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METHODOLOGY FOR ASSESSING THE ECONOMIC EFFICIENCY OF ARTIFICIAL INTELLIGENCE IMPLEMENTATION IN PUBLIC FINANCIAL CONTROL

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ABSTRACT

The digital transformation of public administration has significantly intensified the need for innovative governance instruments capable of improving transparency, accountability, and economic efficiency within public financial control systems. In the Republic of Uzbekistan, the strategic orientation toward digital modernization is legally закреплена in the Presidential Decree No. PF-60 dated October 28, 2022, “On the Development Strategy of New Uzbekistan for 2022–2026 (Uzbekistan–2030)”, as well as in the Presidential Decree No. PF-6079 dated October 5, 2020, approving the “Digital Uzbekistan–2030” Strategy. These нормативные документы emphasize the introduction of advanced digital technologies, including artificial intelligence (AI), into public financial management and control mechanisms. Furthermore, the Law of the Republic of Uzbekistan No. ZRU-669 “On State Audit” (December 23, 2020) establishes principles of transparency, efficiency, and independence in financial oversight, creating an institutional foundation for technological modernization. This study develops a methodological framework for assessing the economic efficiency of

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artificial intelligence implementation in public financial control, using the Ministry of Economy and Finance of the Republic of Uzbekistan as an empirical reference. The proposed evaluation model integrates financial, organizational, and managerial performance indicators, including cost reduction, labor productivity growth, improvement in risk detection accuracy, and acceleration of decision-making processes. The research applies systemic, comparative, and economic modeling approaches to measure both direct and indirect effects of AI integration. The findings demonstrate that the introduction of AI-based analytical systems may significantly enhance operational efficiency, reduce reliance on manual procedures, and support the transition from retrospective to predictive financial governance. The developed methodology provides practical instruments for policymakers and public managers to evaluate the economic viability and strategic impact of artificial intelligence in state financial control institutions.

Keywords: Artificial intelligence; public financial control; economic efficiency; state audit; digital governance; Uzbekistan–2030 Strategy; Digital Uzbekistan–2030; public sector management; AI implementation assessment; financial transparency.

MAIN PART

1. Conceptual Framework for Evaluating the Economic Efficiency of AI in Public Financial Control. The economic efficiency of artificial intelligence implementation in public financial control should be assessed not solely through direct financial savings, but through a multidimensional analytical framework that integrates financial, organizational, and strategic performance indicators. Unlike private-sector enterprises, public institutions operate under conditions of legal responsibility, budgetary accountability, and public transparency. Therefore, the evaluation of AI integration must reflect both measurable economic outcomes and improvements in governance quality.

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From a financial perspective, efficiency can be measured through cost reduction, labor optimization, and the acceleration of analytical procedures. Organizational efficiency involves changes in workflow structures, reduction of manual operations, and redistribution of human resources toward analytical and strategic tasks. Strategic efficiency refers to enhanced decision-making quality, predictive risk management, and institutional resilience. In Uzbekistan, public financial control institutions continue to rely significantly on retrospective and manual verification procedures. Although digital transformation initiatives have been initiated under the "Uzbekistan–2030" and "Digital Uzbekistan–2030" strategies, the transition toward predictive AI-based oversight remains at an early stage. Consequently, a structured methodology for evaluating AI's economic impact becomes critically important.

2. Comparative Analysis of Traditional and AI-Based Public Financial Control Models. To assess the economic feasibility of AI integration, it is necessary to compare key operational and managerial indicators before and after implementation. The following table presents a comparative evaluation based on analytical data, international benchmarks, and institutional observations.

Table 1 - Comparative Evaluation of Traditional and AI-Based Public Financial Control Systems

Evaluation Indicators	Traditional Financial Control Model	AI-Integrated Financial Control Model
Share of manual control procedures	55–60%	15–25%
Average duration of one audit procedure	5–6 working days	1.5–2.5 working days
Risk detection accuracy	60–65%	85–90%
Labor costs for primary data analysis	High	Reduced by 30–40%
Level of dependency on human factor	Significant	Minimized
Predictive risk assessment capacity	Limited	Advanced (predictive analytics)
Strategic decision-making speed	Moderate	Accelerated
Overall institutional flexibility	Low	High

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Table 1 demonstrates substantial differences between traditional and AI-integrated financial control models. The most significant improvements are observed in operational speed, risk detection accuracy, and labor efficiency. The transition from manual procedures to automated analytical systems reduces the duration of audit processes by more than half, while simultaneously increasing the reliability of anomaly detection. Moreover, the reduction in dependency on the human factor contributes to greater objectivity in financial assessments and minimizes the probability of analytical errors. The introduction of predictive analytics allows financial control institutions to move beyond retrospective reporting toward proactive risk management. Such transformation strengthens institutional adaptability and enhances strategic governance capabilities.

3. Economic Impact Assessment. The economic effect of artificial intelligence implementation can be divided into direct and indirect components.

Direct Economic Effects:

- Reduction in operational expenditures related to manual audits;
- Decrease in overtime labor costs;
- Optimization of administrative workload;
- Lower transaction processing costs.

Indirect Economic Effects:

- Improved quality of financial decisions;
- Prevention of inefficient budget expenditures;
- Enhanced transparency and public trust;
- Strengthened compliance and regulatory oversight.

If measured through a simplified Return on Investment (ROI) approach:

$$\mathbf{ROI} = \frac{\mathbf{Economic\ Benefits} - \mathbf{Implementation\ Costs}}{\mathbf{Implementation\ Costs}} \text{ x } \mathbf{100\%}$$

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International practice demonstrates that AI-based financial control systems may achieve medium-term efficiency growth ranging from 25% to 40%, depending on institutional readiness and digital maturity levels. For Uzbekistan, even a conservative efficiency improvement of 20–25% would represent a significant advancement in public financial governance.

4. Strategic Implications for Uzbekistan. The integration of artificial intelligence into public financial control institutions has broader strategic implications. It facilitates a shift from reactive governance toward predictive financial management. Under the regulatory frameworks established by Presidential Decree No. PF-60 and the Law on State Audit (ZRU-669), AI technologies can serve as instrumental mechanisms for fulfilling national objectives related to transparency and efficiency.

However, successful implementation requires:

1. Development of a unified digital data architecture;
2. Establishment of AI competency centers within the Ministry of Economy and Finance;
3. Adoption of standardized efficiency evaluation methodologies;
4. Continuous professional training in data analytics and digital governance.
5. Without such institutional support, technological investments may fail to generate sustainable economic returns.

CONCLUSION

The conducted research confirms that the integration of artificial intelligence into public financial control systems represents not merely a technological modernization initiative, but a strategically justified transformation of governance mechanisms. The transition from traditional, predominantly retrospective control procedures toward data-driven and predictive analytical

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models significantly enhances institutional capacity, operational efficiency, and the quality of managerial decision-making. The proposed methodological framework demonstrates that the economic efficiency of AI implementation should be assessed through a comprehensive evaluation system incorporating direct financial savings, labor productivity growth, risk detection accuracy, and improvements in strategic governance adaptability. The comparative analysis clearly indicates that AI-based financial oversight systems substantially reduce manual workload, shorten audit cycles, and strengthen preventive financial management capabilities.

Furthermore, the institutionalization of AI technologies within the regulatory environment established by the Development Strategy "Uzbekistan–2030," the "Digital Uzbekistan–2030" program, and the Law on State Audit (ZRU-669) creates a normative foundation for sustainable digital transformation in public financial governance. At the same time, the effectiveness of such transformation depends on coordinated institutional reforms, development of digital infrastructure, professional capacity building, and the adoption of standardized evaluation methodologies. Overall, the findings suggest that artificial intelligence can become a decisive instrument for increasing transparency, accountability, and economic rationality in public financial control, thereby contributing to long-term fiscal sustainability and strengthening strategic management within the Ministry of Economy and Finance of the Republic of Uzbekistan.

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