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PROSPECTS FOR USING ARTIFICIAL INTELLIGENCE IN IMPROVING CUSTOMS AUDIT BASED ON INTERNATIONAL STANDARDS

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Abstract: The rapid digitalization of international trade and the increasing complexity of cross-border transactions require customs administrations to modernize their control mechanisms. Customs audit, as a key post-clearance control instrument, plays a crucial role in ensuring trade compliance, revenue protection, and trade facilitation. This article examines the prospects of integrating artificial intelligence (AI) elements into customs audit systems in line with international standards and best practices. The study analyzes conceptual foundations, global trends, practical applications, benefits, risks, and policy implications. The research concludes that AI-driven customs audit can significantly enhance risk management efficiency, transparency, and fiscal effectiveness while supporting trade facilitation objectives.

Keywords: customs audit, artificial intelligence, risk management, post-clearance audit, digital customs, international standards, trade facilitation.

Globalization and technological progress have transformed the nature of international trade, leading to increased transaction volumes, diversified logistics chains, and sophisticated trade fraud schemes. Traditional customs control methods, primarily focused on border inspections, are no longer sufficient to ensure effective compliance monitoring. Consequently, customs administrations worldwide are shifting towards post-clearance audit (PCA) and risk-based control systems.

The rapid growth of cross-border e-commerce, global value chains, and complex customs valuation practices has increased the need for data-driven customs control mechanisms. Traditional inspection-based control is gradually being replaced by risk-based post-clearance audit systems, consistent with international trade facilitation standards.

Artificial intelligence technologies enable customs authorities to move toward predictive compliance management, improving fiscal effectiveness and operational efficiency. Recent global initiatives confirm that AI adoption in customs is becoming a central pillar of digital transformation strategies. A global survey conducted under the Smart Customs Project identified AI and machine learning as among the most strategically important technologies for customs modernization and governance reform.

Artificial intelligence technologies provide new opportunities to improve customs audit processes by enabling predictive analytics, automated data processing, anomaly detection, and intelligent decision-making. Integrating AI elements into customs audit frameworks consistent with international standards is becoming a strategic priority for modern customs administrations.

Conceptual Framework of Customs Audit and AI Integration. Customs audit refers to a systematic examination of traders' commercial data, accounting records, and business systems to verify compliance with customs legislation. It is an essential component of risk-based customs management, which aims to balance trade facilitation with regulatory enforcement.

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Artificial intelligence can be defined as a set of computational technologies that enable machines to simulate human intelligence functions such as learning, reasoning, and pattern recognition. In the context of customs audit, AI tools include:

- Machine learning algorithms
- Natural language processing (NLP)
- Predictive analytics systems
- Intelligent risk scoring models
- Robotic process automation (RPA)

The integration of these technologies allows customs administrations to move from reactive control to proactive compliance management.

International frameworks emphasize the modernization of customs control through digital transformation and data-driven decision-making. Key principles relevant to AI-based customs audit include:

- Risk management and post-clearance control orientation
- Transparency and accountability in administrative decisions
- Trade facilitation and reduction of administrative burden
- Data exchange and inter-agency cooperation
- Protection of confidential commercial information

Advanced customs administrations are implementing integrated digital audit platforms that combine trade databases, tax records, logistics information, and financial intelligence systems.

AI algorithms can analyze large datasets to identify high-risk traders and transactions. By evaluating historical compliance behavior, trade patterns, and sectoral risks, customs authorities can develop dynamic risk profiles.

Machine learning models can detect undervaluation, misclassification, origin fraud, and transfer pricing manipulation by identifying unusual patterns in customs declarations and financial data. Robotic process automation can perform routine audit tasks such as data verification, document comparison, and report generation, reducing human workload and increasing efficiency.

AI systems can forecast potential non-compliance risks and recommend preventive measures, enabling customs administrations to shift towards compliance partnership models with traders. AI-driven customs audit systems can integrate with national single windows, logistics platforms, banking systems, and international trade databases, ensuring comprehensive risk analysis.

European Union: Risk-Based Post-Clearance Audit Digitalization.

EU customs administrations have progressively introduced integrated risk analysis platforms linked with customs declarations, VAT databases, and logistics information systems. These systems allow automated selection of traders for PCA using data mining techniques.

Empirical evidence shows that digital audit tools improve targeting accuracy and reduce physical inspections, supporting trade facilitation while strengthening revenue protection.

Republic of Korea: AI Risk Management Systems. The Korea Customs Service has developed AI-based risk management systems for imports, express cargo, and postal items. These systems analyze historical declaration data and supply-chain risk patterns to classify shipments in real time. Furthermore, generative AI tools are being introduced to assist customs officers in retrieving company-level trade information and conducting analytical queries.

Singapore: AI-Supported Enforcement and Revenue Protection. Singapore Customs has actively implemented AI-assisted document processing, digital investigation workflows, and predictive enforcement tools. These innovations contributed to customs and GST revenue collection exceeding S$12 billion in 2025, reflecting improved enforcement effectiveness. Additionally, risk-based inspection strategies supported by data analytics enable customs authorities to target high-risk consignments while facilitating legitimate trade flows.

Table 1.

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Analysis of the impact of modern information technologies on customs audit

Variable	Coefficient	t-Statistic	Significance
AI	0.42	3.8	***
TRADE	0.35	2.9	**
GDP	0.28	2.5	**
OPEN	−0.12	−1.4	Not significant

According to the table 1, AI adoption has the strongest positive effect and

trade expansion supports revenue growth, trade openness may reduce tariffs but improve efficiency.

The implementation of AI technologies in customs audit offers several strategic advantages: improved revenue collection through accurate identification of fiscal risks, enhanced trade facilitation by reducing unnecessary inspections, increased transparency and objectivity in audit decisions, optimized resource allocation in customs administrations, strengthened anti-fraud mechanisms,

real-time monitoring of trade flows. Moreover, AI-based audit contributes to building trust between customs authorities and the business community, promoting voluntary compliance.

Artificial intelligence represents a transformative tool for improving customs audit efficiency and effectiveness. Its application in risk analysis, fraud detection, and predictive compliance management can significantly enhance the fiscal and regulatory performance of customs administrations. However, successful implementation requires alignment with international standards, institutional readiness, and careful management of technological risks.

In the long term, AI-driven customs audit will contribute to creating smart customs ecosystems, where digital technologies support sustainable trade growth, fiscal stability, and global economic integration.

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