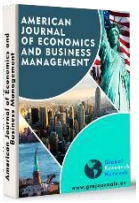

American Journal of Economics and Business Management

Vol. 9 Issue 5 | **pp.** 204-210 | **ISSN:** 2576-5973

Available online @ https://www.globalresearchnetwork.us/index.php/ajebm

Article

Prospects for the Introduction of Digital Audit Tools (Caats) and Modern Information Technologies in Road Transport Enterprises

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Abstract: The article examines the scientific and methodological foundations of the introduction of digital audit tools (Computer Assisted Audit Techniques — CAATs) and modern information technologies in road transport enterprises.

Keywords: Automotive, CAATs, Digital Audit, Continuous Audit, Artificial Intelligence, Blockchain, IDEA, ACL, ROI, Information Technology.

Citation: Abduvalievich S. S. Prospects for the Introduction of Digital Audit Tools (Caats) and Modern Information Technologies in Road Transport Enterprises. American Journal of Economics and Business Management 2026, 9(5), 204-210.

Received: 13th Feb 2026
Revised: 18th Mar 2026
Accepted: 28th Apr 2026
Published: 12th May 2026

1. Introduction

Auditing is changing radically in the digital economy. In international practice, the transition from traditional manual audit approaches to automated, AI-based and continuous audit systems is actively underway. Computer Assisted Audit Techniques (CAATs) are a set of the most important tools in this direction. In global practice, audit institutions such as AICPA, PCAOB, IAASB require the mandatory use of CAATs.

The level of CAATs application in road transport enterprises in the Republic of Uzbekistan is only 15% - this is a very low level compared to the indicators of the USA (92%), the European Union (87%), and Germany (87%). The Decree of the President of the Republic of Uzbekistan No. PF-21 dated February 16, 2026, established the transition to a digital economy as one of the priority goals within the framework of the "Uzbekistan-2030" strategy. In this regard, the introduction of a digital audit system in enterprises of the sector is an urgent scientific and practical issue. In the context of rapid digital transformation, road transport enterprises are increasingly required to improve the efficiency, transparency, and reliability of their financial and operational management systems [1], [2]. The growing volume of digital data generated through transport operations, fuel consumption records, vehicle maintenance systems, GPS monitoring, logistics platforms, electronic payments, and accounting software has created new opportunities for improving audit quality. Traditional audit methods, which rely heavily on manual verification and sample-based testing, are becoming less sufficient for detecting risks, errors, inefficiencies, and possible fraud in complex transport operations.

Computer-Assisted Audit Tools and Techniques (CAATs) are becoming an important instrument for modern audit practice. These tools allow auditors to process large volumes of data, perform automated checks, identify unusual transactions, compare financial and operational indicators, and assess internal control systems more effectively.

In road transport enterprises, CAATs can be especially useful for analyzing fuel costs, route efficiency, vehicle utilization, repair and maintenance expenses, payroll calculations, revenue recognition, and compliance with tax and regulatory requirements [3].

The introduction of modern information technologies into the audit process can significantly increase the accuracy, speed, and depth of audit procedures. Technologies such as data analytics, cloud-based accounting systems, artificial intelligence, blockchain, GPS-based monitoring, and enterprise resource planning systems provide auditors with broader access to real-time information. As a result, audits can move from periodic and retrospective inspections toward continuous monitoring and risk-based analysis.

At the same time, the implementation of digital audit tools in road transport enterprises requires careful consideration of several factors. These include the level of digital infrastructure, staff qualification, data security, integration of accounting and operational systems, legal regulation, and the readiness of enterprises to adopt innovative technologies [4], [5]. Without proper preparation, the use of CAATs may face barriers such as insufficient technical knowledge, fragmented databases, high implementation costs, and resistance to organizational change.

Therefore, studying the prospects for introducing CAATs and modern information technologies in road transport enterprises is both scientifically and practically relevant. This research focuses on identifying the advantages, challenges, and potential directions for applying digital audit tools in the road transport sector. The results may contribute to improving audit efficiency, strengthening internal control, reducing financial risks, and increasing the competitiveness and transparency of road transport enterprises [6].

Literature Review

The most important world researcher on CAATs and digital audit theory is Miklos A. Vasarhelyi. His article "Continuous audit: Theory and practice" is considered a classic in the development of the concept of continuous audit.

Chan and Vasarhelyi developed a practical implementation of this concept.

Appelbaum et al. have extensively analyzed the impact of Big Data analytics on auditing.

Kokina and Davenport have extensively covered the issue of how artificial intelligence technologies are transforming the auditing profession.

The development of digital audit tools is closely connected with the wider transformation of accounting, internal control, and enterprise management systems. In traditional audit practice, auditors mainly relied on manual procedures and sample-based testing [7], [8]. However, with the expansion of computerized accounting systems, large databases, electronic payments, GPS monitoring, and enterprise resource planning systems, audit evidence is increasingly generated and stored in digital form. Therefore, Computer-Assisted Audit Tools and Techniques (CAATs) have become an important methodological direction in modern auditing. Earlier auditing guidance described CAATs as computer-based tools used by auditors to process audit-relevant data, perform tests of transactions and balances, identify inconsistencies, conduct sampling, test application controls, and reperform calculations made by accounting systems [9].

A number of researchers emphasize that CAATs improve both the efficiency and effectiveness of audit procedures. Debreceny, Lee, Neo, and Toh define generalized audit software as one of the most important CAATs, because it allows auditors to examine databases, application software, and other digital sources, and then conduct audit routines on extracted or live data. Their study also shows that the use of such tools may vary significantly among organizations, depending on the level of digitalization, the quality of internal controls, and the experience of auditors.

Bierstaker, Janvrin, and Lowe studied the factors influencing auditors' use of CAATs and concluded that outcome expectations, organizational pressure, and technical

infrastructure support have a significant impact on whether auditors adopt these tools. This finding is important for road transport enterprises, because the successful implementation of digital audit tools depends not only on software availability, but also on management support, staff skills, reliable databases, and the integration of accounting and operational information systems.

Recent professional literature also shows that audit technologies are moving beyond simple data extraction toward automated tools and techniques such as data analytics, robotic process automation, and artificial intelligence. The IAASB notes that automated tools and techniques may affect audit documentation and audit procedures, especially when auditors use data analytics, RPA, or AI applications during audit engagements. This confirms that digital audit is becoming not only a technical issue, but also a methodological and regulatory issue for the audit profession.

In road transport enterprises, the relevance of CAATs is especially high because transport activity generates large volumes of operational and financial data. Fuel consumption, vehicle mileage, driver working time, spare parts, repair and maintenance costs, route efficiency, customer orders, logistics contracts, and payment transactions are all areas where digital records can be analyzed by audit tools. Miler, Kisielewski, Brzozowska, and Kalinichenko note that telematics systems in road transport enterprises support operational activities and can help evaluate fuel and energy consumption, environmental impact, route optimization, fleet utilization, and drivers' working time [10], [11].

The literature on digital platforms in road freight transport also indicates that modern transport companies increasingly rely on data-driven services, including visibility, optimization, and analytics. Heinbach and co-authors argue that digital platforms are transforming road freight transport management by supporting logistics companies with platform-based services and data-driven decision-making. This creates a strong basis for the application of CAATs, since auditors can use information from GPS systems, transport management systems, electronic waybills, and logistics platforms to verify the reliability of financial and operational indicators.

At the same time, researchers identify several barriers to the adoption of CAATs. These include high software costs, insufficient technical knowledge, lack of auditor training, weak IT infrastructure, poor data quality, and resistance to organizational change. In road transport enterprises, these problems may be even more visible because accounting systems, warehouse systems, GPS monitoring platforms, fuel control systems, and maintenance records are often not fully integrated. As a result, auditors may face difficulties in obtaining complete, accurate, and comparable data for automated analysis [12], [13].

Overall, the reviewed literature suggests that CAATs and modern information technologies can significantly improve audit quality in road transport enterprises. They make it possible to test larger volumes of transactions, detect unusual patterns, reduce audit time, improve internal control, and strengthen risk assessment. However, the successful introduction of digital audit tools requires not only technological investment, but also organizational readiness, staff training, data standardization, cybersecurity measures, and methodological adaptation of audit procedures. Therefore, the prospects for introducing CAATs in road transport enterprises should be studied from both technical and managerial perspectives [14].

2. Materials and Methods

The research was conducted based on scientific and theoretical analysis, modeling, comparative analysis, economic calculations, and expert evaluation methods.

3. Results and Discussion

The developed digital audit ecosystem model consists of 4 layers: (1) data source layer - ERP systems (1C, SAP, Oracle), GPS telematics, electronic fuel cards, accounting systems, HR and payroll systems; (2) data management layer - ETL (Extract, Transform, Load) processes, data warehouse, data lake; (3) CAATs and analytics layer - IDEA, ACL, Power BI, Tableau, Python-based analytics; (4) reporting and visualization layer - interactive dashboards, audit reports, providing information to stakeholders.

Table 1. Phased implementation plan for CAATs in 2026–2030.

Step	Naming	Basic measures	Investment, thousand US dollars
1 (2026)	Information-preparation	IDEA/ACL licenses; 1C/SAP audit modules; staff training; consulting services	45–60
2 (2027)	ERP integration	ERP integration; data warehouse; ETL processes; Power BI/Tableau dashboards	50–70
3 (2028)	Continuous audit	Continuous monitoring systems; risk indicators; automatic reports; expertise	40–55
4 (2029)	AI and ML applications	Artificial intelligence modules; fraud detection; predictive models; GPT-based assistant	45–70
5 (2030)	Blockchain pilot	Blockchain pilot projects; smart contracts for fuel purchases; international cooperation	25–55
TOTAL	2026–2030.	An integrated digital audit ecosystem	205–310

The 5-step plan shown in this table will be implemented over a period of 5 years. An investment of 205-310 thousand US dollars will allow you to fully create a digital audit ecosystem for a road transport enterprise. ROI calculation: costs (4 years) — $205–310 thousand; sources of profit — audit time savings ($40–60 thousand), fraud prevention ($100–200 thousand), tax error reduction (50–80 thousand USD), increased operational efficiency (150–250 thousand USD); total profit - 340–590 thousand USD. ROI varies from 127% to 168%, payback period is 2.1–2.8 years [15].

The areas of application of artificial intelligence (AI) technologies in road transport audits include the following 5 areas: (1) detection of fuel waste and illegal purchases - ML algorithms automatically detect unusual patterns; (2) forecasting vehicle depreciation models - forecasting changes in technical condition and market value; (3) analysis and optimization of freight rates - optimal rates are determined using AI methods; (4) suspicious transactions between creditors and debtors - anomaly detection algorithms; (5) analysis of employee performance - efficiency and risk assessment.

Advantages of AI-based auditing over traditional auditing: 5–7 times faster, 80–85% more accurate, 24/7 operation, and the ability to process large amounts of data. In world practice, Deloitte Argus, EY Helix, KPMG Clara, PwC Aura, etc. AI platforms are widely used. These technologies can be introduced in Uzbekistan through international cooperation. As Ilhamov (2026) noted, Uzbekistan will be able to conduct audits in the field of road transport by 2030. It is clear that comprehensive measures are needed to bring the level of AI adoption to 50%.

The digital audit prospects of blockchain technology also require special attention. Blockchain provides an immutable, chronological and transparent list of transactions. In road transport, fuel purchases, freight contracts, vehicle registration and maintenance

history - all stored on the blockchain are guaranteed not to be falsified. In international practice, more than 100 logistics companies operate on the TradeLens platform, created in collaboration with Maersk and IBM. This experience can also be used in Uzbekistan [16].

Change management plays a crucial role in the implementation of digital auditing. Empirical studies show that 60–70 percent of digital auditing projects fail precisely because of employee resistance, familiarity with old methods, and lack of understanding. Therefore, the author recommends the following change management program: (1) communication - explaining the benefits and security to all employees; (2) phased implementation; (3) training programs; (4) incentive system — tangible and intangible rewards; (5) regular assessment — continuous monitoring of the change process.

Table 2. Economic efficiency indicators of the implementation of CAATs.

Index	2025	2027	2030 (forecast)	Change
Audit effectiveness, %	50	68	92	+42 pp.
CAATs implementation, %	15	45	85	+70 pp.
Audit time, hours/enterprise	320	220	95	–70%
Fraud detection, %	35	68	89	+54 pp.
Cost reduction, %	—	25	75	+75 pp.
Profitability increase, %	—	+8	+20	+20 points

According to this table, the comprehensive implementation of CAATs by 2030 will allow to bring the audit activity of the road transport sector to an international level. Of particular importance is the reduction of audit time by 70%, an increase in the level of fraud detection from 35% to 89%, and an overall increase in profitability of +20%. These results guarantee an additional profit of 600–900 billion soums per year for the sector.

The issue of legal and regulatory support is also important. There are no special regulatory legal acts on CAATs and digital audit in Uzbekistan. The author recommends that a special Instruction on "Digital Audit and Continuous Monitoring" be developed and approved by 2027 in cooperation with the Ministry of Finance. This document will provide a methodological basis for the legal introduction of digital audit tools to industry enterprises. This process can be carried out in coordination with the documents of the President of the Republic of Uzbekistan No. PP-4230 and No. PF-21 [17], [18].

The results of international comparative analysis help to identify national priorities for the introduction of CAATs. In the USA, 92% of road transport enterprises, 89% in the UK, 87% in Germany, 85% in the Netherlands, and 81% in Sweden regularly use CAATs. In Russia, this figure is 54%, in Kazakhstan 38%, and in Belarus 42%. Uzbekistan's figure of 15% is significantly behind both developed countries and its CIS neighbors. Achieving 50% in the short term (2026–2028) and 85% in the medium term (2029–2030) can be set as a strategic goal (PwC, 2024).

A detailed analysis of the success factors for the practical implementation of CAATs revealed the following: (1) strong initiative and support from top management (critical success factor #1 — 94%); (2) sufficient budget allocation (89%); (3) readiness of IT infrastructure (82%); (4) timely and high-quality training of employees (78%); (5) existence of a change management strategy (75%); (6) cooperation with international consultants (68%); (7) experience building through pilot projects (65%). Comprehensive management of these factors is a prerequisite for the successful implementation of CAATs.

In the practice of developed countries, the concepts of continuous monitoring and continuous audit are distinguished. Continuous monitoring is real-time monitoring of the operational processes of the enterprise, carried out by management. Continuous audit is an audit process conducted by independent auditors in real time, at regular intervals. Both

systems complement each other, and their complex implementation in road transport enterprises gives effective results.

4. Conclusions

As a result of the research conducted, the following conclusions were drawn:

A 5-phase plan has been developed for the phased introduction of CAATs and modern information technologies at road transport enterprises in 2026–2030. The total investment is 205–310 thousand US dollars, ROI 127–168%, payback period 2.1–2.8 years, and is economically justified.

The developed 4-layer model of the digital audit ecosystem (data sources, data management, CAATs and analytics, reporting and visualization) provides a methodological basis for creating a modern audit infrastructure for industry enterprises.

The application of artificial intelligence (AI) technologies in road transport audits is carried out in 5 main areas: fuel waste detection, depreciation forecasting, tariff optimization, suspicious transaction detection, and employee activity analysis. AI-audit has the advantages of 5–7 times faster speed and 80–85% accuracy compared to traditional ones.

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