Before the introduction of artificial intelligence in the accounting and reporting system	After the introduction of artificial intelligence into the accounting and reporting system	The general impact of artificial intelligence on the automation of accounting and analysis
Automation of data entry into the accounting system (50 operations/day)	Time for processing one document=5 minutes. Total time for data entry: 50*5 min=250 min/day or 4 h 10 min/day	Time for processing one document: 1 minute. Total time for data entry: 50*1 min=50 min/day or 1 hour 10 min/day	Time saving per document 50 transactions/day=3 hours. Annual time saving for document processing (if work 5 days a week, 52 weeks): 3 hours*5 days*52 weeks=780 hours/year
Automation of reporting:			
Financial reporting (20 reports/year)	Time to prepare one financial report: 10 hours (data collection, verification, compilation of reports). Total time for preparing reports for the year: 20 reports*10 hours=200 hours/year	Time to prepare one financial report: 2 hours (artificial intelligence automates data collection and analysis). Total time for preparing reports for the year: 20 reports*2 hours=40 hours/year	Annual saving of time for preparation of financial statements: 200–40 h=160 h/year
Budget reporting (40 reports/year)	Total time for preparing reports for the year: 40 reports*10 hours=400 hours/year	Total time for preparing reports for the year: 40 reports*2 hours=80 hours/year	Annual saving of time for preparing budget statements: 400–80 h=320 h/year
Tax reporting (20 reports/year)	Time to prepare reports for a year: 20 reports*10 hours=200 hours/year	Time for preparing reports for a year: 20 reports*2 hours=40 hours/year	Annual saving of time for preparation of tax reporting: 200–40 h=160 h/year
Statistical reporting (30 reports/year)	Time to prepare reports for a year: 30 reports*5 hours=150 hours/year	Total time for preparing reports for the year: 30 reports*1 hour=30 hours/year	Annual saving of time for preparing reports: 150–30 h=120 h/year
Automation of data processing and analysis	Time for data processing and analysis per week: 15 hours	Time for data processing and analysis per week: 3 hours	Annual saving of time for data processing and analysis: 15–3 h=12 h/week. Annual saving of time for data processing and analysis: 12 h*52=624 h/year
Total impact of integrating Zoho Books AI into the accounting and reporting system for the year			2164 h/year

Such changes will lead to optimization of public funds, reduction of accounting staff, reduction in labor costs and accruals.

6. Discussion of research results regarding the integration of artificial intelligence technology into the system of accounting and analytical support

The peculiarities of our results are the generalization of the differences between conventional accounting automation and AI technologies in the system of accounting and analytical support (Table 1). The possibilities of integrating artificial intelligence, which fully automates accounting and analytical processes and makes them intelligent, adaptive, and effective for the public sector, are indicated.

The work summarizes the results in terms of investment volumes for the introduction of artificial intelligence, in particular, in the accounting system (Fig. 1). The leading countries are defined as the USA, China, Germany, Japan, Great Britain. Forecast data for 2025 need discussion regarding the amount of investment in the field of AI for automation of accounting and reporting, which is limited. However, general trends indicate an increase in investments in digital technologies and automation of accounting and analytical processes.

Analysis of artificial intelligence technology, which can be used in the accounting and analytical processes of public sector entities, has been carried out. Unlike [1], in which the types and characteristics of technologies are defined, our work summarizes the characteristics of technologies and their average cost of integrating artificial into the system of accounting and analytical support (Table 3). Among the most effective technologies, Zoho Books AI has been identified, which is affordable and suitable for government structures with a limited budget. However, the use of the proposed technology requires discussion in terms of budgetary funding, the scale of the institution, the scope of accounting and analytical procedures, the number of employees, etc.

In contrast to studies that determined the impact of artificial intelligence on the transformation of accounting and auditing practices [8] and the impact of artificial intelligence on the accounting profession [10], this work reports a comprehensive study on the assessment of the impact of the integration of artificial intelligence technologies on the automation of the accounting and analytical system provision. The key factors of the impact of artificial intelligence on the automation of the accounting and analytical support system have been determined (Fig. 2). Based on the results of the expert survey (Table 4), the amount of time required for processing accounting and reporting processes in the public sector was determined. An analysis of the change in the amount of time before and after the integration of the Zoho Books AI cloud system into the accounting and analytical support system of public sector entities was carried out (Table 5). The results showed that the overall impact of integrating Zoho Books AI into the accounting and analytical support system could lead to significant time savings of up to 2,164 hours per year and cost reduction. However, these results require additional research in terms of the speed of document processing by each employee, depending on the experience of the employee, the volume of document circulation, the technical capabilities of the institution, etc.

7. Conclusions

1. The key differences between conventional accounting automation and artificial intelligence technologies in the accounting and analytical support system have been identified, namely, self-learning and adaptation; forecasting and analytics; automatic detection of errors and fraud; intelligent processing of documents; robotic financial assistants; advanced analytics and visualization; deep integration. Based on the identified differences, the advantages of integrating artificial intelligence technologies into the system of accounting and analytical support to public sector entities have been summarized.

2. According to the results of our analysis of the amount of investments for the introduction of artificial intelligence, including in the accounting system for 2023–2025, such leading countries of the world as the USA, China, Germany, Japan, Great Britain are identified. According to forecasts for 2025, it was established that the amount of investment in the field of AI for the automation of accounting and reporting is actively growing and can reach the following indicators: USA (USD 45–50 billion), China (USD 30–35 billion), Germany (USD 15–18 billion), Japan (USD 13–15 billion), Great Britain (USD 12–15 billion).

3. Based on the results of analysis of the characteristics of artificial intelligence technologies that can be integrated into the system of accounting and analytical support, we have identified the leaders: QuickBooks, Xero, Zoho Books AI Microsoft Dynamics 365, UiPath (RPA+AI), which integrate machine learning, forecasting, processing documents and robotic automation to optimize the work of accountants and analysts. Based on the value range and properties, the integration of Zoho Books AI cloud technology into the accounting and analytical support system is recommended for public sector entities. The cost of integrating this technology varies from USD 15/month to USD 60/month, which is suitable for government agencies with a limited budget.

4. The main factors of the influence of artificial intelligence on the automation of the accounting and analytical support system have been identified, namely, automation of primary documentation processing, accounting processes, improvement of data accuracy and reduction of errors, data analysis and forecasting, increase of transparency of accountability and reporting data, detection of financial violations and optimization of the budget process. Factors that lead to saving time on document processing, reporting and data analysis are identified as key. With the help of an expert survey (200 experts), the amount of time required for the accounting process and preparation of reports of public sector entities was determined. A comparison was performed of the amount of time spent on processing documents, compiling reporting forms, processing and analyzing data before and after the introduction of Zoho Books AI technology into the accounting and analytical support system. Based on our calculations, it was determined that as a result of the integration of Zoho Books AI technology into the accounting and analytical support system, time will be reduced by 2164 hours/year. Such changes will lead to optimization of public funds, reduction of accounting staff, reduction in labor costs and accruals.

Conflicts of interest

The authors declare that they have no conflicts of interest in relation to the current study, including financial, personal, authorship, or any other, that could affect the study, as well as the results reported in this paper.

Funding

The study was conducted without financial support.

Data availability

The data is publicly available in a public repository that publishes datasets with DOIs.

Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the current work.

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