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Using AI in public finance: opportunities and risks for EU integration

Uso da inteligência artificial nas finanças públicas: oportunidades e riscos para a integração à União Europeia

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Keywords
Artificial intelligence.
State budget.
Digitalization.
Taxation.
Financial modelling.

Abstract

The article examines the use of AI technologies in public finance in Ukraine in the context of integration into the EU. The introduction of AI is seen as a digital transformation tool that can increase transparency, reduce the risk of fraud, and ensure that Ukrainian financial processes are adapted to the requirements of the AI Act. The research methodology combines the methods of monitoring, comparative legal analysis, content analysis, and step-by-step detailing. The source base includes scientific papers, reports of international organisations, and EU regulations. As a result, it is found that the chronic budget deficit of Ukraine, which worsened after 2022, requires the introduction of innovative approaches to financial management. The potential of AI in taxation and financial modelling is analysed, and its positive effects are identified such as automation, time saving, improved analytical accuracy, and reduced risk of fraud. However, the risks associated with cybersecurity, data quality and high implementation costs are outlined. Based on the content analysis, a step-by-step algorithm for introducing AI into the financial administration of Ukraine is created, taking into account the requirements of the AI Act. The suggested algorithm can become the basis for harmonising Ukraine's financial management with EU standards and facilitate effective digital transformation of the public sector. The use of AI in public finance is seen as a strategic condition for European integration, ensuring transparency, accountability and stability of Ukraine's financial system.

Palavra-chave
Inteligência artificial.
Orçamento público.
Digitalização.
Tributação.
Modelagem financeira.

Resumo

O artigo examina o uso de tecnologias de inteligência artificial (IA) nas finanças públicas da Ucrânia no contexto de sua integração à União Europeia (UE). A adoção da IA é apresentada como uma ferramenta de transformação digital capaz de aumentar a transparência, reduzir os riscos de fraude e adequar os processos financeiros ucranianos às exigências do AI Act. A metodologia da pesquisa combina os métodos de monitoramento, análise jurídica comparativa, análise de conteúdo e detalhamento passo a passo. A base de dados é composta por artigos científicos, relatórios de organizações internacionais e regulamentos da União Europeia. Os resultados indicam que o déficit orçamentário crônico da Ucrânia, agravado após 2022, demanda a adoção de abordagens inovadoras para a gestão das finanças públicas. O estudo analisa o potencial da IA na tributação e na modelagem financeira, identificando benefícios como a automação de processos, a economia de tempo, o aumento da precisão analítica e a redução dos riscos de fraude. Por outro lado, também são destacados desafios relacionados à segurança cibernética, à qualidade dos dados e aos elevados custos de implementação. Com base na análise de conteúdo, foi elaborado um algoritmo de implementação gradual da IA na administração financeira da Ucrânia, em conformidade com os requisitos do AI Act. O algoritmo proposto pode servir como base para a harmonização da gestão financeira ucraniana com os padrões da União Europeia e contribuir para uma transformação digital eficaz do setor público. Conclui-se que a utilização da IA nas finanças públicas constitui uma condição estratégica para a integração europeia, ao promover maior transparência, accountability e estabilidade do sistema financeiro da Ucrânia.

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Practical Implications

The proposed step-by-step algorithm provides policymakers and public finance authorities with a practical framework for introducing AI into Ukraine's financial management. It can support the automation of tax administration, fraud detection, financial forecasting, and reporting while ensuring transparency, human oversight, cybersecurity, and alignment with the EU AI Act. The framework also provides a basis for pilot projects and public-private partnerships, helping to optimise implementation costs and accelerate digital transformation.

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1. Introduction

Public finance plays a key role in economic development and social well-being (Balkı & Göksu, 2025). It involves managing government revenues, expenditures, and public debt through various institutions. Its core components include taxation, budgeting, and debt management (Vipond, 2018). Effective financial governance supports global goals such as poverty reduction and shared prosperity while ensuring fiscal discipline and efficient use of public resources (World Bank, 2021). Conversely, poor financial management can hinder policy implementation and negatively affect national development (Mergel et al., 2019).

The budgeting reform has been underway in Ukraine for a long time, with a number of different measures implemented. The reasons for mixed results were the formal nature and low level of implementation of the tasks set during the reform (Malyshko, 2021). On 29 December 2021, the Cabinet of Ministers of Ukraine (2021) approved the Strategy for Reforming the Public Finance Management System for 2022–2025, defining the effective functioning of budgeting as a prerequisite for Ukraine's transition to a resource-efficient and socially inclusive economy. In 2025, the Ministry of Finance of Ukraine focused on introducing fiscal risk management for local budgets and establishing a Debt Agency and a Fiscal Council (Ministry of Finance of Ukraine, 2024). These measures are intended to increase the sustainability of public finance.

The latest measure implemented by the Cabinet of Ministers of Ukraine to promote reforms in of financial management was the approval and adoption of the Strategy for Reforming the Public Finance Management System for 2026-2030. According to the Minister of Finance of Ukraine, Serhiy Marchenko, "The approval of this Strategy is a signal that Ukraine is consistently implementing the best European governance practices" (Ministry of Finance of Ukraine, 2026). Therefore, Ukraine's legislation aims to strengthen financial sustainability and align governance with European standards. This approach to domestic budget system reforms has been shaped by the conditions of war and the subsequent intensification of European integration processes.

Ukraine's financial system has become more strained due to military spending, infrastructure destruction, energy shortages, and labour migration (Yermachenko et al., 2023). The negative impact of these trends is evidenced by the structure of budget expenditures in 2024, according to which 51% of the budget was allocated to defence and security, 20% was spent on social payments, including pensions, and another 5,6% was spent on public debt service (Myronenko, 2025). As a result, only 23.4% of the 2024 budget was allocated to education, healthcare, and other sectors, highlighting a significant fiscal imbalance.

Alongside public finance reform in Ukraine, the digitalisation of state institutions is advancing. Digital technologies reduce budgetary pressure and enhance the competitiveness of the national economy (Khlivniuk, 2022; Lavrukhina et al., 2025). In this context, the use of artificial intelligence in financial management is becoming increasingly relevant and supports compliance with EU financial governance standards (Sinkovskyi et al., 2025). Therefore, it is important to assess the impact of AI on the transformation of Ukraine's budgeting system and its alignment with EU norms.

Previous studies have largely neglected the role of European integration in transforming Ukraine's public finance system and have not developed a structured algorithm for implementing AI in financial management. In this regard, the aim of this study is to identify the opportunities and risks for EU integration arising from the use of AI in public finance. To achieve this aim, the study examines the condition of Ukraine's public finances, assesses the role of AI in taxation, and analyses its application in fiscal modelling. Furthermore, the research defines the principles of approximation between Ukraine and the European Union in the context of integrating AI into financial management and develops an algorithm for implementing AI in the public finance management system of Ukraine.

The novelty of the article lies in the development of an integrated approach to the introduction of AI into the public finance management system of Ukraine, taking into account the EU requirements and standards, in particular the AI Act (European Parliament and the Council, 2024). Moreover, a phased algorithm for implementing AI is developed that combines technological, legal and organisational aspects of financial management, and forms the component composition of the concept of public finance based on content analysis. This, in turn, facilitates creating a theoretical basis for harmonising the Ukrainian fiscal governance with European standards of transparency, accountability, and digital security.

This study contributes to the literature by analysing the role of artificial intelligence in the transformation of public finance in Ukraine in the context of EU integration and by proposing a step-by-step algorithm for

implementing AI in financial management. The results may be useful for policymakers, public administration professionals, financial analysts, and researchers interested in digital governance and budgeting reform.

The article is structured as follows. Section 1 introduces the research problem and outlines the aim and objectives of the study. Section 2 presents the literature review. Section 3 describes the research methodology. Section 4 provides the results of the analysis, including the assessment of Ukraine's public finances, the role of AI in taxation, and the compliance of AI applications with EU standards. Section 5 discusses the findings and presents the proposed algorithm for implementing AI in financial management. Finally, Section 6 summarises the main conclusions and outlines directions for future research.

2. Literature review

The evolution of Ukraine's financial administration took place even before the emergence of AI and the beginning of attempts to implement it. Thus, the transformation processes in the field of domestic public finances in the early 1990s continued under the influence of the decentralisation of the budget system and the introduction of a programme-targeted method of forming the state budget. The reforms of that time were aimed at replacing the Soviet model of financial management. The latter involved increasing the independence and accountability of local self-government bodies and improving the transparency and efficiency of the use of Ukraine's state budget funds (Svichkar, 2025). However, digital transformation of financial control is now a key condition for ensuring the sustainability of domestic public finances (Pikhotskyy, 2025).

Using AI in budget system has been studied by a wide range of researchers. Thus, Vinnykova (2022) examined digital technologies and AI as a means of preventing corruption. The main problems for the effective operation of AI in financial transformations were the lack of access to the data, verification systems, and regulatory framework. Moreover, Kachula (2025) described the methodology of cyber defence in public finance, mentioning the innovation area and AI as one of its tools. Karlin et al. (2024) argued that special attention should be paid to measures for the financial security of public administration in the context of AI development.

Belova et al. (2023) identified the responsibilities of the government as a provider of digital public services in the terms of using AI and blockchain to improve their efficiency. Furthermore, Radionov (2025) analysed the development of the EU public finance system and the digitalisation of the financial sector of its member states using AI tools. In turn, Krynytsia (2023) suggested specific areas for the AI implementation to improve public finance management. Derlytsia (2020) focused on developing financial governance strategies that would consider the possibility of introducing AI. Moreover, Sinkovskyi et al. (2025) confirmed the need to create a unified strategy for the digitalisation of budget system that would use blockchain, AI, and analytical platforms.

Apart from that, Bouchetara et al. (2024) considered the transformative role of AI in improving financial risk management in the public sector. Manta (2020) believed that AI would be present mainly in the financial and fiscal spheres, facilitating their continuous development and the creation of complex financial models. Skuza and Lizak (2023) assessed the extent to which AI technology was used in the management of the US federal budgeting system in 2019-2022.

In addition, Gao et al. (2024) analysed how AI transformed the way governments manage budgets, revenues, and expenditures, increasing efficiency and reducing operating costs. Finally, Bernales-Vásquez and Sánchez-Dávila (2025) conducted a bibliometric analysis of the academic literature on financial management digitalisation. They showed that the peak of interest in digital transformation of public finances occurred in 2018-2022. However, despite the existence of various studies of AI usage in public administration, they need to be partially revised due to changes in AI technologies and new opportunities and risks of Ukraine's integration into the EU.

3. Methodology

The following sources of information were used in this study: academic and analytical publications, reports of international organisations, results of independent observations, and Internet resources. The selection of sources was based on the criteria of timeliness (mainly for the period of 2020-2025), relevance (relevance to the subject matter of the study) and credibility (reliability of the data provided). Scientific articles that did not pass the review stage and were written in languages other than Ukrainian and English, or those that the author could not correctly translate on their own, were excluded. The source base of the study covered a wide geographical range,

including the works of Ukrainian scholars and publications by researchers from Asia and the EU member states. The Google Scholar and Web of Science search platforms were used to find data for this study. Their use provided access to open access scientific and analytical publications related to the research topic.

The study used a set of research methods that provided a systematic approach to analysing the introduction of AI into financial management of Ukraine. Monitoring was used to collect and analyse data on Ukraine's financial system and AI developments in the financial sector. In the course of the monitoring, the statistical data of the Ministry of Finance of Ukraine, materials of international organisations, and analytical reports were processed to analyse the current problems and dynamics of the budget system.

The content analysis method was used to study academic sources on financial governance and digitalisation. It helped identify the essential characteristics of the concept of public finance, determine the frequency of their references in academic literature, and classify the causes of its imbalance, in particular, the factors that led to tax evasion and accumulation of public debt. It was also used to single out the key properties of the system: the component composition of the public debt, the structure of expenditures, and the priority areas of budget financing in 2025. In addition, it helped identify the stages of growth of the state budget deficit and outline the relationships between tax revenues, debt burden, and the level of financial sustainability of the state.

The comparative legal analysis was used to summarise the requirements of European legislation, in particular, the AI Act (European Parliament and the Council, 2024) and determine their impact on the Ukrainian financial system. This method was also used to analyse the differences between the financial models of Ukraine and EU member states. It was applied to compare the main financial indicators of the state budget of Ukraine for different years (2020-2025), identify trends in the growth of revenues and expenditures, and determine the moment when the budget deficit becomes chronic. The method of step-by-step detailing was applied to create a step-by-step algorithm for implementing AI in financial management in Ukraine. This method ensured a logical sequence of algorithm development from needs analysis and data collection to pilot implementation and evaluation of results.

The research was conducted in four stages. The first stage of this study provided an insight into the reasons for the decline of public finances in the period 2022-2025 and specified the role of international assistance in their structure. The methodological procedure for the first stage involved the use of monitoring, comparison, analysis, synthesis and abstraction methods. Among the official criteria for comparison at this stage were Ukraine's state budget indicators, the share of international aid in the budget structure, the structure of revenues and expenditures, and the weighted average cost of state and Ukraine-guaranteed debt.

The second stage described the role of taxation as a driver of economic development and social welfare and the positive impact of AI on the process of paying taxes and processing tax data. This stage involved the use of monitoring and abstraction methods. The third stage of the research helped identify the place of AI in fiscal models and financial modelling and explain the impact of European AI regulations (AI Act) on public finance. The methodological procedure for this stage involved the use of monitoring methods, content analysis and step-by-step detailing. Finally, the fourth stage involved building a step-by-step algorithm for implementing AI in the financial management in Ukraine (European Parliament and the Council, 2024).

4. Results

4.1. The condition of public finances of Ukraine

It is important to assess the condition of Ukraine's public finances and identify the main challenges facing the state. Since the budget plays the most important role in the financial system (Myronenko, 2025), the consolidated budget of Ukraine for the last five years is shown in Table 1.

Table 1.
Consolidated budget of Ukraine for 2020-2024 (UAH million)

Year	Revenue	Expenditure	Lending	Balance
2020	1376661,6	1595289,7	5316,2	-223944,3
2021	1662242,7	1844377,7	4773,2	-186908,3
2022	2196273,3	3043499,1	-2397,9	-844827,9
2023	3104306,6	4440940,2	-8932,9	-1327700,7
2024	3587789,5	4944026,1	-5622,5	-1350614,1

Source: based on Ministry of Finance of Ukraine (2025)

Based on the data in Table 1, it is possible to claim that Ukraine's budget remained in deficit even before the start of the full-scale aggression of the Russian Federation. However, this deficit became chronic in 2022. Moreover, state budget revenues and expenditures denominated in UAH have been growing steadily. Nevertheless, there was a particularly sharp increase in revenues by about a third and in expenditures by almost 50% in 2022-2023. This increase in revenue was due to support from international partners and financial organisations (non-repayable aid). The share of international aid in the structure of revenue rose from 7.3% to 24.8%. The increase in state budget revenues was also driven by economic factors such as the devaluation of the hryvnia, an increase in the monetary allowance for Ukrainian Armed Forces personnel, inflation, and an increase in imports and profits of domestic enterprises (Accounting Chamber, 2025).

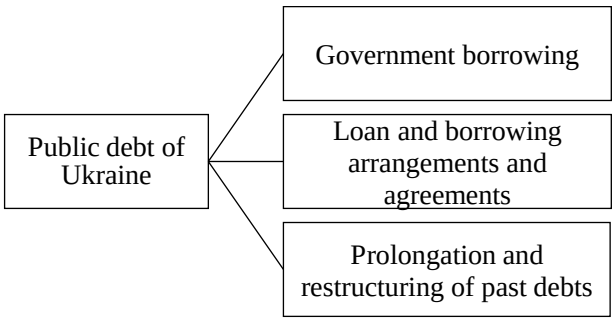
Another indicator that demonstrates the conditions of public finances in Ukraine is the state budget revenues. As of 1 August 2025, the main revenue sources are domestic taxes on goods and services (30,4%), taxes on income, profit and market value growth (20,65%), revenues of budgetary institutions (24,31%) and funds from other states and international donors (10,27%). It is also worth noting that the majority of the 2025 state budget is the general fund, which is used to finance general expenditures (Ministry of Finance of Ukraine, 2025b).

Such distribution of tax revenues to the state budget of Ukraine indicates the high role of indirect taxes, which in turn demonstrates the critical dependence of domestic budget revenues on the level of consumption (Tischenko et al., 2025). Among the advantages of this distribution are the ease of administration of indirect taxes and their lower sensitivity to changes in the economy. Meanwhile, the main disadvantages of the high role of indirect taxes are potential price increases and a drop in the purchasing power of the population, especially in times of economic emergencies (Yushko, 2019).

According to the Law of Ukraine No. 4059-IX "On the state budget of Ukraine for 2025" of 19 November 2024 (Verkhovna Rada of Ukraine, 2024), state budget expenditures amounted to UAH 3929061884,7 thousand. The priority areas in 2025 were defence and socio-humanitarian sectors, which received 56,6% and 22% of the expenditures respectively. It should be noted that in 2025, expenditures are covered by only 59% of the Ukrainian budget revenues and 41% by borrowing (Agency for Legislative Initiatives, 2025).

Hence, the trend of imbalance in the national budget in the context of expenditures continues. When referring to the public debt, it should be considered that as of 30 September 2024, its total amount was UAH 6.404 trillion. However, as of the end of May 2025, Ukraine's public debt reached UAH 7.5 trillion. In other words, it is approaching the critical level of 90% of GDP (Slutstkyi, 2025). The public debt is influenced by many different factors such as its structure and international geopolitical and geoeconomic situation. The components of public debt of Ukraine are shown in Figure 1.

Figure 1
Components of the public debt of Ukraine



Source: based on Podakov (2024)

The composition of public debt is not constant, as it can vary significantly depending on the level of development of a particular country. Moreover, the composition of public debt affects the economic sustainability of countries and their ability to pay off their debts. One of the main problems of Ukraine's financial management is the lack of possibility to restructure debts granted by international donors until 2022, as they have a priority position and are not considered commercial (Slutstkyi, 2025). This fact demonstrates an example of how treaties and loan agreements resulted in funds being obtained on unfavourable terms, making it difficult to repay the debt during the Russian-Ukrainian war.

However, despite the fact that the national budget deficit became chronic after 2022, military spending increased disproportionately as a result of the war, and the public debt reached almost 90% of GDP, the condition of Ukraine's public finances has been a problematic issue since the country's independence. For example, the consolidated budget was in balance only in 2000 and 2002 out of the first 15 years of Ukraine's independence (1991-2006). At that time, the balance was 0,6 and 0,7% of GDP respectively (State Statistics Service of Ukraine, 2006).

Regular budget deficits forced the Ukrainian government to attract domestic and foreign borrowing. This resulted in a 3,2-fold increase in the ratio of total public debt to state budget revenues between 2005 and 2018 (Tymoshenko & Hudz, 2020). In turn, the low level of budget revenues had a negative impact on the level of financial potential and Ukraine's ability to solve socio-economic problems (Radionov, 2022). Therefore since 2022, there has been a sharp deterioration in the condition of Ukrainian budget system which was caused not by objective macroeconomic changes but by Russia's full-scale armed aggression against Ukraine. Improving the state of Ukraine's public finances requires their transformation through new taxation technologies. The importance of this task is underpinned by the fact that in the context of the Russian-Ukrainian war, budgeting serves as the foundation for preserving Ukraine's sovereignty (Petrukha et al., 2024).

4.2. The role of AI in taxation

Taxes are used to finance public expenditures aimed at improving the economy and the welfare of society (Mitroulia et al., 2025). However, if the funds allocated by the government do not make a real contribution to the development of the regions, this encourages communities to evade taxes (Sitkiewicz & Białek-Jaworska, 2024). Another motivation for tax evasion is the attempts of private entities to reduce the tax burden imposed on them (Kanca & Bayrak, 2024). In this regard, AI can solve the problem of double taxation and updating taxpayer data, thereby increasing trust and monitoring compliance (Dike & Worugji, 2020). Introducing AI into tax systems signals a new era of tax administration, offering benefits to taxpayers and tax authorities (Kimani et al., 2020). The positive aspects of AI in taxation are described in Table 2.

Table 2.
Positive impact of AI on taxation

AI subfields	Essence	Application	Impact
Machine learning	A system used to process large amounts of data into information that is used in decision-making	E-filing, e-billing, e-invoicing, e-registration	Simplification of tax payment and reporting, improvement of tax services, detection of tax fraud
Chatbots	A technology designed to facilitate interaction between users and computer networks	Advice, tips, workflow automation, complaints handling	Time savings and constant availability
E-commerce	The technology used for digital buy and sell transactions	VAT and corporate income tax	The ability to increase tax revenues, as the digital sphere is a new industry with taxation potential
Internet of Things	A concept created to facilitate communication, data exchange, and connectivity to other devices if they are connected to the Internet	A barcode on the tax invoice instead of the signature of an authorised person	The ability to detect errors or manipulation of data
Blockchain	Digital data and transaction management system	A digital tax model, such as application models linked to accounting software	Simplification of tax reporting, increases transparency, and minimises errors caused by manual reporting
Cloud services	Technologies for receiving services through online media	Storage of tax data, networks, servers and databases	Simplification of the storage of large amounts of tax data
Natural language processing	Computer technology that enables the understanding, interpretation, and manipulation of human speech or commands in the form of text or voice messages	A chatbot for tax services	Automated responses to taxpayer notifications and simplification of the preparation of detailed reports on tax refunds

Source: based on Rahayu (2024)

Despite the positive impact of AI on taxation, it creates additional risks. For example, if AI-powered systems rely on inadequate or distorted data, this can lead to inaccurate or unfavourable results for some individuals or groups. In the context of tax administration, this could lead to inaccurate risk assessments and thus to the incorrect targeting of control measures (e.g., audits). Inconsistencies in data formats, incomplete or incorrectly entered records, outdated taxpayer data, or data that lacks the necessary context can cause inaccurate forecasts, flawed risk models, and biased results (OECD, 2025).

One of the main challenges in implementing AI for tax administration is ensuring compatibility with existing legacy systems (Wirtz et al., 2019). Many tax authorities still rely on legacy infrastructure that may not be equipped to handle AI systems or integrate with modern technologies such as machine learning and blockchain. Modernising these systems to support AI-based solutions requires significant investment in software and hardware. In some cases, the cost and complexity of modernising legacy systems may deter tax authorities from adopting AI technologies (Ernst et al., 2019).

Despite the growth in public debt, it should be noted that the structure of public debt by maturity showed positive changes. As of 2024, the weighted average cost of Ukraine's public and publicly guaranteed debt decreased by almost 1.4 times, from 7.8% to 5.6%, while the weighted average maturity increased by 1.6 times, from 6.3 years to 10 years (Shemaieva, 2023). This increase in the average maturity was caused by the full-scale invasion of Ukraine by the Russian Federation, which was accompanied by an increase in EU financial assistance and an

intensification of the redemption of government bonds. The latter increased pressure on the hryvnia exchange rate and inflation, which were the result of the NBU's issuance to buy back government bonds in the first months of Russia's full-scale invasion.

The introduction of AI-based tax systems also requires significant changes in staff training. Tax authorities need to ensure that their employees have the necessary skills to work with AI tools, such as data analytics, machine learning, and cybersecurity. In addition, there is a need to train employees whose roles may change as a result of automation, ensuring that they are prepared to take on new tasks, such as overseeing AI systems or focusing on more complex cases. The adaptation process may be difficult for some employees, especially in public institutions with limited resources or a workforce that is resistant to change (Ezeife et al., 2025).

4.3. EU standards for the AI application in public finance

Fiscal models have undergone a transformation through the AI integration. AI has become an important tool for adapting to fiscal legislation, managing large datasets, and tracking regulatory changes. Interpreting fiscal legislation is complex due to frequent regulatory changes. Using AI in fiscal models facilitates a better understanding of tax liabilities for taxpayers and experts. In addition, it identifies rules applicable to specific situations. AI systems used in this context are also capable of analysing large data sets to predict changes (Bostan, 2024).

AI-powered financial modelling uses AI to transform traditional forecasting processes into automated, intelligent systems (OECD & CAF Development Bank of Latin America, 2022). It combines machine learning algorithms with financial expertise to analyse data and draw analytical conclusions with minimal human intervention. Unlike conventional spreadsheets, AI-based financial modelling processes huge amounts of information, identifies complex patterns, and improves its accuracy constantly (Sun & Medaglia, 2019). In turn, AI-powered financial forecasting transforms finance departments from retrospective accountants to strategic consultants. By automating routine calculations, AI allows finance professionals to focus on analysing and supporting decisions and provide timely analytics. When evaluating the best AI for financial modelling, it is necessary to identify its critical functions, check the usability and security of the algorithm, and identify integration opportunities (Lluch, 2025).

Thus, AI in fiscal models seeks to improve the quality of forecasts, assess the impact of regulatory changes in public finances, and optimise fiscal decisions. Fiscal models of EU member states vary due to historical, economic, religious, and geographical differences (Moskalyk & Moskalyk, 2020). While in the Scandinavian countries, a significant share of taxes is generated through high VAT rates and social contributions, in Ireland and Hungary, policies promote low corporate taxation to stimulate exports and attract multinational companies (Tsalan, 2025). However, a negative manifestation of this fiscal diversification is the difficulty of coordinating a common European strategy.

The principles of approximation between Ukraine and the EU in the context of AI integration into public finance include transparency, automation of the procurement process, and overcoming corruption (Kussainov et al., 2023). However, achieving these goals requires investment in the development and integration of AI. The implementation and administration of already created AI systems also necessitates additional budgetary expenditures. For example, the Germany supports investment in AI research and development through initiatives aimed at integrating AI into financial management (Larikova et al., 2024).

Ukraine also has budgeting tools that can support the AI integration into its management. Modern AI capabilities can be used in the algorithms of the domestic Prozorro and DOZORRO platforms to improve the interaction of participants in trade operations, enhance the efficiency of public finances, and reduce the number of abuses (Doroshenko et al., 2024). Another important principle is the harmonisation of domestic legislation with the AI Act (European Parliament and the Council, 2024). Its goals are to minimise risks, protect the rights, safety, health, and trust of the European society in AI. The requirements of the AI Act and their impact on public finances are provided in Table 3.

Table 3

AI Act requirements and their impact on public finance

Requirements	Nature of the obligation	Outcomes
Transparency and accountability	Government agencies should keep records and logs of AI systems' activities, providing data on their decisions	Increasing user confidence and administrative costs
Managing unacceptable risks	Inadmissibility of using AI that can cause manipulation or collect biometric data without user consent	The need for legal expertise and possible rejection of certain AI systems
Data and infrastructure quality	The need to use unbiased and representative data while balancing them with the reliability and security of the AI system	The government needs to invest in data preparation and storage without shortcuts to cybersecurity
Control	Evaluation of AI systems and human supervision	The need for audits and highly skilled technicians
Fines	Readiness to face fines for violations of work regulations	Risks of legal expenses and litigation

Source: based on European Parliament and the Council (2024)

Table 3 demonstrates that private business representatives could be involved in the development of the AI system as part of a public-private partnership (PPP) programme (Alazzam et al., 2023). The government also needs to hire consultants with legal expertise, as the AI Act regulates many issues in this area (European Parliament and the Council, 2024). Adherence to the principles set out in the AI Act would help prevent the negative consequences of the risks of using AI in public finance during the EU integration of Ukraine.

Unfortunately, it is currently impossible to determine the extent to which the harmonisation of Ukrainian financial management with EU standards is confirmed by empirical results, as domestic legislation has not yet been harmonised with the AI Act. However, the White Paper on Artificial Intelligence Regulation in Ukraine states that the domestic law on AI will be developed based on the AI Act model (Regulations.ai., 2024). This guarantees the compatibility of AI application standards of financial management between EU member states and Ukraine.

5. Discussion

Pellentesque convallis ligula tellus, ac tempus est faucibus quis. Orci varius natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec et orci sed mi tristique dignissim id non magna. In vitae elit convallis, aliquam lectus eu, mollis dui. Aliquam sit amet molestie tellus, vel commodo quam. In finibus viverra libero eget venenatis. Suspendisse cursus malesuada viverra. Morbi ut posuere urna. Cras eu sodales diam. Although AI applications in public finance are widely discussed, no implementation algorithm has yet been proposed for Ukraine. However, a number of researchers confirmed some of the intermediate results of this study. Thus, Zalcewicz (2023) suggested that the adoption of new technologies should be viewed from a different perspective, i.e., as costs associated with the functioning of administrative processes and the rationalisation of technology development and implementation. For example, this could include the adoption of standards for the adoption of new technologies in the public sector as part of a cost control process. Larikova et al. (2024) argued that for AI to be effective in financial management, it is important to ensure that audit reports, macroeconomic statistics, raw data provided by taxpayers, data from banks and other intermediaries would be consistent, transparent, reliable, and timely available.

In the developed algorithm for introducing AI into financial management in Ukraine, a separate block is responsible for searching for data to train the neural network. The study by Kumari et al. (2024) showed that the key factors for the AI introduction in the financial sector are the availability of a high-quality data structure, growing competitive pressure, the availability of appropriate infrastructure, and support from top management. Accordingly, a step was added to the algorithm to assess the state of the infrastructure for AI development.

The methodological foundations of content analysis are described in the manual Modern Methods of Content Analysis, which examines how quantitative counting allows objective conclusions to be drawn about the focus of materials based on the number of uses of units of analysis (components) (Kostenko et al., 2018). To identify these units of analysis, the component structure of the phrase 'public finances' was created, which is presented in Table 4.

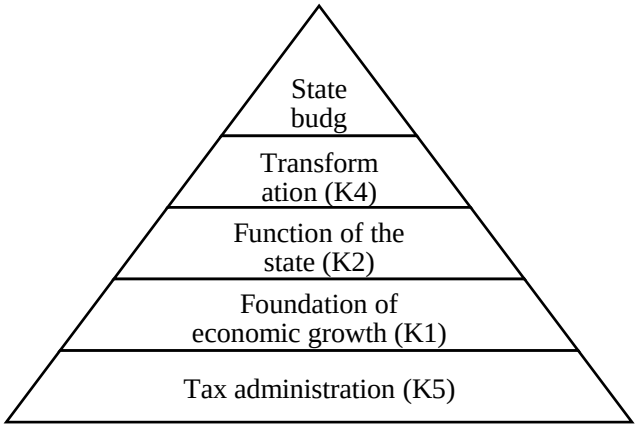
Table 4
The component composition of public finance

Component	Sources
Foundation of economic growth (K1)	Balkı and Göksu (2025); Petrukha et al. (2024); Karlin et al. (2024)
Function of the state (K2)	Derlytsia (2020); Sinkovskyi et al. (2025)
State budget (K3)	Tischenko et al. (2025); Yushko (2019)
Transformation (K4)	Malyshko (2021); Bouchetara et al. (2024); Manta (2020)
Tax administration (K5)	Mitroulia et al. (2025); Kanca and Bayrak (2024)

Source: authors' own development

Table 4 demonstrates that the components of the concept of public finances differ significantly in their internal content. Thus, there is no unified approach to defining it among scholars. Hence, the components of the concept of public finance were identified. References to these scholars were provided based on whether they are included in the source base of the study. Furthermore, it is necessary to allocate the number of references and counting them for each component. Thus, considering that K(1) is mentioned 9 times in the analysed works of scientists, K(2) – 10 times, K(3) – 12 times, K(4) – 11 times, and K(5) – 8 times, the main components were selected and the component composition of public finance was determined (Figure 2).

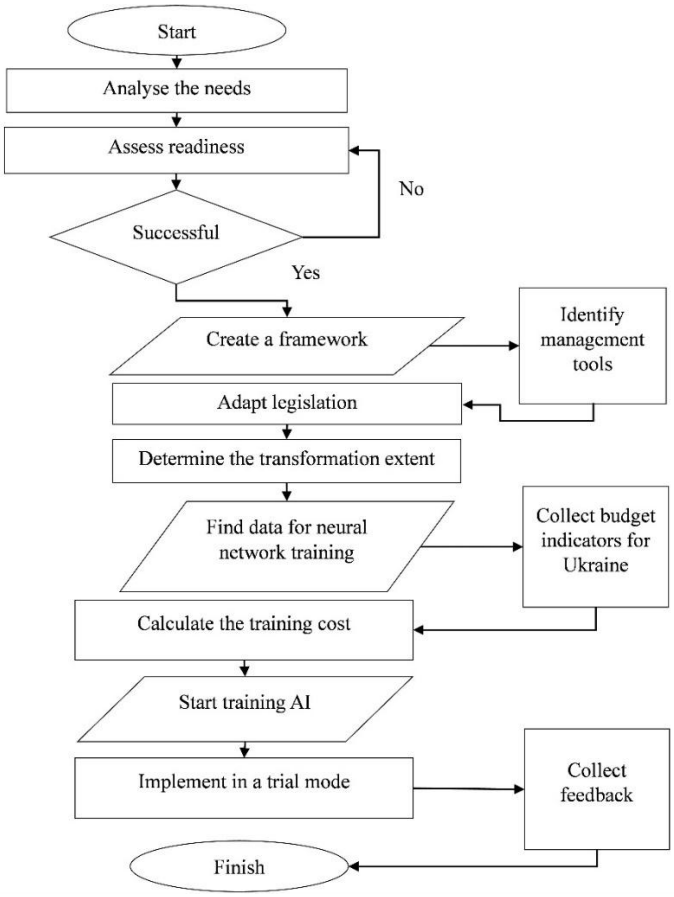
Figure 2.
The component composition of public finance



Source: authors' own development

The content analysis showed that in the previous studies, the concept of public finance is mostly regarded as an analogue of the state budget, which is transformed through the activities of the state and lays the foundation for economic growth through the administration of taxes. This interpretation was taken into account when developing the step-by-step algorithm for introducing AI into financial management in Ukraine. First of all, this involves the search for data to train the neural network, which requires the implementation of a block for collecting national budget indicators. It will provide access to information on tax revenues, expenditures, budget deficit, and public borrowing. The data obtained will be the basis for determining the budget structure and forecasting inflation and the national currency exchange rate. The AI implementation algorithm is shown in Figure 3.

Figure 3
Algorithm of AI implementation in public finance management in Ukraine



Source: authors' own development

The first stage of the algorithm is the process of needs analysis, which requires setting a technical task for developers, namely, defining the functions of the AI system and all its necessary attributes. Next, it is necessary to assess the readiness to develop such an AI system, evaluate the number of available resources and infrastructure, and recognise the level of employees' competence involved in the development. If the readiness assessment is positive, it is necessary to create a framework of how the created AI system will manage domestic public finances, namely to identify the tools necessary for effective management. After that, it is essential to adapt the legislative norms to this system by determining what exactly and how to change the domestic legislation regulating the budgeting sector**.**

The next steps require access to public finance databases, which will be used to train the neural network. Since most of this data is publicly available, it is possible to use domestic financial data for previous years for training purposes. It is also necessary to calculate the training cost in order to predict the level of depreciation costs during the operation of the ready-made AI system in budget system in Ukraine. An important step is to pilot the system in order to get feedback from civil servants who will use it to manage public finances. The feedback will be the main factor that will enable the modernisation of the created AI system and modification of the previously developed algorithm for its implementation.

The transformation component of public finances in the algorithm is expressed in a block that determines the degree of transformation by assessing the necessary degree of changes in the financial administration of Ukraine. The fact that the algorithm treats financial management as a function of the state is demonstrated by the block of legislation adaptation, which sets the goal of integrating the requirements of the AI Act into Ukrainian financial legislation (European Parliament and the Council, 2024). It will be possible to evaluate the effectiveness of the integrated AI system and proceed to its audit and further scaling only after the successful completion of the

algorithm. All these processes should be carried out in accordance with the principle of transparency and in compliance with the AI Act (European Parliament and the Council, 2024).

The created algorithm does not have a separate block responsible for tax administration, since the principles according to which the AI system will carry it out can be determined only after its implementation in the management of public finances in Ukraine. Therefore, the integration of the tax administration function into the AI system will require a separate algorithm that will allow for the efficient collection of data from all domestic tax authorities and the implementation of a set of necessary decisions and procedures.

One hypothetical example of the pilot application of the proposed algorithm is its use for taxation. For this purpose, the neural network will need to be provided with a database of tax revenues for several years. Once it has been calculated that taxation using the proposed algorithm is economically justified, it is necessary to begin training it in the context of solving the problem of double taxation and updating taxpayer data. After implementing this algorithm, its effectiveness should be assessed by comparing tax revenue results for different periods and considering taxpayer complaints and suggestions.

The proposed algorithm may also be applied in other countries, although institutional, financial, and legal constraints may limit its implementation. For example, adapting legislation requires government officials to be ready for political reforms, which is often difficult or nearly impossible for developing countries. This is due to the embryonic state of their legislative institutions. It should also be noted that, according to the Organisation for Economic Co-operation and Development, financial constraints are one of the main barriers to the use of AI in public administration (OECD, 2025). At the same time, calculating the cost of training a neural network requires financial allocations, which may require international financial and technological assistance.

Despite these challenges and barriers, a number of countries have already implemented AI in financial management. Estonia uses AI integrated into the X-Road digital infrastructure for taxation and budget analysis (Aldemir & Uçma Uysal, 2025). Recent actions by the Greek government have shown how digitalisation can lead to real fiscal benefits. There are now plans to integrate AI into the work of the tax authorities (Gatopoulos, 2025). In 2022, South Korea introduced an AI system for budgeting, which has contributed to greater transparency in budgetary processes and improved budgetary risk management (OECD, 2025). Thus, the above examples of AI implementation in public finance demonstrate that this is the prerogative of developed countries that have high institutional capacities and are able to finance the process of fiscal governance transformation or find financial donors interested in doing so.

6. Conclusion

The study analysed introducing AI into the public finance sector of Ukraine and identified opportunities and risks arising in this context during the EU integration. The results of the study show that the current condition of Ukraine's budget system is characterised by a high level of budget deficit, which became chronic after 2022. This is due to a structural imbalance between revenues and expenditures, growing military needs, and dependence on external borrowing. This situation demands transformational solutions, among which digitalisation and the use of AI technologies is a key one.

AI can improve tax administration, detect fraud, automate reporting, reduce human error, and enhance financial forecasting. Meanwhile, the AI implementation is accompanied by significant challenges, ranging from the need for financial resources and infrastructure modernisation to ensuring compliance with EU legislation, in particular the AI Act. Compliance with these regulations requires transparency, accountability, control over the operation of AI systems, and cybersecurity, which entails the participation of legal and technical experts.

As a result of the analysis, the step-by-step algorithm for implementing AI in financial management in Ukraine was created. This algorithm allows for the systematic introduction of innovative technologies, considering technical and legal aspects, and the specifics of the Ukrainian budgeting. The suggested algorithm can serve as a basis for building partnerships between government agencies and private businesses within the framework of public-private partnerships, which will optimise costs and accelerate the AI integration into financial management. Thus, using AI in public finance serve as a tool for improving the efficiency of budget policy and a strategic condition for the EU integration of Ukraine. The AI implementation algorithm can establish a modern model of financial management that embraces transparency, stability, and compliance with European standards.

Nevertheless, the limitations of the study include the lack of examples of AI use in budget system of EU member states and the assessment of its efficiency across countries. This limitation is caused by the limited access to data on a number of indicators of fiscal governance of EU member states and commercial secrecy. Therefore, further research should be focused on a comparative analysis of the use of AI and blockchain in financial management, which will help identify the best ways to transform Ukraine's financial system digitally, improve the efficiency of public spending, reduce tax risks, and strengthen financial stability in the post-war recovery.

Future research should focus on modelling the operation of the step-by-step algorithm for implementing AI in the domestic financial management, which will make it possible to determine its effectiveness in terms of reducing tax risks and strengthening financial stability in the context of post-war recovery.

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